

Managing packaging waste on your construction site



This Guide includes a CD-ROM with a Construction Packaging Waste Estimator designed to estimate the weight and volume of packaging that will be created from a construction project.

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packaging waste
recycling site





Managing packaging waste on your construction site

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Envirowise

Prepared with assistance from:

Responsible Solutions Ltd

with kind help from:

BRE
Carillion plc
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Kier Eastern
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Summary

The construction industry uses enormous quantities of materials, but only about half of the construction and demolition waste generated each year in the UK is currently recycled or reclaimed. This represents a major loss of resources - and money.

On average, 34% of waste from construction sites is packaging waste (timber, cardboard, plastic, etc). Much of it is unnecessary and significant amounts could be re-used or recycled rather than sent to landfill.

Improving the management of packaging waste on construction sites offers a major opportunity to save money by reducing material losses, waste disposal costs and waste handling costs. It will also contribute significantly to improving your company's business and environmental performance.

The first priority is to reduce the amount of packaging used by suppliers and manufacturers; the less packaging you have, the less effort is needed to deal with it. The next priority is to look for ways to reduce the amount of packaging being sent to landfill by identifying opportunities for re-use or recycling. Effective segregation of different waste materials is the key to successful re-use and recycling on construction sites. Educating the workforce is another essential element of successful waste minimisation.

This Good Practice Guide describes:

- the benefits of taking action to minimise packaging waste;
- the types of packaging and packaging waste found on construction sites;
- packaging waste legislation in the UK;
- a range of practical measures to eliminate, reduce, re-use and recycle packaging waste;
- how to achieve efficient waste segregation;
- management issues associated with minimising packaging waste;
- a range of tools and resources to help you improve packaging waste management at your site;
- other sources of information and advice.

The pockets of the Guide contain various tools (including a Construction Packaging Waste Estimator) to help you save money by minimising packaging waste on your site.

Industry examples throughout the Guide demonstrate the cost and environmental benefits that can be achieved by adopting a systematic approach to the management of packaging waste on construction sites.

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Why tackle packaging waste?

Around 90 million tonnes of construction and demolition waste are generated each year, of which only around 50% is recycled or reclaimed. A surprisingly large proportion (34% by volume) of the waste from a construction project is derived from materials used to package the products and materials being delivered to sites.¹

Significant cost savings and other benefits can be achieved through minimising the amount of packaging waste your site sends for disposal by implementing practical and management measures to reduce, re-use and recycle packaging.

Waste minimisation and resource efficiency have a key role to play in overall business efficiency. Even small cost savings can have a major impact on turnover and profitability, as efficiency savings can be added directly to the bottom line. For example, assuming a company's net profit is 3%, then a £1,000 increase in profit requires either a £1,000 efficiency saving or additional sales worth £33,000.

This Good Practice Guide provides free advice and tools to help those responsible for managing and supervising construction site operations improve the management of their site's packaging waste by adopting a systematic approach to waste minimisation.

Examples of the savings already achieved at construction sites around the UK are given in two free guides from Envirowise:²

- *Saving money and raw materials by reducing waste in construction: case studies (GG493)*
- *Saving money and raw materials by reducing waste in construction: case studies from Scotland (GG500)*

1.1 True cost of packaging waste

Table 1 shows estimated costs of disposing of packaging waste from construction sites. These costs are only the direct costs of the skips in which waste materials are placed and do not include:

- the indirect costs of labour to handle wastes on-site;
- the cost of packaging incorporated into the purchase cost of the material.

Table 1 Estimated weekly disposal costs of construction waste

Waste type	Average weekly cost (£)
Mixed skip of packaging waste	278
Segregated packaging waste	197
Cardboard	72
Polythene film	38
Timber pallets	87

Source: *Establish tonnages, and cost-effectiveness of collection, of construction site packaging waste.* WRAP, 2005.

¹ *Construction site packaging wastes: a market position report*, Information Paper IP8/02. BRE, 2002.

² These and other free publications from Envirowise can be obtained through the Environment and Energy Helpline on 0800 585794 or via its website (www.envirowise.gov.uk).

Construction site personnel associate the cost of waste with the costs of hiring skips and sending the waste to landfill. However, the true cost of waste is made up of:

- **Material purchase.** The majority of material thrown away (including packaging) can usually be re-used. When something is thrown away, a proportion of the initial purchase cost is also being thrown away (and wasted).
- **Labour costs.** Do not underestimate the costs of handling waste on-site. These include time clearing up waste and collecting it into skips, plus the cost of transporting and placing replacement materials around the site.
- **Waste disposal costs.** The costs of skip hire, transport costs and gate fees at landfill sites are significant. Landfill fees are increasing as site operators seek to recoup the cost of complying with stricter legislation governing what can and cannot be accepted for disposal. In addition, the landfill tax will increase by £3/tonne each April until it reaches a level of £35/tonne for non-hazardous waste.³
- **Loss of revenue.** Even when it is impossible to re-use a material on-site, there is usually an opportunity to benefit from selling the waste and gaining an income stream.

True cost of waste = Material purchase + Labour costs + Disposal costs + Loss of revenue

This formula applies to all waste types and is particularly appropriate to packaging as significant amounts of packaging materials can be re-used.

This waste of money is compounded by the fact that around 13 million of the 90 million tonnes thrown away by the construction industry each year are unused materials. As well as the unused materials, the construction industry is also throwing away the packaging in which they were delivered to site.

True cost of waste

Skanska Integrated Projects calculated that the cost of waste disposal and landfill tax only accounts for less than one-fifth of the true total cost of waste.

1.2 Business benefits of reducing packaging waste

In addition to the direct cost savings, there are other commercial issues that can affect waste management and packaging use on construction sites. These include:

- **Different methods of procurement.** If each sub-contractor is responsible for their own waste disposal, the level of performance on packaging waste will vary depending on each contractor's individual commitment to waste minimisation. However, if the main contractor is responsible for all waste, a single level of performance can be applied to the project as a whole.
- **Material specifications.** The procurement method provides an opportunity for packaging requirements to be specified within contract documents and material specifications. This has the direct effect of improving performance in terms of packaging waste management.
- **General management of the supply chain.** Improvements can be derived at all levels of the supply chain through a general focus on behaviour and culture within construction companies. For instance, the main contractor can specify within supply agreements that suppliers are responsible for taking away their packaging materials.

³ The rate for 2006/2007 is £21/tonne for non-hazardous waste.

- **Government pressure to improve performance.** The construction industry is under pressure to improve its performance through innovation and best practice.⁴ The Department of Trade and Industry (DTI) is encouraging the industry to minimise waste at source on construction sites and has published a voluntary code of practice on Site Waste Management Plans⁵ (see section 7.4); these may become mandatory in the future. The DTI supports Constructing Excellence,⁶ a not-for-profit organisation set up to help the industry and its clients apply best practice.
- **Complying with the packaging waste legislation.** All sectors of industry in the UK, including the construction industry, have a part to play in helping the UK achieve its EU targets for the recovery and recycling of packaging waste. Some construction companies and/or their supply chain will have obligations under UK packaging waste legislation (see section 3).

