WRAP’s vision is a world in which resources are used sustainably.

Our mission is to accelerate the move to a sustainable resource-efficient economy through
- re-inventing how we design, produce and sell products,
- re-thinking how we use and consume products, and
- re-defining what is possible through re-use and recycling

Find out more from WRAP at www.wrap.org.uk

Contents

1 Introduction
   1.1 The business opportunity
   1.2 What is your company’s main objective?
   1.3 Fitness for purpose
   1.4 Under-packaging and over-packaging
   1.5 Resource efficiency

2 Packaging optimisation by minimisation
   2.1 Primary, secondary and tertiary packaging – the trade-offs
   2.2 Storage and handling
   2.3 Luxury products and pre-packed fruit and vegetables
   2.4 Packaging considerations for other reasons
   2.5 Benchmarking against ‘best in class’
   2.6 Packaging optimisation by transport efficiency
   2.7 Other minimisation possibilities
   2.8 Complying with the Essential Requirements Regulations

3 Packaging optimisation by re-use, recycling and recovery
   3.1 Packaging optimisation by preparing for re-use
   3.2 Packaging optimisation by recycling
   3.3 Packaging optimisation by material or energy recovery
   4 Packaging optimisation by compostability/biodegradability
      4.1 Biopolymers, biodegradability and compostability
      4.2 Trade-offs between biodegradability/compostability and other environmental goals
      4.3 Classifications for materials to be classed as compostable/biodegradable
      4.4 Considerations to decide whether compostable packaging is appropriate
      4.5 Other points of consideration with compostable/biodegradable packaging

5 Communication with stakeholders
   5.1 Staff
   5.2 Your business partners
   5.3 Consumers
   5.4 Local government

6 Further information

7 Appendix

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This guide explains the basics of packaging optimisation and will help you develop an action plan to save money and the environment’s critical resources.

There are numerous terms used regarding packaging optimisation – recyclability, recycled content, re-usability, returnable packaging systems, biodegradability, compostability, etc. This guide will help you to understand what all of these mean so you can choose the option that is right for your business. It has been specifically designed to be a packaging optimisation quick reference document that you can refer to and gain an understanding of:

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

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 systems;
- save money by making your operations more resource efficient;
- demonstrate your commitment to sustainability and thereby improve your reputation; and
- increase your company’s competitiveness in the marketplace.

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 to optimise their use of packaging, thus reducing environmental impact, saving money and reducing resource use.

The ultimate aim in optimising 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 should not add to cost, provided it is considered throughout the initial 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 money and project delays.
1 Introduction

Have you ever looked at your packaging and wished you knew how to reduce its environmental impact or just thought that optimising its use could save you money? If so, this guide will explain the basics of packaging optimisation and help you develop an action plan to save money and the environment’s critical resources.

There are numerous terms you will hear when people talk about packaging optimisation – recyclability, recycled content, re-usability, returnable packaging systems, biodegradability, compostability, etc. This guide will help you to understand what all of these mean so you can choose the option that is right for your business. It has been specifically designed to be a packaging optimisation quick reference document that you can refer to and gain an understanding of:

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

The guide explains how producers and distributors of packaging and packaged goods can optimise packaging and product systems so that, as well as protecting the product and performing all the other functional roles, they make a positive contribution to sustainable production, distribution, consumption and end of life.

This means obtaining materials and energy from known, responsible sources and optimising 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 this by optimising the use of materials, water and energy; minimising waste (of product and used packaging); and maximising the recovery of used packaging.

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**Figure 1: Different packaging protection types**

<table>
<thead>
<tr>
<th>Raw materials, energy sourcing</th>
<th>Manufacture, distribution</th>
<th>Use</th>
<th>End of life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimising</td>
<td>Maximising</td>
<td>Helping consumers live more sustainably</td>
<td>Maximising</td>
</tr>
<tr>
<td>• Raw materials, energy, water</td>
<td>• Packaging performance</td>
<td>• Recovery of raw materials and energy from used packaging</td>
<td></td>
</tr>
<tr>
<td>• Hazardous components</td>
<td>• System efficiency</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Logistics</td>
<td></td>
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<td>• Waste and releases to air, water</td>
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**Figure 2: The concept of sustainability for packaging and product systems**
1.1 The business opportunity

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 systems;
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- increase your company’s competitiveness in the marketplace.

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 to optimise their use of packaging, thus reducing environmental impact, saving money and reducing resource use.

1.2 What is your company’s main objective?

There are many ways to optimise your packaging and this guide splits each strategy into individual sections for easy reference.