1.3 Environmental benefits of reducing packaging waste

As well as using resources, a number of other environmental impacts are associated with the use of packaging. These include:

- **Energy consumption** in the gaining of raw materials, their processing and manufacture into packaging, and transport of the packaging product.
- **Air pollution.** Although bonfires are generally prohibited by local authorities, many construction sites still burn waste on-site and this often includes packaging materials such as pallets and cardboard. The burning of such materials not only generates smell and dust (causing nuisance to the local community), but could result in the emission of toxic or even carcinogenic substances (eg dioxins) into the atmosphere if certain inks and plastics are present.
- **Methane** is generated by the biodegradation of organic materials in landfill sites. Methane is a greenhouse gas like carbon dioxide but is more than 20 times more potent in its contribution to global warming.⁷
- **Leachates.** The degradation of different types of plastics within a landfill site could generate hazardous components within the landfill leachate.
- **Disposal as hazardous waste.** Recyclable containers that contain residues of hazardous materials must be disposed of as a hazardous waste.⁸

1.4 Barriers to improved performance

There is a widely held perception that improving waste management performance requires additional effort with little perceived benefit. Additional effort is required but, as shown in Table 2 overleaf, the barriers to implementation are not too difficult to overcome. Some of the benefits can be achieved much more easily if everyone adopts better waste management practices.

Most of the problems associated with packaging waste relate to a lack of recycling and re-use on-site. In many cases, more proactive action will deliver improvement. However, there are instances where it is not possible to recycle simply because recycling facilities do not exist within a reasonable distance of the project and/or re-use does not occur because there is no adequate system in place to facilitate this. In these situations, the potentially recyclable and re-usable packaging waste is added to the mixed waste stream and either incinerated or sent to landfill.

⁴ www.dti.gov.uk/sectors/construction/index.html

⁵ *Site waste management plans: guidance for construction contractors and clients. Voluntary code of practice.* DTI, July 2004.

⁶ www.constructingexcellence.org.uk/

⁷ www.epa.gov/methane/sources.html

⁸ Contact the Environment and Energy Helpline on 0800 585794 for advice on hazardous waste.

Table 2 Barriers to improved packaging waste management on construction sites

Perception	Reality
Need to train the workforce.	Training of the workforce goes on anyway on a construction project, so there is little extra effort involved in running an additional toolbox talk.
Need to engage a champion to improve performance.	This role is easily added to the role of the general waste champion, which many projects now have. If not, the environmental champion could easily deal with packaging.
Segregation costs more.	Only if sub-contract agreements with waste contractors are not negotiated properly. Segregated waste skips can be significantly cheaper than mixed waste skips.
Lack of space for segregation activities.	If a simple baler is utilised on a project, then packaging waste can be compacted and will take up much less space.
No incentive in pricing from waste contractors to encourage segregation.	Robust sub-contract agreements will ensure segregation does not increase costs.
Performance requires education and partnership within the supply chain.	This is where much of the additional effort is needed but once suppliers are engaged and onboard, significant savings can be achieved.
Packaging is reduced to an extent that increases damage to products.	This is a possible danger but if the practices outlined in this Guide are followed, the risks of increased product damage will be minimal.

1.5 The purpose of this Guide

The Guide offers practical advice to help you reduce the cost of packaging waste on your site through measures to:

- eliminate the need for packaging;
- reduce the amount of packaging used;
- enable greater re-use and recycling of different packaging materials.

The Guide describes:

- the benefits of improved packaging waste management;
- the types of packaging waste found on construction sites;
- current packaging waste legislation;
- a framework for improvement made up of practical solutions and management initiatives;
- tools and resources to help you reduce packaging waste and increase re-use and recycling.

Industry examples throughout the Guide demonstrate how companies have achieved cost savings and other benefits by improving the management of their packaging waste.

The pockets at the front and back of the Guide contain:

- a poster showing the standard colour codes for packaging waste segregation;
- an example toolbox talk on packaging waste;
- a packaging waste management plan checklist and guidance;
- a CD-ROM containing a Construction Packaging Waste Estimator spreadsheet for you to download onto your PC.

If you require any assistance with these and the other tools described in this Guide, please contact the Environment and Energy Helpline on 0800 585794. Other types of free advice and help available from Envirowise are listed in section 8.1.

Chiswick Park office development

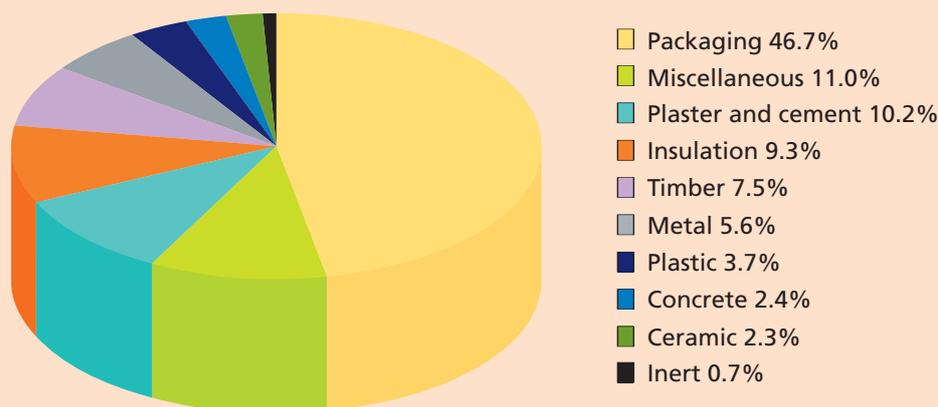
Chiswick Park is an office development for 7,000 people, covering 1.5 million square feet. A BRE waste measuring tool called SMARTWaste was used on the project to:

- identify the sources and types of waste;
- measure the quantities of waste (by volume);
- evaluate the reasons and causes for waste generation.

The system began in July 2000 with an observer on-site providing weekly feedback reports. These allowed a detailed report on the types and amounts of waste produced on-site to be compiled. Fig 1 shows that nearly half of the site's waste was packaging waste. This was because the site utilised a 100% glass façade and solar shading, which required much more rigorous packaging because of its fragile nature.

This example illustrates the importance of packaging waste as an issue for the construction industry, especially for the more glass-intensive and cutting edge developments, and demonstrates how construction methods can affect packaging requirements.

Fig 1 Breakdown of waste at Chiswick Park, July-November 2000



Source: SMARTWaste case studies: reducing construction waste - Chiswick Park. www.smartwaste.co.uk/casestudies.jsp

Packaging and packaging waste on construction sites

2.1 What is packaging?

The legal definition of packaging is:

'... all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods from the producer to the user or the consumer ...'⁹

Packaging is often described by the following generic terms, which are determined by the stages of production of the product and also its purpose:

- **Primary or sales packaging** whose job is to primarily contain, protect and identify the product.
- **Secondary packaging** for grouping, separating or binding more than one item together.
- **Tertiary or transit packaging** that protects and supports specifically during transit of the product (this includes storage and handling).

These types of packaging can be summarised in the following statement:

'Materials are often identified by primary packaging, are bound together with secondary packaging and wrapped in or placed on tertiary packaging'.¹⁰

2.2 The purpose of packaging

Packaging materials are designed to fulfil a specific purpose. Between the production and final use of a particular product, there will often be a whole plethora of different packaging goods that are used only once and then discarded.

The examples below are ones that are seen on many construction sites. They also illustrate some of the inherent problems found with the different forms of packaging.

2.2.1 Containment

- **Plastic bagging.** Individual sets of ironmongery items, for example, are often contained in plastic bags to separate them from one another and then contained within a cardboard box. This can sometimes cause corrosion when condensation forms within the bags.
- **Cardboard and paper.** Cement is often transported in multi-layered paper bags. However, these get wet very easily, resulting in wastage of the cement (see Fig 2). While cardboard and paper seem to be perfect materials because of their ability to let air flow through the packaging, excess moisture will be retained in the cardboard and therefore decrease its ability to hold the product and protect it. This can occur through overnight dew as well as from water leaks, spillages and rain (see Fig 3).

⁹ User's guide to the packaging waste regulations, available from the Defra website at www.defra.gov.uk/environment/waste/topics/packaging/index.htm

¹⁰ Adapted from *Construction site packaging wastes: a market position report*, Information Paper IP8/02. BRE, 2002.

2.2.2 Impact protection

A common problem occurs when product producers opt to over-protect their products for 'just in case' situations. But with proper planning and communication between producers, transporters and buyers, a reduction in over-packaging can occur with cost benefits for all.

A specific example of this is where individual products are purchased in bulk and these are contained within a single large container, but with each having its own packaging. For example, do electrical sockets all need to be in individual plastic bags when there are 100 in a box? This is the type of packaging issue that you can discuss with your suppliers and persuade them to use less packaging (thus creating less waste on-site).

A reduction in over-packaging is the key to reducing packaging waste on a construction site. Fig 4 shows a classic example of over-packaging.

2.2.3 Identification

Another primary function of packaging is to identify the product.

This can include labelling to identify batch numbers - critical to ensure the consistency of colour in predetermined areas and/or when only one batch is used on-site.

The packaging can also be pre-printed with the use, mixing and/or fixing instructions (see Fig 5 overleaf) or it may contain separate use, mixing, and/or fixing instructions. The latter is an example of excess as there will be an instruction sheet in every pack.

The packaging also may need to show:

- quality marking such as British Board of Agrément (BBA) certificates or BSI Kitemarks;
- health and safety symbols;
- handling information.

Fig 2 Cement bags exposed to the elements



Fig 3 Water-damaged cardboard packaging



Fig 4 Bubble-wrapped aluminium drainpipes. But why not use re-usable cardboard sleeving?



Fig 5 Instructions printed directly onto packaging



Fig 6 Plastic recycling identifier



Fig 7 Use of polystyrene 'slugs' to fill gaps



Fig 8 Brick waste as a result of too little packaging



Plastic packaging is generally printed with a symbol indicating which one of the seven types of plastic it is (see Fig 6). It may also show packaging recycling scheme accreditations.

There is sometimes also the need for opaque or clear windows in packaging. However, this can cause a problem with recycling due to the mixed plastic and cardboard content.

2.2.4 Rubbing/breakage

Grouping or separation of products requires the use of packaging materials such as banding or shrink-wrapping. This also often requires further prevention of sticking and rubbing, in which case paper and cardboard are often used.

There is also vibration prevention through the use of clingfilm, strapping or low-tack film spacing.

Gap filling with polystyrene 'slugs' may also be needed to minimise movement in transit (see Fig 7).

2.2.5 Securing

Although plasterboard is frequently wrapped in polythene to hold many boards together, this often provides little protection from damage to corners and edges. Cement can be delivered to site in bags on a pallet, which is then shrink-wrapped over. These are both examples of how securing goods is a further aspect of packaging.

Another example of securing is the strapping of heavy items onto pallets. Small precast concrete components and bricks are examples of this, giving rise to issues of the weight and ability of the standard pallet to take an economically viable quantity of components. This is why concrete products and bricks are often not delivered on pallets. However, this causes increased product damage and waste as there is nothing to support the products when the bands securing them together are cut (see Fig 8).

2.2.6 Ease of handling

Ease of handling is another important aspect of packaging. This can be as a result of many product parts or shapes all being moved on one pallet; for example, central heating and hot water system

components collected together and placed on a single pallet and clingfilmed together for stability (see Fig 9). There is also the issue of strapping down top-heavy items onto pallets, eg a WC close-coupled suite.

Strapping down also provides more stability, enabling more efficient utilisation of space. It may also be necessary to comply with health and safety requirements.

Fig 9 Components combined to provide efficient delivery



2.3 Different types of packaging system

If packaging is used appropriately, there is no reason why it cannot be re-used time and again instead of being reprocessed or thrown away. This is called a closed-loop system. Examples of closed-loop systems include:

- If suppliers take timber pallets back, they can be re-used countless times.
- In the automotive and retail industries, plastic bins circulate continually between suppliers and production lines or shops. These bins are often collapsible so that they take up little space when they are being returned.
- Timber, cardboard and paper can all be sourced from sustainable forests. This reduces the overall environmental impact (eg deforestation, reduction in carbon sinks and destruction of habitats) of material use and means the materials come from renewable resources.
- Plasterboard transported on pallets made of plasterboard, which are returned to the supplier for recycling.
- Compaction and baling of paper, cardboard and plastic make handling and movement easier, thus increasing the practicality of recycling.

Figs 10 and 11 highlight the differences between closed-loop and linear packaging systems.