Your company needs to take into account all the packaging design strategies covered in this guide or it may run the risk of causing unintended consequences in other areas of the product 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 as part of a voluntary agreement or perhaps it has made public statements about how it intends to use packaging in the future and now needs to live up to it. This guide aims to help you on your road to achieving these targets and intentions.

If you are looking at ways to improve your packaging, you must be clear about the environmental objectives you are aiming for:

- reducing product wastage;
- reducing your carbon footprint;
- increasing the proportion of renewable materials that you use;
- reducing the amount of packaging you use; and
- reducing the amount of packaging that goes to landfill.

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

- packaging optimisation by minimisation;
- packaging optimisation by re-use, recycling and recovery; and
- packaging optimisation by compostability/biodegradability.

And, don’t overlook the main purpose of packaging (i.e. getting the product to its point of use in good condition). Typically, 10 times more resources are used in products than in their packaging.
1.3. Fitness for purpose
Packaging has to fulfil a number of core functions:

- 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;
- protect the contents from hazards such as vibration, moisture, heat, odours, light penetration, micro-organisms or pest infestation, and it must not leak;
- be easy to open (but difficult to open accidentally) and pilfer-resistant;
- allow liquids to pour without spillage;
- be as easy as possible to carry; and
- for consumer goods, it 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 contain and protect the item, but this does not mean it should be excessive.

Packaging usually carries information about the product, the company taking responsibility for it and instructions for handling or use. It may bear a logo indicating what 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, consider using an outer box so that a leaflet can be inserted. Another option is a fold-out label.

It may also have to be re-sealable, tamper-evident and/or child-resistant.

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.

1.4. 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 the contents of the pack 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).

1.5. Resource efficiency
The ultimate aim in optimising 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 should not add to cost, provided it is considered throughout the initial 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 money and project delays.

It does not make sense to base your 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, and therefore heavier, to provide equal functionality); and
- similarly, for comparison, the unintended consequences of focusing on easily recyclable materials can be:
  - more waste for final disposal, even if a very high recycling rate is achieved – see example from Germany below; and
  - 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 and towards more recyclable packaging. The laminated pouches then being used for instant coffee weighed 11g, a metal can for the same amount of product weighed 120g and a glass jar weighed 470g. Even with a high recycling rate of 80%, the can would still generate 24g of waste (20% of 120g) and the jar 94g (20% of 470g). Only 11g becomes waste if pouches are used, though they are not currently recyclable. Therefore, roughly 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 product shelf-life, 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.
2 Packaging optimisation by minimisation

2.1 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 (including retail-ready and display packaging);
- tertiary packaging – the outer transport packaging, such as pallets and stretch wrap, which is used in transporting 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 secondary packaging, you could find that you have actually increased your total packaging use.

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

The retail trade is increasingly demanding retail-ready packaging that reduces a store’s 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.

2.2 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 more products on top of one another, which reduces your storage space requirement.
- 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. Plastic slip-sheets can sometimes...
be used to avoid the need for pallets, particularly for overseas shipments and inter-company deliveries. This saves space and materials.

- If you are transporting high-value, fragile products, you may want to consider the mode of transport used and the alternatives if product damage is occurring.
- WRAP research\(^1\) shows that manual handling can be 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.

2.3 Luxury products, and loose/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 that effect be achieved with clever graphics, and higher-quality print and packaging materials rather than by protecting your primary packing 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 store’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 careful shoppers will 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 point of sale. 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.

2.4 Packaging considerations for other reasons

The conventional way to discourage 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 replace the blisterpack with a simpler option, such as a single material?
- 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, over-the-counter medicines and perfumes.

2.5 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 have not considered or have minimised/optimised 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 develop something similar?
- If the new design involves less primary packaging, what changes have been made to the secondary or transport packaging?

\(^1\) www.wrap.org.uk/content/resource-efficient-distribution
2.6 Packaging optimisation by transport efficiency

Sometimes, one of the largest environmental impacts of a packaging system is the energy (fuel) used in the transportation of the product. Therefore, to reduce this burden, packaging can be optimised with this in mind. For example, if your main transportation mode is air freight (due to short lifespans of products coming from far away), it would be sensible to minimise your packaging weight (e.g. a lightweight, recyclable plastic in a cartonboard box instead of glass containers transported in heavier wooden crates).

If your main transportation method is by truck, consider designing your packaging so there is minimal space between packs. Also think about designing primary packaging so it can stack easier into each other. This increases the number of packs that can be contained in each box, the number of boxes stacked on each pallet and the number of pallets that can fit into each truck.

Alternatively, if your product includes a high concentration of water, for example laundry detergents, can you create a more concentrated pack where the consumer dilutes the product at home? This could dramatically reduce the packaging material needed to contain the product (and, therefore, disposed of at end of life), and the transportation effort needed to get your product to your consumer and to the recycling facility once the product has been used.