Fig 10 Closed-loop packaging system

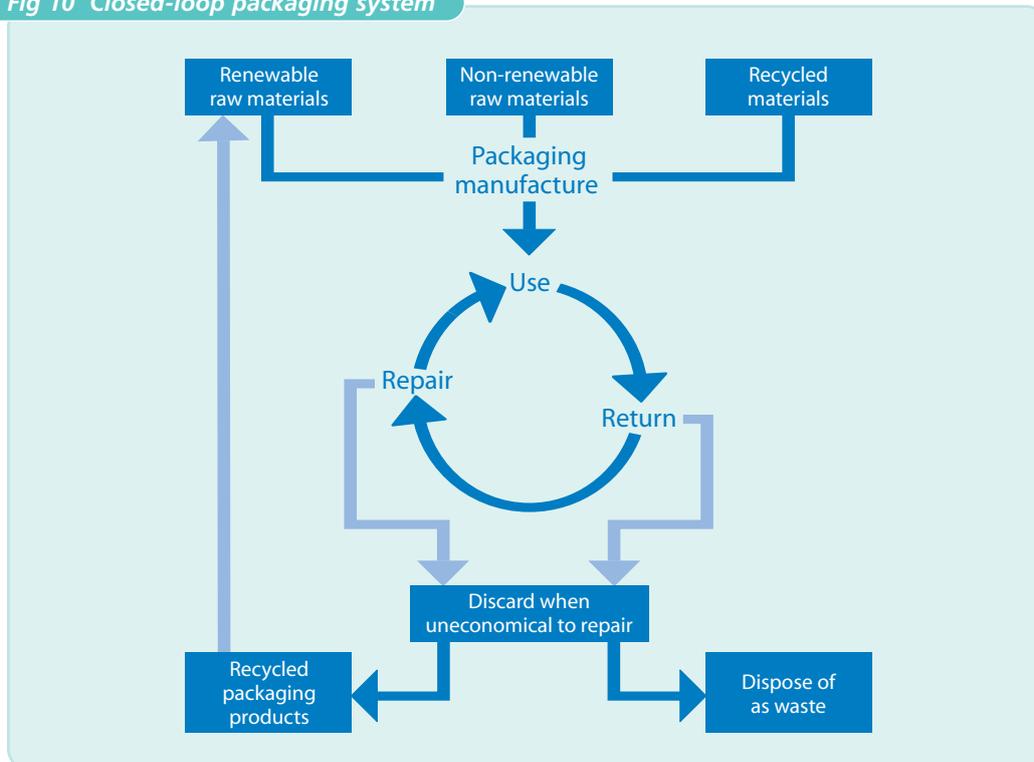


Fig 11 Linear packaging system



2.4 Types of packaging on construction sites

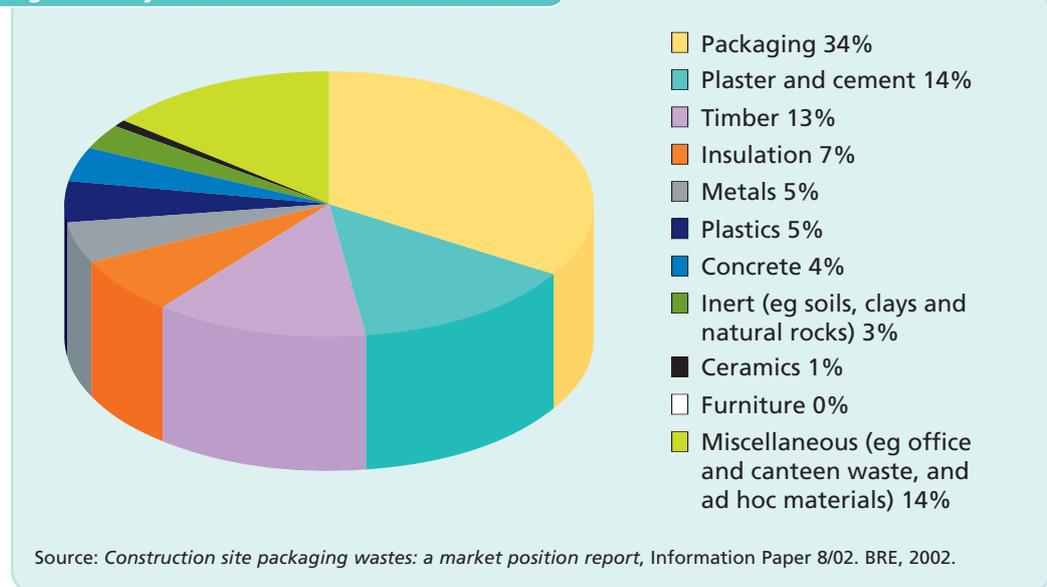
Many examples of primary, secondary and tertiary packaging can be found on a construction project. The large poster provided with this Guide shows examples depending on the type of construction activity.

2.5 Packaging waste on construction sites

Packaging is the largest single waste type generated by construction projects by volume.

- Research published in 2002 by BRE¹¹ found that packaging wastes accounted for between 5% and 50% by volume of a construction project’s total waste, with an average of 34% by volume (see Fig 12).

Fig 12 Analysis of construction waste streams



- A study published by WRAP¹² in 2005 found that packaging accounts for an average of 26% by volume of waste from a construction project.

The WRAP study highlighted the huge potential to increase the level of re-use or recycling of packaging on construction projects. The main findings were:

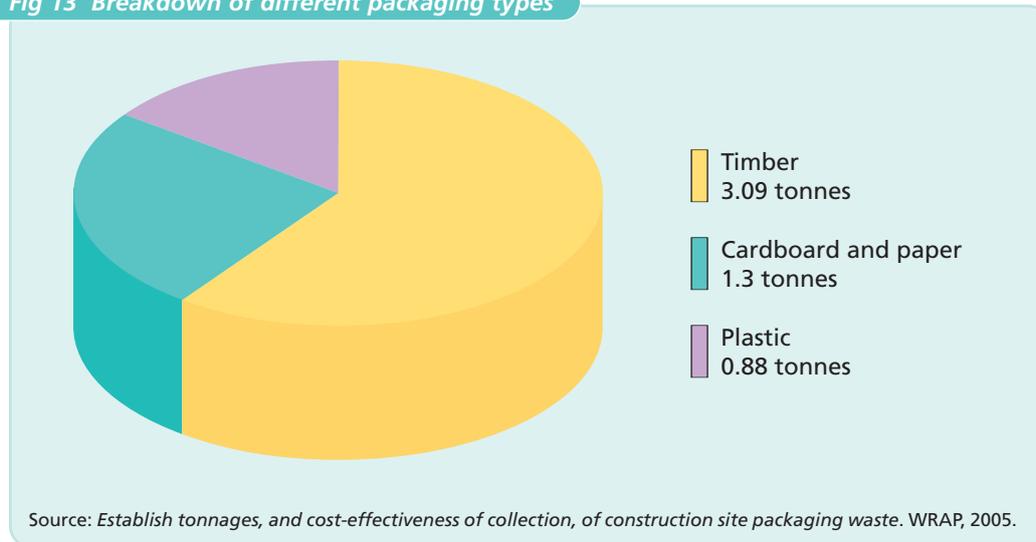
- The main packaging products were timber, cardboard and polythene.
- Timber packaging waste had the highest weekly tonnage, followed by cardboard/paper and then plastic packaging waste (see Fig 13).

¹¹ *Construction site packaging wastes: a market position report*, Information Paper IP8/02. BRE, 2002.

¹² *Establish tonnages, and cost-effectiveness of collection, of construction site packaging waste*. WRAP, 2005.

- Segregation has significant benefits, is practical on-site, and should be carried out before waste reaches a waste transfer station.
- Promotion of effective segregation systems on-site is required.
- Establishment of a common system of engaging and training sub-contractors in partnership with waste management companies is needed.
- 10% of sampled sites did not segregate timber or metals from their general waste stream.
- 25% of the sampled sites did not segregate paper waste.
- 30% of the sampled sites did not segregate plastics by at least hand-picking.

Fig 13 Breakdown of different packaging types



Packaging waste legislation

3.1 European legislation

The EC Directive on Packaging and Packaging Waste 94/62/EC aims to introduce harmonised measures for Member States to reduce the environmental impacts of packaging and packaging waste. Its primary objective is to reduce the overall quantity of packaging waste that is subject to final disposal. Priority is, therefore, given to:

- prevention of packaging waste;
- re-use of packaging where possible.

In addition, packaging must comply with certain 'essential requirements' if it is to be put on the market. Packaging must be minimised at source and the use of certain hazardous substances must be reduced.

The Directive sets mandatory recovery and recycling targets that Member States must achieve, the first of which had to be met in 2001. A revised Directive (2004/12/EC) published in February 2004 set new national recovery and recycling targets to be met by 31 December 2008. The UK target is to recover 60% and recycle 55% of all its packaging waste. There are separate targets for different packaging materials.¹³

3.2 UK implementation of the Directive

Directive 94/62/EC came into force in 1994 and was transposed into UK law in 1997 through the Producer Responsibility Obligations (Packaging Waste) Regulations 1997. The Producer Responsibility Obligations (Packaging Waste) Regulations 2005¹⁴ came into force on 1 January 2006. The 2005 Regulations:

- consolidate the original 1997 Regulations with all the subsequent amending Statutory Instruments;
- incorporate the changes made following public consultation in 2005;
- cover Great Britain.¹⁵

The UK has business targets (see Table 3) set by the Government that are designed to ensure that the UK meets its Directive targets.¹⁶

¹³ See *The Producer Responsibility Obligations (Packaging Waste) Regulations 2005: Is your business complying? Summary*. Defra, January 2006.

¹⁴ www.opsi.gov.uk/si/si2005/20053468.htm

¹⁵ Separate but similar regulations apply in Northern Ireland. Companies are advised to contact the Environment and Energy Helpline (0800 585794) or the Environment and Heritage Service (EHS) (see www.ehsni.gov.uk/environment/wasteManage/regulations_PR%20homepage.shtml).

¹⁶ The business targets are different to the Directive targets because a number of smaller businesses are excluded from the obligations under the 2005 Regulations (see Section 3.2.1) and those that are obligated have to share the obligation between them.

Table 3 UK business recovery and recycling targets (%)

Material	2006	2007	2008	2009	2010
Paper	66.5	67	67.5	68	68.5
Glass	65	69.5	73.5	74	74.5
Aluminium	29	31	32.5	33	35.5
Steel	56	57.5	58.5	59	59.5
Plastic	23	24	24.5	25	25.5
Wood	19.5	20	20.5	21	21.5
Overall recovery	66	67	68	69	70
Minimum recovery from recycling*	92	92	92	92	92

Source: *The Producer Responsibility Obligations (Packaging Waste) Regulations 2005: Is your business complying? Summary*. Defra, January 2006 (www.defra.gov.uk/environment/waste/topics/packaging/pdf/packagewaste06.pdf).

* Minimum amount of recovery to be achieved through recycling.

3.2.1 Obligations under the 2005 Regulations

In order to allow the UK to meet its Directive targets, the 2005 Regulations impose specific recovery and recycling obligations on all UK businesses (companies, partnerships, sole traders) that:

- have an annual turnover exceeding £2 million;
- 'handle' more than 50 tonnes of packaging waste per year and are considered 'producers' as defined in Schedule 1 of the 2005 Regulations.

Packaging 'handled' is defined as packaging or packaging materials that are owned by the producer and on which a relevant function or activity is performed prior to supply onto the next stage in the chain listed below. It excludes packaging exported from the UK, packaging that is being re-used, and production residues arising from manufacture and conversion.

Packaging 'producers' include:

- raw material manufacturers - those manufacturing raw materials for packaging;
- converters - those converting raw materials into packaging;
- packer/fillers - those putting goods or products into packaging or using packaging to wrap goods;
- sellers - those selling packaged goods to the final user or consumer of the packaging (other businesses or the public);
- service providers - those performing a service such as leasing/hiring out packaging to other businesses;
- importers - those importing packaging/packaging materials/packaged goods into the UK for any of the activities above.

In terms of the construction industry, there are packer/fillers, sellers and service providers. For example, businesses that lease/hire out wooden or plastic pallets are considered service providers. Converters and manufacturers of packaging are not generally part of the construction industry. However, if construction products are imported into the UK, then the importer is deemed to have been the manufacturer, converter, packer/filler and, in many cases, also the seller.

The obligations imposed on businesses that meet the criteria laid down by the 2005 Regulations and what they have to do to meet these obligations are explained in detail in guidance issued by:

- Department for Environment, Food and Rural Affairs (Defra) - www.defra.gov.uk/environment/waste/topics/packaging/index.htm
- Environment Agency - www.environment-agency.gov.uk/packaging/
- SEPA - www.sepa.org.uk/producer/packaging/index.htm

Please note that the legislation mentioned within this publication was checked for accuracy in May 2006 before going to press. However, legislation is constantly changing and being updated. For information on current environmental legislation, please contact the Environment and Energy Helpline free on 0800 585794, or visit the NetRegs website (www.netregs.gov.uk).

Practical ways to improve packaging waste management

Solutions to improving the construction industry's performance on packaging waste need to focus on the generic waste hierarchy of:

- eliminate;
- reduce;
- re-use;
- recycle;
- other recovery options.

Not producing the packaging waste in the first place is the most efficient way of reducing waste.

There are a number of areas to consider, including:

- eliminating packaging;
- reducing production losses;
- reducing void space and fillers;
- lightweighting and downsizing;
- reducing energy use;
- improving transport efficiency.

Packaging reduction requires action to be taken at all levels within the supply chain. Many of the practical measures outlined below require direct action to be taken by manufacturers and suppliers. However, the benefits will be seen on-site through reduced costs and waste generation.

It is, therefore, important for contractors to engage with their supply chain to:

- encourage implementation of appropriate actions;
- incorporate requirements into contractual obligations.

Section 5 contains advice about waste segregation and section 6 describes a number of management-related measures that are necessary to maximise the chance of implementation and improve performance. Section 7 gives details of a number of tools and resources designed to help you implement a systematic approach to managing your site's construction waste.

4.1 Eliminating packaging

- Eliminate packaging altogether.
- Eliminate unnecessary layers, eg:
 - collation trays plus shrink-wrap;
 - cartonboard boxes with appropriate laminates can be used without an inner bag and still give good product preservation;
 - high-performance IP-rated components (eg exterior electrical fittings meeting an IP code classification) may not need protection from dust and moisture;
 - standard quality electrical accessories may not need separation layers.

Everest wins with packaging redesign

Everest Ltd, a manufacturer of double-glazed windows and conservatories, has an on-going programme of packaging reviews and streamlining, with the aim of cutting costs and improving its environmental performance.

During the most recent review, a redesign of packaging led to significant packaging reduction and environmental benefits. Following the lead of a European producer, Everest realised that it could reduce packaging without increasing damage to its products during transit. The company stopped using stretch-wrap around the glass frames and used a new delivery system. The packaging supplier produced redesigned packaging made out of foam protectors at less cost while still providing the required protection.

The changes resulted in cost savings of £90,000/year due to:

- reduced labour time;
- reduced material costs;
- reduced disposal costs.

- Eliminate the use of adhesives and tapes by using only interlocking tabs to ease disassembly and return.

- Eliminate the need for labels by using in-mould embossing or direct printing wherever possible, eg on paper, polypropylene (PP) and polystyrene (PS). This is particularly applicable to electrical accessories and plumbing/drainage goods. However, direct printing can be a disadvantage if the packaging is recycled, as the associated colour cannot be excluded.

- Avoid having a leaflet in a cartonboard pack by printing the detailed information on the inside of the box or the sleeve. This measure is particularly applicable to electrical/electronic items.

- If products (eg small electrical or plumbing components) need to be kept together, consider delivering them in re-usable plastic boxes (see Fig 14) that can be returned to the supplier, instead of in cardboard boxes.