See the checklist ’Packaging optimisation for transport efficiency’ in the Appendix.

2.7 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 packaging material be used by modifying the volume sold (e.g. 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 they be replaced with waste material (shredded paper/board) that you would normally throw away?
- 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?
2.8 Complying with the Packaging (Essential Requirements) Regulations

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

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

An ‘unacceptable’ pack failure rate is 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.

2.8.1 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 in producing it.

Consumers have expectations regarding the appearance and 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 able 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 the evidence that proves this. 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?

2.8.2 Documentation

To show that you have complied with the Packaging (Essential Requirements) Regulations, you need to document the results of any assessments, 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 this 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.

2.8.3 Minimising heavy metals and other dangerous substances

The components that make up your packaging must contain less than 100 parts per million (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 find out this information.

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’ when relying on a packaging supplier’s input. This is particularly important for imported goods.

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.
The Industry Council for Packaging and the Environment’s (INCPEN) Responsible Packaging Code of Practice has a standard letter requesting this information.

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

2.8.4 Simplified compliance for glass, and paper and board

If you are using glass or paper and board packaging, Local Government Regulation (formerly the Local Authorities Coordinators of Regulatory Services (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 Packaging (Essential Requirements) Regulations.
3 Packaging optimisation by re-use, recycling and recovery

It is important to note the differences between the terms re-use, recycling and recovery as they are commonly confused. In summary:

- preparing for re-use is the use of a product or packaging for a second (or more) use, either for the same or different function, but without any processing of the product or packaging;
- recycling is the re-processing of a product or its packaging into another product or packaging (which could be of the same type of product or packaging, or be something completely different made from the recycled material); and
- recovery is the process of recovering material (or energy) from used products or packaging, this can include composting (where material is recovered), but if you compost in compliance with quality protocols, then you can also define this as recycling. You can also recover energy from waste (where energy is gained from waste materials being incinerated).

3.1 Packaging optimisation by preparing 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 that stays with the end-user (e.g. biscuit tin, spice jar, coffee jar, laundry detergent bottle) and is refilled from one-way, lighter-weight packaging that is used to take the product home (e.g. 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, and is often referred to as returnable packaging or a returnable packaging system. Alternatively, re-usable packaging can stay within an organised group of companies. This could be the case for the supply of components to, say, a car manufacturer.

Figure 8 Returnable plastic crates

In ‘open-loop’ systems, re-usable packaging circulates among unspecified companies (e.g. CHEP pallets) or can be provided to consumers for re-use.

3.1.1 Checklist for ‘Preparing 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, repairing 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.

If possible, work out the lifespan or number of uses of the packaging before it needs to be replaced. This information can be used to determine if re-usable packaging is actually the cheapest/most environmentally beneficial option.

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

The European Committee for Standardization (CEN) has published a report setting out methods for assessing the performance of a re-use system by calculating the proportion of re-used packaging in use.

A standard is now available from the British Standards Institution at PD CEN/TR 14520:20074.

3.1.2 ‘Informal’ re-use
You may also find an informal, secondary use for packaging that is not actually designed to be re-usable, particularly if this use is not 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 (e.g. as trays in which consumers can take plants away from a garden centre)?

Do not re-use packaging that is not designed for re-use if there is any question of a risk to safety (e.g. if you are filling products, such as carbonated soft drinks, which exert a pressure greater than atmospheric pressure).

See the checklist ‘Packaging optimisation by preparing for re-use’ in the Appendix.

3.2 Packaging optimisation by recycling
Optimising packaging specifically for recycling is often beneficial for packaging made predominantly from glass, metals, board or rigid plastics. This is because the packaging typically contains sufficient material to justify spending additional resources to collect it for recycling after it has been used. However, for recyclability to be successful, a robust infrastructure needs to be in place (or the ability for one to be created) to collect, segregate and clean the packaging in a way that will yield a net gain in resources.

In these circumstances, recycling will make a positive contribution to the overall resource efficiency of the complete life-cycle. Therefore, it is important 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, aluminium foil can be recycled, but metallised plastic film (often called ‘foil’), which looks similar, usually cannot, but its energy content can be recovered. All kerbside schemes also collect newspapers and magazines.

Figure 9: Commonly recycled materials

4 http://shop.bsigroup.com/ProductDetail/?pid=000000000030158840
3.2.1 Options for making packaging compatible with collection for recycling systems

- Try to avoid types of 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 manufacturing, 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. For example, pump-action, liquid soap with a suction tube that is too short to reach the bottom of the container and the final parts of the product.
- Construct your packaging so that the end-user can easily separate any components that should not go into the recycling process (‘ease of 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 standard\(^5\) advises that new types of packaging may be classified as recyclable provided active steps are being taken to develop recycling for it. BS EN 13430 provides practical guidance in assessing recyclability.

3.2.2 Plastics

Optimising plastic packaging for recycling involves particular challenges. To provide just the right technical properties for different functions, different polymers are often used in combination. When considering polymers, remember the following:

- If combinations of material type 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.
- 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.
- Ensure that closures, liners and cap seals don’t interfere with the recyclability of the material to be recycled – they should ideally be made from the same material.
- Avoid using metal caps on plastic containers as they are difficult to remove and may cause contamination in recycling streams.
- 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.

Where coloured plastic is specified, be aware of the following:

- Unpigmented polymers are more valuable as recyclate than pigmented polymers. So, if you are using a colourless plastic packaging material, it is better to attach an adhesive label than print on the packaging itself.

\(^{5}\) http://shop.bsigroup.com/ProductDetail/?pid=000000000030094800
Plastic tubs made from clear or colourless material and with the information printed on the lid are more likely to be recycled than those made from coloured plastics.

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.

Where printing on coloured plastics is necessary, use as little pigment as possible in the ink because automated sorting equipment often can’t identify strongly light-absorbing objects.

### 3.2.3 Trade-offs between recyclability and other environmental goals

Currently, optimising packaging for recycling is not viable for packaging made from thin layers of mixed materials or plastic films. This is because more resources are usually required to collect and clean it than can be recovered from the material. Much of this packaging may also be contaminated by food residues, which means that even if it is collected for recycling, there may be a high rejection rate at the sorting plant.

However, this type of packaging may have environmental advantages further up the supply chain by allowing more products to be packaged onto one delivery vehicle, which would mean fewer vehicle movements, less traffic congestion and lower fuel consumption. At the end of its life, energy can also be recovered from this type of material at the increasing number of areas in the UK where waste is being treated in energy-from-waste plants.

If you find that you have a choice between packaging that will not get collected for recycling and packaging that will probably get collected – assuming that both have the right functional properties – you should compare the resource requirements (and possibly the transport efficiencies) 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. However, you can make top-line calculations that may guide your decisions by looking at:

- what the effect would be on the weight and volume of the pack;
- if the fuel savings per distribution vehicle would be significant; and
- if the number of vehicle loads required to ship a given quantity of product could be reduced.

### 3.2.4 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 (e.g. aluminium and steel) often has a high recycled content and this has no effect on functional performance.

Likewise, glass packaging often has a high recycled content and this has no effect on functional performance. In recent years, there has been an issue about the 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.

Therefore, it is 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 glass containers 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?

Often, 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 (e.g. transport efficiency) 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?

Historically, plastics packaging, especially that used in food-contact applications, has seldom contained high levels of recycled content – mainly for contamination reasons. However, technology is moving fast in this area and it is now possible to use recycled plastics for food packaging. Because of this, it is worth checking with reprocessors and the British Plastics Federation to find out what is available. WRAP also publishes studies in this area, which might be worth investigating.

See the checklist ‘Packaging optimisation by recyclability’ in the Appendix.

### 3.3 Packaging optimisation by material or energy recovery

Although recycling is often an effective way of recovering resources from packaging waste, it is not the only way. The next section covers optimising packaging with recovery in mind through composting. Note that statistics about recycling rates usually refer to the combined amount of material sent for recycling and composting.

The UK plans to recover the energy from 25% of its municipal solid waste by 2020 (twice the current rate). Therefore, 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 may be an acceptable alternative to recycling.

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

A CEN standard includes a formula for calculating the net calorific value of a pack consisting of various constituents. However, in most cases, 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 (e.g. wood, cardboard, paper and other organic fibres, starch, plastics); and
- thin-gauge aluminium foil (up to 50µm thick).

Packaging consisting of more than 50% by weight of inorganic material (e.g. ceramic, glass, clay, metals) may be declared energy recoverable if it can be shown that there is calorific gain. BS EN 13431 defines and specifies the thermodynamic requirements for packaging to allow the incineration with energy recovery of packaging waste.

The only specific 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).

See the checklist ‘Packaging optimisation by material or energy recovery’ in the Appendix.

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6 www.wrap.org.uk/content/food-grade-recycled-polypropylene-pp-packaging
7 http://shop.bsigroup.com/ProductDetail/?pid=000000000030094803

Figure 10: Energy from waste plant
4 Packaging optimisation by compostability/biodegradability

4.1 Biopolymers, biodegradability and compostability

There are three main types of biodegradable packaging and are described below.