Fig 14 Re-usable plastic box

**Re-usable boxes eliminate waste**

A pilot scheme involving Waterstone's (book retailer), Macmillan Distribution (book distributor) and Securicor Omega Express (distribution) using a custom-designed re-usable plastic tote box eliminated the need for 21,720 cardboard cartons a year. As well as cost savings worth £7,000/year, the benefits included:

- waste reduced by 15 tonnes/year;
- reduced paper packaging (used for in-fill) by 95%;
- reduced damage to stock during transit;
- reduced cost of compliance with the packaging waste regulations.

The benefits of such a scheme spread throughout the supply chain. Securicor Omega Express estimates that, by adopting the scheme, its partners could make annual cost savings of about £1.5 million and eliminate 3,500 tonnes of waste each year.

For more details, see Envirowise case study *Retail supply chain distributes cost savings from improved packaging* (CS332).

Fig 15 Polypropylene bags are non-returnable



Fig 16 Corner protection on furniture instead of complete encasement



- Ensure deliveries of sand and aggregate are delivered in bulk instead of in 1 m³ polypropylene bags that are non-returnable (see Fig 15).
- Investigate the use of silos to bulk store cement on-site and mix it as needed rather than having it delivered in 20-kg bags. This not only reduces packaging waste but gives greater material efficiency overall.
- Furniture is a classic area where packaging is over-used. Consider packing furniture with edge and corner protection rather than being completely encapsulated in cardboard (see Fig 16).

Sales benefit from packaging change

A well known DIY retail and trade builders merchant has adapted the packaging for a range of its products. In the case of hand-tools, blister packs have been replaced with card incorporating a hook attached to one end of the tool. This allows prospective purchasers to check if the tool is the one they want rather than going away unsure without purchasing. The company also benefits from being able to:

- put more tools on a hanger;
- place hangers closer together;
- display a larger product range;
- sell more goods.

Where possible, the company ensures the packaging and protection take the form of something useful. For example, saw blades come attached to a strip of plastic to avoid damage while the plastic strip acts as a ruler.

4.2 Reduce

The following sections set out areas where improvements may be possible by working with suppliers.

4.2.1 Reducing losses during packaging production

- Choose a shape that minimises material wastage during packaging production.
- Maximise material yield by using a computer-aided design/computer-aided manufacturing (CAD/CAM) system to plan pack/component layout, eg in corrugated board manufacture. This will allow more to be cut from each sheet of material.
- Use larger pack sizes to reduce the amount of packaging per unit of product. But be aware of manual handling limitations.

4.2.2 Reducing void-space and fillers

- Reduce unnecessary void-space in containers, eg where there is a cartonboard pack around plastic inner packaging.
- Avoid using fillers (eg expanded polystyrene blocks) and padding (eg bubble wrap) in containers by creating a better-designed, smaller container wherever possible.
- When using fillers, consider using biodegradable chips of foamed starch polymer (see section 4.2.4).
- Consider using compostable, biodegradable extrusions of foamed starch polymer as edge protectors.
- Consider using air as the packing medium where the product is fragile. Crisp packets are an everyday example of where air pressure protects the product. Within construction, this could be applied to:
 - ironmongery;
 - fasteners;
 - mechanical and electrical (M&E) components.
- Consider using the removal of air from sealed packaging to increase the rigidity of both the loose contents and the packaging.
- Wrap hollow metal items such as lampposts, rainwater down pipes and other aluminium or steel sections with cardboard sleeves instead of bubble wrap (see Fig 17). Complex-shaped sections may require multiple-part sleeves which are then taped together.

Fig 17 Over-packaged aluminium rainwater pipes



Flagpoles protected by tubes instead of bubble wrap

A flagpole manufacturer in Leeds used to bubble wrap its flagpoles, securing the wrap with adhesive tape. This exercise was both time-consuming and expensive.

Bradford packaging manufacturer, Holmes Mann, developed a thin-walled tube that slides on to the flagpole like a glove and provides the appropriate scratch resistance. The tube, which is much quicker and easier to apply than the bubble wrap, is made from recycled paper and is itself both re-usable and readily recyclable.

Different flagpole styles are identified by colour-coding the tubes. The flagpole manufacturer estimates that its packaging costs have fallen by around 20%.

4.2.3 Lightweighting and downsizing

- Eliminate one or more packaging layers to reduce the weight of packaging used.
- Replace large blister packs with smaller cardboard packs, using a photograph (if needed) to illustrate the product.
- Eliminate plastic film 'windows' in packaging. Instead use a cut-out or a scaled product photograph (if needed) on a smaller pack.
- Do not use hollow, double-walled containers (eg plastic tubs) unless these are specifically needed for strength/insulation.

- Use double-walled rather than triple-walled corrugated board where the extra strength given by the latter is not necessary.
- Strengthen materials locally to allow an overall reduction in material use. For example, use corrugated flutes (in compression), paper honeycomb, biaxial plastics or localised ribbing/thickening.

New design eliminates plastic insert

A. Fox Systems Ltd, a small manufacturer of domestic and industrial water conservation valves based in Barnsley, originally packaged its products in a cardboard carton and used a moulded plastic insert to hold the various components. The packaging proved both large and expensive, and the plastic tray was difficult to recycle.

Holmes Mann, a Bradford packaging manufacturer, designed a new and much smaller box made entirely from corrugated board but still containing appropriate partitions. No adhesives are used in the new box and the inks are water-based. This design change achieved a cost saving per pack of 70%, saving the company around £3,000/year.

- Reduce the average thickness of the material used wherever possible, ie down-gauge. A reduction from 50 μm to 30 μm plastic thickness often has no detrimental effects on the products being wrapped.
- Use CAD/CAM and associated tools such as finite element analysis (FEA) (for stress analysis) and mould flow analysis (MFA) to help reduce/optimize packaging weight.
- Avoid putting strength into secondary/transit packaging if the primary/secondary packaging already provides that strength. Remember that the product itself can add to the strength/rigidity of the pack.
- Consider using the removal of air from sealed packaging to make the contents and their packaging more rigid and reduce the overall size of the package.
- Consider reducing the main packaging material and using low tack adhesive to glue identification to the product.
- Reduce the use of adhesives and tapes by targeting their application. For example, use 'spot weld' blobs of adhesive rather than a continuous strip.
- Minimise the size of labels. Do not let information requirements dictate the use of an over-large pack. Consider printing on the inside of the pack or using a fold-out label/leaflet rather than a fixed label.
- Consider not printing illustrations and photographs. Products being sold directly to the construction industry do not require any sales promotion.

4.2.4 Improving the environmental impact of packaging

- Consider using recycled paper.
- Consider using non-synthetic adhesives.
- Consider using waterborne pressure-sensitive adhesives (PSAs) made of starch-based biopolymer and having a low volatile organic compound (VOC) content. The properties of PSAs can be turned off, making recycling easier.
- Consider if laser toner is necessary. Short-life packaging deserves short-life printing. Consider using an ink jet printer in preference to laser toner if the printing will not be subject to weather.

- Consider vegetable-based inks in preference to synthetic ones.
- Consider waterless offset printing.
- Wherever possible, ensure all timber, cardboard and paper packaging materials are made from materials certified by the Forest Stewardship Council (FSC).¹⁷
- Investigate the possibility of using plant-based products such as biodegradable corn starch loose fill (see Fig 18) instead of polystyrene for packing around fragile components. Unlike polystyrene, it dissolves when wet.

Fig 18 Corn starch loose fill



- Ask suppliers to use recycled plastic pallets instead of wooden ones.

Cardboard pallet is smaller and lighter

A 100% recycled fibreboard pallet made by a Northern Ireland company uses a honeycomb structure between two corrugated sheets. The pallet, which is only 25 mm thick, takes up less space than a conventional wooden pallet and is significantly lighter and cheaper than its wooden counterpart. Cardboard pallets are also available from other UK board manufacturers.

4.2.5 Reducing energy use

- Use adhesives with a low melting point where possible. Less energy will then be needed to maintain the adhesive in the liquid state within the applicator.
- When considering switching to a different ink, coating or adhesive, identify opportunities for energy savings per unit of production through the use of more energy efficient processes or materials.
- Consider the sealing temperature (and hence energy use) needed for films. For example, ionomers can initiate sealing at temperatures as low as 75°C, while linear low-density polyethylene (LLDPE) requires a temperature of around 100°C. Lower sealing temperatures also mean there is less chance of damage to heat-sensitive products and, in some cases, better machine operation.

Free advice from the Carbon Trust

The Carbon Trust provides free, practical advice to business and public sector organisations to help them reduce energy use.

Carbon Trust Energy Helpline: 0800 085 2005 www.carbontrust.co.uk/energy/

4.2.6 Improving transport efficiency

- Choose packaging shapes (eg rectangular sections and flat tops) that will maximise:
 - case and pallet utilisation;
 - transport efficiency.

¹⁷ www.fsc-uk.org

In some cases, it is worth considering stacking and nesting possibilities, and shaping the pack accordingly.

Improving transport efficiency: stacking and nesting

One manufacturer uses L-shaped interlocking assemblies of close-coupled WC suites strapped to pallets, which form the flat base and flat top ready to receive the next layer of interlocked assemblies.

- Choose distribution pack sizes that maximise pallet use and transport efficiency. Keeping to ISO standard box footprints will help to fully utilise the pallet area. For example, you can get four 600 x 400 mm boxes per layer on a 1,200 x 800 mm Euro-pallet.
- If the pallet dimensions are not exact multiples of the pack dimension, it is usually better to slightly underhang rather than overhang to avoid product damage. However, excessive underhang can result in damage from too much product movement.
- Consider producing a concentrated product and/or lightweight refill packs.

Reducing weight of content

A European manufacturer of natural paints supplies one of its ranges of paint as dry powder in bags, thus eliminating the weight of water and reducing transport costs.

Another European manufacturer of clay-based coatings supplies its materials as dry powder in bags rather than pre-mixed in tubs.

- Consider delivering robust items such as drainage products in returnable/re-usable pallet boxes instead of in relatively unmanageable shrink-wrapped 'towers' or in large bags (see Figs 19 and 20).

Fig 19 Why shrink-wrap bulk items when simple strapping will suffice?

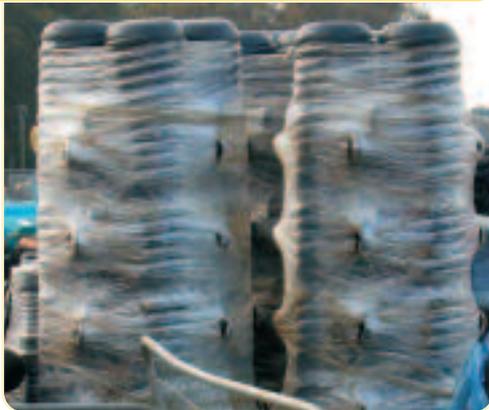


Fig 20 Why deliver robust items in plastic bags when they can be delivered in re-usable boxes/bins?



Free advice from Freight Best Practice

Freight Best Practice offers free information for the freight industry covering topics such as saving fuel, developing skills, equipment and systems, operational efficiency and performance management.

Hotline: 0845 877 0877

www.freightbestpractice.org.uk

4.3 Re-use

Structural packaging such as pallets, crates and sturdy plastic or cardboard boxes can be re-used time and again. However, suppliers often feel it is not economic to collect them for re-use.

However, provided materials are being delivered in sufficient quantities to a site, there is no reason why the last lorry or two could not collect all the pallets, for example, and take them back to the factory.

Cost savings from controlling pallet movements

Kier Eastern's quantity surveyor recognised that significant cost savings could be achieved on a multi-million pound mixed housing and commercial development at Ravenswood, Ipswich, by putting in place a few simple measures to control the movement of pallets on-site

A dedicated storage area for all returnable pallets was set up. A member of the site team was made responsible for ensuring that all returnable pallets were returned to this area. This ensured these pallets were not used on-site and subsequently damaged.

Non-returnable pallets were also identified and these were set aside for use in moving materials around site. Damaged pallets were repaired where practicable and those beyond repair were placed in a segregated skip for timber, which is sent for recycling.

The average deposit on a returnable pallet is £12.50 and, to date, 344 pallets have been returned, delivering a cost saving of £4,300. Previously, a number of pallets would have ended up in the mixed waste skip, so not only would the company have lost its deposit, but it would have incurred an unnecessary disposal cost.

The scheme also has environmental benefits, as it reduces the amount of waste sent to landfill and returning pallets avoids the need for new ones to be manufactured, saving on natural resources.

Fig 21 Pallet repair bench



There are a number of ways of maximising packaging re-use on construction sites:

- Consider setting up a pallet repair bench on-site to maximise pallet re-use (see Fig 21).

Skanska takes action to maximise pallet re-use

At its £82 million redevelopment project at RAF Woodbridge in Suffolk for Defence Estates, Skanska made pallet collection a contractual requirement with its brick suppliers and even provided a pallet repair bench to maximise the amount of pallets being re-used. Fig 22 shows pallets awaiting collection.

Fig 22 Pallets awaiting collection by supplier



- If suppliers are not able to take pallets back then consider putting them to other uses on site, eg:
 - for stacking other materials on;
 - using them to promote hydration or curing of masonry.
- If no other use can be found, sell pallets for re-use elsewhere. Companies that specialise in pallet resales will often buy them for around £1 - £1.50 each (for standard pallets). However, they are often less keen to take non-standard pallets (eg those used to deliver plasterboard).
- Look for alternative local outlets that could use timber packaging.

Wood waste turned into garden items

Carillion Building sent low-grade timber including pallets and packaging timber to the local probation service to be used in the manufacture of kennels, bird tables, nesting boxes, etc. The benefits of this scheme include:

- less waste sent to landfill;
- community engagement.

- Consider using non-returnable polypropylene bags for storing re-usable demolition waste such as paviors (see Fig 23). But do check the bags regularly for damage if they are to be re-lifted.
- Take care when unwrapping large items covered in plastic sheeting. The sheeting can be re-used on-site as weather protection or to aid curing.
- Use original packaging to contain product/material off-cuts. This helps to identify materials for subsequent re-use or segregation for recycling.

Fig 23 Re-use of non-returnable polypropylene bags for storage



- Form partnerships between suppliers, contractors and waste management/logistics companies to encourage the economic and environmental viability of collecting packaging material from construction sites.