4.1.1 Degradable

When considering plastics, degradable packaging often contains additives to break down the traditional plastic over a period of time. This packaging is sometimes known as ‘oxo-degradable’. The main consideration with this type of packaging is that it can often get mistaken for the traditional plastic and may then contaminate the recycling stream. Care must be taken when considering this type of plastic so that it ends up where it is supposed to. Any form of degradable plastic is much worse in landfill as it emits methane, a greenhouse gas that has a global warming potential of over 20 times that of carbon dioxide (CO₂).

4.1.2 Biodegradable

Biodegradable packaging usually consists of a biological component such as starch, cellulose or other plant fibres. This means it can be broken down biologically by microbes. As with degradable packaging, there is concern if biodegradable material is mistaken for traditional types of packaging material and ends up in the recycling stream or in landfill. However, this is less likely as it often looks quite different.

4.1.3 Compostable

Composting is a managed process where biodegradable material is broken down by microorganisms in the presence of oxygen to produce CO₂, water, minerals and organic matter (compost or humus). Compostable differs from biodegradable as the end product is usable compost. Products made from compostable plastic are tested and will biodegrade/disintegrate under standard test conditions set out in the relevant CEN standard8. BS EN 13432 specifies the requirements for packaging recoverable through composting and biodegradation.

It is also important to note than not all materials can be composted at home because some require high temperatures to break down and these are only possible to achieve in commercial composting systems. Therefore, care must also be taken that this does not end up in recycling streams or landfill.

4.2 Trade-offs between biodegradability/compostability and other environmental goals

Biopolymers are not 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.

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.

WRAP has also developed some biopolymer guidance9 which can help you understand this area further.

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8 http://shop.bsigroup.com/ProductDetail/?pid=000000000030144234
9 www.wrap.org.uk/content/information-sheet-biopolymer-packaging-uk-grocery-market
Most compostable packaging on the market 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 can take place at a much lower temperature.

4.3 Classifications for materials to be classed as compostable/biodegradable

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, and meet the criteria and pass levels laid down in **BS EN 13432:2000**, without any observable negative effect on the process; and
- 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 (e.g. 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.

4.4 Considerations to decide whether compostable packaging is appropriate

Is the product likely to be a good candidate for compostable packaging (i.e. 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 polylactic acid (PLA) derived from renewable sources, such as corn starch, have better structural properties than their conventional fossil-fuel-based counterparts, which makes 10-15% reductions in packaging weight possible. 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 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?
4.5 Other points of consideration with compostable/biodegradable packaging

- A recent study highlighted the uncertainty about the impact of plastics on the natural environment. Degradable plastic is hydrophobic (has little or no affinity for water) and may attract other hydrophobic particles – including pesticides and heavy metals – which can lead to bioaccumulation of toxic substances.

- Genetic modification (GM) is a controversial subject and, therefore, investigations are necessary to understand whether the raw materials come from a GM source.

- Intensive farming practices (large-scale crops reliant on pesticides and fertilisers derived from fossil fuels) are sometimes used to create this type of material.

- Very few local authorities (within the UK) accept and/or can process these types of material, so care must be taken that this material does not end up in landfill.

See the checklist ‘Packaging optimisation by biodegradability/compostability’ in the Appendix.
5 Communication with stakeholders

5.1 Staff
Your staff not only do their jobs, but 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?

5.2 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. Make sure you understand what will lead to opportunities and what will hinder them. 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 Packaging (Essential Requirements) Regulations – and be prepared for your customers to ask the same of you.

A request for a Packaging (Essential Requirements) Regulations 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 customers want to make their own assessments.

5.3 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, recycling and recovery 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. Therefore, 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.

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.

5.4 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 underpin packaging optimisation.

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.

Figure 13: Communicating with stakeholders
6 Further information

Useful sources of information

WRAP Resource Efficiency Publications www.wrap.org.uk/bre-guides
- Finding Cost Savings: Resource Efficiency for SMEs
- Resource Efficiency for Managers
- Waste Mapping: Your Route to More Profit
- Self-assessment Review for Food and Drink Manufacturers
- Packaging Optimisation for SMEs
- Water Minimisation in the Food and Drink Industry
- Saving Money Through Resource Efficiency: Reducing Water Use
- Reducing Your Water Consumption
- Tracking Water Use to Cut Costs
- Workforce Partnerships for Resource Efficiency
- Environmental Strategic Review Guide
- Your Guide to Environmental Management Systems (EMS)

WRAP Online Resource Efficiency Tools www.wrap.org.uk/bre-tools
- Water Decision Tree Tool
- The Rippleffect
- Water Monitoring Tool
- Mogden Formula Tool
- Green Town
- Waste Hierarchy Tool
- Carbon Ready Reckoner Tool
- Volume to Weight Calculator
- Resource Efficient Innovations Database (REID)
- Food Waste Recycling for Your Business
- Hospitality and Food Service Info-Finder

Useful links
- The WRAP PET bottle categorisation tool helps those organisations producing soft drinks, fruit juices and mineral water in PET bottles to make them as recyclable as possible.
- The WRAP HDPE milk bottle categorisation tool helps those organisations producing milk in HPDE bottles to make them as recyclable as possible.
- Water Technology List http://wtl.defra.gov.uk
- Energy Technology List https://etl.decc.gov.uk
For guidance on environmental topics go to:
- England – GOV.UK: Waste and environmental impact
- Northern Ireland – NIBusinessInfo: Environment and efficiency
- Scotland – Business Gateway: Environment policy and procedures
- Wales – Business Wales: Environment - efficiency, waste & pollution prevention

WRAP

WRAP works, uniquely and by design, in the space between Governments, businesses, communities, innovative thinkers and individuals – forging partnerships and developing ground-breaking initiatives to help the UK use resources more sustainably. We have strong relationships with Government decision makers; with business leaders with the ability to influence powerful supply chains and with individuals through our highly respected consumer campaigns.

WRAP works in a distinctive way – developing evidence where there is a knowledge gap, bringing together the right people to work on specific issues, to develop solutions and then, finding ways to implement them.

We focus on the most resource intensive sectors where we have deep expertise and a track record of strong delivery:

We work at all points around the resource ‘loop’ – preventing and minimising waste, re-using, and recycling. We are able to bring together groups of people who might not naturally work together. This means we can mobilise action to address market failures where there is a disconnect between who needs to take action and who benefits.

WRAP works with UK Governments, the EU and other funders to help deliver their policies on waste prevention and resource efficiency. We take action in those areas where we can have the greatest impact on reducing waste, protecting our natural resources and providing economic and environmental benefits.

WRAP is a registered charity (no. 1159512) and a company limited by guarantee.

Visit www.wrap.org.uk to find out more.
## Appendix: Checklists

### Packaging optimisation by minimisation

<table>
<thead>
<tr>
<th>Section</th>
<th>Investigate further</th>
<th>Implement now</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reducing production losses</strong></td>
<td></td>
<td></td>
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<tr>
<td>Has the pack shape been designed to minimise wastage in production?</td>
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<tr>
<td>Can computer-aided design (CAD)/computer-aided manufacture (CAM) be used to increase the number of packs cut from one sheet of material?</td>
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<tr>
<td>Does the customer/consumer allow more products to be packed in a single container?</td>
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<tr>
<td><strong>Eliminating packaging</strong></td>
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<tr>
<td>Does the product need any packaging [e.g. would a simple label suffice] – bearing in mind that eliminating packaging might reduce shelf life of some food produce?</td>
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<tr>
<td>Can some layers of packaging be removed [e.g. remove inner bag from cardboard box]?</td>
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<tr>
<td>Could adhesives or tapes be replaced with interlocking tabs?</td>
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<tr>
<td>Can separate labels be avoided by using direct printing or embossing?</td>
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<tr>
<td>Can information be printed on the pack [e.g. inside the carton] rather than on a separate leaflet?</td>
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<tr>
<td><strong>Reducing void space and fillers</strong></td>
<td></td>
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<tr>
<td>Can void space be reduced [e.g. between cartonboard and plastic inner packaging]?</td>
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<tr>
<td>Could the use of fillers and padding be reduced by designing a smaller container?</td>
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<tr>
<td>Can air pressure be used to protect the product [as in a crisp packet]?</td>
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<tr>
<td><strong>Lightweighting and downsizing</strong></td>
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<tr>
<td>Can a blister pack be replaced by a smaller cardboard container with a product picture or a cut-out window?</td>
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<tr>
<td>Could the use of a scaled product photo replace a plastic film window or cut-out window in a package?</td>
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<tr>
<td>Is a double or hollow-walled container specifically needed for strength/insulation?</td>
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<tr>
<td>Could a double-walled corrugated container be used instead of a triple-walled container?</td>
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<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
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<tr>
<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Could localised strengthening of a container lead to an overall reduction in material use?</td>
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<tr>
<td>Can the gauge thickness of any part of the packaging be reduced?</td>
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<tr>
<td>Can CAD, CAM, stress analysis or mould flow analysis tools help reduce packaging weight?</td>
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<tr>
<td>Could product/primary packaging strength be used to reduce or eliminate the need for secondary packaging or vice versa?</td>
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<tr>
<td>For card packaging, can cut-outs reduce material use and folds/tabs provide stiffness?</td>
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<tr>
<td>Can adhesives be used to allow a reduction in the use of the main packaging material?</td>
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<tr>
<td>Can the use of adhesives, non-water-based inks and tapes be reduced? Are they being used in the most effective way?</td>
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<tr>
<td>Have label sizes been minimised?</td>
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<tr>
<td>Would a fold-out leaflet/label reduce the size of the pack?</td>
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</table>

**Reducing energy use**

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>Can adhesives with a low melting point be used?</td>
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<tr>
<td>Does the use of alternative (water-based) inks, coatings or adhesives have any impact on energy use or drying times?</td>
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<tr>
<td>Could any of the plastic components be replaced by card?</td>
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<tr>
<td>Can plastic film be eliminated or film with a lower sealing temperature be used?</td>
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</tbody>
</table>
### Packaging optimisation by transport efficiency

<table>
<thead>
<tr>
<th>Transport efficiency</th>
<th>Investigate further</th>
<th>Implement now</th>
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</thead>
<tbody>
<tr>
<td>Can the shape of the package be altered to improve case/palletisation/transport efficiency (e.g. could the packs slot into each other so they stack more efficiently)?</td>
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<tr>
<td>Can the pack dimensions be changed to improve pallet utilisation?</td>
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<tr>
<td>Can the product be made and sold in a more concentrated form (i.e. reducing the water content) or could the packaging be optimised to provide refills?</td>
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<tr>
<td>Are the delivery trays used to transport goods re-usable/returnable?</td>
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<tr>
<td>Are the vehicles fully loaded?</td>
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<tr>
<td>Are the materials used in transport (e.g. drums, crates, pallets) as lightweight as possible?</td>
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<tr>
<td>Are the transportation distances involved as short as possible?</td>
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<tr>
<td>Are return vehicles trips being used to transport materials?</td>
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</table>
### Packaging optimisation by preparing for re-use

<table>
<thead>
<tr>
<th></th>
<th>Investigate further</th>
<th>Implement now</th>
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<tbody>
<tr>
<td><strong>Re-use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Could the packaging be re-used internally for any other function (e.g. waste paper and card can be used for packaging material)?</td>
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<tr>
<td>Could contamination be reduced to facilitate re-use?</td>
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<tr>
<td>Could the consumer use the packaging for any other function after its primary use?</td>
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<tr>
<td>Could discarded packaging be used elsewhere on site or by staff?</td>
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<tr>
<td>Could discarded packaging be sold/given away for re-use (rather than recycling)?</td>
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<tr>
<td><strong>Returnable packaging systems</strong></td>
<td></td>
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<tr>
<td>Could a cost-effective returnable packaging system be introduced?</td>
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<tr>
<td>Could a returnable packaging scheme [e.g. for corrugated cases] be set up with packaging suppliers?</td>
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<tr>
<td>Could a returnable packaging scheme [e.g. for corrugated cases] be set up with customers?</td>
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<tr>
<td>Could packaging containers be sent back to the supplier in empty vehicles on return trips?</td>
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</tbody>
</table>
## Packaging optimisation by recyclability

<table>
<thead>
<tr>
<th>Recycled content</th>
<th>Investigate further</th>
<th>Implement now</th>
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</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
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<tr>
<td>Could the use of recycled material be considered/increased?</td>
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<tr>
<td>Can materials be specified in terms of technical performance rather than material origin?</td>
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<tr>
<td>Can recycled material containing post-consumer waste as well as recycled offcuts be specified?</td>
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<tr>
<td>Has the use of recycled material for packaging food products been fully considered?</td>
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<tr>
<td>Are the Department for Environment, Food and Rural Affair’s (Defra) Green Claims Code guidelines being followed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Use of recycled paper and board</strong></td>
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</tr>
<tr>
<td>If corrugated board is used, does it contain a high percentage of recycled material? Could this be increased?</td>
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<tr>
<td>Where a smooth printing surface is required, can a recycled micro-flute board be used?</td>
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<tr>
<td>Does the cartonboard used contain a high percentage of recycled material?</td>
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<tr>
<td>Would a virgin layer (e.g. to protect the product from the recycled material) enable cartonboard with a higher percentage of recycled material to be used?</td>
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<tr>
<td>For food products, would a laminated cartonboard allow recycled board to be used?</td>
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<tr>
<td>For food products, would a plastic inner bag allow recycled board to be used (ensure this does not increase the environmental impact of the packaging used)?</td>
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</tr>
<tr>
<td><strong>Use of recycled plastics</strong></td>
<td></td>
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<tr>
<td>Can some recycled plastics be used without compromising the performance specification?</td>
<td></td>
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<tr>
<td>Can the container or film be co-extruded to use some recycled post-consumer plastics in the inner layer?</td>
<td></td>
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<tr>
<td>Are production wastes (sprues) re-used as prime production materials?</td>
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<tr>
<td><strong>Use of recycled glass</strong></td>
<td></td>
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<tr>
<td>Can clear glass be specified for imported containers instead of brown or green?</td>
<td></td>
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<tr>
<td>In the UK, can glass containers be specified/manufactured from green or brown glass waste?</td>
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<tr>
<td>Can plastic shrink sleeves or organic coatings be used to provide colour, thereby allowing the re-use of green/brown glass?</td>
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</tbody>
</table>
## Packaging recyclability

### General

Has a segregation, collection and sorting regime for recycling been considered?

Have the end markets for the materials been considered?

### Single materials and compatible polymers

Can an all-cardboard design be used instead of a cardboard container with expanded polystyrene/plastic inserts?

Can a blister pack be replaced with an all-cardboard pack with illustration/photo?

Have efforts been made to stick to a single polymer design for plastic containers?

Are component polymers identified using the EU/APME numbering and labelling system?

### Minimising contamination

Has the use of colourants in plastic containers been reduced/avoided?

Has the use of potential contaminants (inks, adhesives, coatings and labels) been minimised?

Can labels be replaced with information that is directly moulded/printed on the packaging?

On paper packaging, could more use be made of interlocking tabs?

On plastic packaging, could more use be made of integrally moulded press-studs?

Is it possible to use fasteners that are easier to remove (e.g. use paper tape with natural adhesives rather than plastic adhesive tape), or fasteners instead to eliminate tape completely (ensure this does not increase the overall environmental impact or contaminate the recycling stream)?

On paper and board packaging, can pressure-sensitive and cold-seal adhesives be avoided?

Can plastic and foil laminates, and UV varnishes on paper packaging be eliminated?
Packaging optimisation by material or energy recovery

<table>
<thead>
<tr>
<th>Material recovery</th>
<th>Investigate further</th>
<th>Implement now</th>
</tr>
</thead>
<tbody>
<tr>
<td>See checklist on compostability/biodegradability</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy recovery</th>
<th>Investigate further</th>
<th>Implement now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is your packaging likely to be heavily contaminated by residual product? If so, it may be beneficial to send the packaging for incineration at an energy-from-waste facility.</td>
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<tr>
<td>Would your packaging generate more energy than is needed to drive the combustion process? To be sure of this ‘calorific gain’, the net calorific value must be at least 5MJ/kg.</td>
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<tr>
<td>Have you checked your packaging against the CEN standard? This includes a formula for calculating the net calorific value of a pack consisting of various materials.</td>
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<tr>
<td>Does your packaging consist of more than 50% (by weight) of inorganic material (e.g. ceramic, glass, clay, metals)? If so, this may be declared energy recoverable if it can be shown that there is calorific gain.</td>
<td></td>
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<tr>
<td>Does your packaging consist of over 50% (by weight) of organic materials (e.g. wood, cardboard, paper, starch, plastics)? If so, in most cases, it isn’t necessary to make any calculations because under the CEN standard this type of packaging can automatically be considered energy recoverable.</td>
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<tr>
<td>Is your packaging made from thin-gauge aluminium foil (up to 50µm thick)? If so, in most cases, this also does not require any calculations for the above reasons.</td>
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</tbody>
</table>
# Packaging optimisation for biodegradability/compostability

<table>
<thead>
<tr>
<th>Biodegradability</th>
<th>Investigate further</th>
<th>Implement now</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the packaging is to be composted, are the most appropriate biodegradable materials used?</td>
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<tr>
<td>Does the biodegradable material meet the criteria and levels in BS EN 13432:2000?</td>
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<tr>
<td>Is it possible to identify packaging made from biodegradable material and segregate it so that it is disposed of in the intended way at the end of its life?</td>
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<tr>
<td>Once collected, could biodegradable waste be kept uncontaminated to increase its value?</td>
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<tr>
<td>Is there any residual product in the packaging? If so, is it compostable?</td>
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<tr>
<td>Does the packaging destined for composting contain anything that might be harmful to the environment during the biological treatment process (e.g. heavy metals)?</td>
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<tr>
<td>Could you mix the compostable packaging (e.g. paper and board) with garden waste in outdoor windrows to produce quality compost?</td>
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<tr>
<td>Could your local authority or waste management contractor take packaging waste for composting?</td>
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<tr>
<td>Are you confident that the majority of the packaging will actually be composted? If not, then this may not be the best option from an environmental point of view.</td>
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</tbody>
</table>
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