Segregation initiatives make project low waste

Sherwood Park is a new 92-bedroom hotel and office complex on a large enterprise park to the north of Nottingham. The value of the project contract was £12.1 million, with an on-site duration time of 59 weeks. The main contractor was Simons Construction Ltd.

Measures to reduce, re-use and recycle packaging waste were part of an overall site waste management plan that resulted in substantial cost savings.

Segregation of on-site waste included an area for timber packaging waste. Over 403 tonnes of waste were removed from the site, of which 274.2 tonnes (68%) were recycled through the materials recycling facility operated by Wastecycle of Nottingham rather than being sent to landfill. Wherever practical, reclaimed materials were re-used in the construction.

The site also used a small reclaim area where surplus, but usable, materials could be returned for re-use by other operatives on the site. This area made significant inroads in the re-use of timber, with recovered materials being used for a second, or even third time as shuttering, window linings, dummy frames, propping and packings, before eventually being consigned to the timber skip.

Other initiatives included using:

- returnable transit packaging, such as for the glass façade;
- old oil drums filled with concrete as re-locatable 'bollards' to prevent damage to finished works from moving vehicles;
- prefabricated bathroom pods to reduce the amount of waste generated on-site.

These and other measures helped to reduce the amount of waste leaving site to an estimated 1,631 m³; this represents some 13.5 m³ per £100,000 of expenditure.

In terms of the Construction Industry Key Performance Indicators¹⁸ for waste, this places the project in the top 20% for UK projects for low waste.

4.4 Recycle

There is no reason why any packaging materials should be sent to landfill unless:

- they still contain residues of a hazardous material, eg a part-used can of paint;
- there are no recycling facilities within a practical distance of the construction site.

For example:

- metals such as steel and aluminium can be recycled;
- timber can be sent for shredding and recycling in particleboard manufacture or for landscaping;
- cardboard and paper can be sent for recycling into other paper-based products;
- plastics can be sent for recycling into other products.

¹⁸ www.dti.gov.uk/sectors/construction/Construction%20Statistics/KPIs/page16440.html

A common barrier to recycling is the low volume of packaging material and the rate at which it is produced. This barrier can be overcome through:

- the provision of bins for waste packaging around the site to maximise volumes;
- overall waste planning to:
 - identify waste streams;
 - ensure the correct facilities are provided at appropriate stages in the project life;
- training and education (see section 6.2).

Low volumes of packaging waste should not stop you segregating and collecting waste for recycling. Section 5 contains advice on segregation and tips on how to get the most out of your waste segregation regime. **Segregation is the key to successful recycling.**

Specialist service boosts recycling

Lindum Waste Recovery (LWR) offers a new service to support, not only its own construction division, but also other regional builders. Recognising the impossibility of detailed on-site segregation, LWR devised a basic on-site split, supported by a specialist waste transfer station.

Site waste is split two ways:

- expensive high-volume, low-weight packaging wastes such as polystyrene and plastics, cardboard etc;
- dense wastes such as rubble, concrete and brick.

Skips are received from sites into LWR's licensed waste transfer station where intensive segregation takes place. The unit is properly equipped to carry out efficient segregation and reprocess materials, thus maximising recycling.

Efficient recovery of resources creates saleable materials and avoids paying landfill charges. These savings enable LWR to provide a cost-competitive alternative to landfill.

LWR currently achieves a 92% recycling rate. This has enabled the Lindum Group to reduce its waste removal costs by more than £10/tonne over the last three years, despite significant increases in fuel and landfill tax.

The following measures are designed to boost the recycling of packaging waste on construction sites:

- Use the national colour coding scheme for waste containers to encourage correct segregation and minimal contamination with the wrong materials (see section 5.3).
- Contact local waste processors for information about local prices and thresholds for collection.
- Arrange for the collection and return of good condition timber pallets to suppliers and the mending or recycling of broken pallets. Similar schemes do not currently exist for other packaging waste streams, possibly because timber pallets have a much greater visual impact on-site compared with other forms of packaging such as clear plastics and paper.
- Try to segregate packaging waste on-site rather than sending as mixed waste to a recycling centre. This will avoid contaminating material and potentially decreasing its value and recyclability.

Use of plasterboard rather than timber pallets

At its project to build the new Great Western Hospital at Swindon (a replacement for the Princess Margaret Hospital), Carillion had plasterboard sheets delivered on plasterboard pallets instead of traditional wood pallets. The pallets were then returned to the plasterboard supplier for recycling, thus reducing overall packaging waste on-site.

- Use a baler on-site to compact cardboard, paper and plastic wastes to make them easier to handle and store, as well as reducing the cost of disposal because they are denser and thus take up less space in a skip.

Compacting or baling segregated plastic packaging on-site avoids the need for time-consuming and expensive separation of this waste from the general waste stream at the waste transfer station.

Similar advice applies to cardboard packaging waste. A baler makes economic sense in the later stages of a construction project, as it is only during this stage that enough cardboard waste is produced to justify collection.

- Investigate setting up a scheme to collect packaging from a group of sites in close proximity to one another in order to achieve viable volumes to aid recycling collections. Note that any site receiving packaging waste from another will still need to comply with waste management legislation.
- Strike through hazard symbols with a permanent marker on packaging used to contain non-hazardous materials to ensure they are not considered as hazardous.
- Off-site manufacture of a product (eg a bathroom) can reduce on-site packaging waste and increase overall recycling of packaging waste. Off-site production does not remove the need for individual packaging of components, it merely transfers to the off-site manufacturing centre. Instead of having packaging spread throughout many different construction sites, all the packaging is in one place and in a factory environment. This means that it can be collected more easily and in larger volumes, thus increasing the potential for recycling and reducing the amount going to landfill.

Bathroom pods reduce on-site packaging waste

The finished bathroom units delivered to the Express by Holiday Inn in Stevenage (see Fig 24) arrived on-site with a single piece of plywood and a small amount of plastic wrapping on the top and a band to hold it on. This is minimal compared with the individual pieces of packaging that would have accompanied every single item making up a bathroom (eg paper wrapping around taps, plastic bags of screws and shrink-wrap on the toilet bowl) had it been constructed on-site. Other benefits include savings in the time taken to build the bathroom.

Fig 24 Bathroom pods being delivered to site



4.5 Other recovery options

- Instead of burning packaging waste on-site (which is illegal in many parts of the country), consider sending it for incineration in a waste-to-energy plant.
- Consider composting cardboard and paper that does not contain any adhesives or tape.

Segregation of different waste streams

Waste segregation is the key element of any programme to improve the management of packaging waste on a construction site.

Segregation of recyclable materials on-site can lead to significant cost savings as it allows substantially more re-use and recycling of different packaging waste streams. For example, savings of £1,500 were achieved over the length of one build programme as a result of timber segregation for recycling.¹⁹

5.1 Planning your segregation regime

Fig 25 shows the essential elements of a successful waste segregation regime.

Fig 25 Elements of a waste segregation regime



Educating staff and raising awareness are considered in section 6.2.

5.2 Optimum times for segregation for collection and recycling

The optimum times during the construction process to carry out waste segregation for collection and recycling are given in Table 4. These times take account of differing minimum thresholds set by waste contractors before coming to collect recyclables.

Such contractors collect either on payment of a fee or for free. In some cases, they may pay for the waste.

Plastics recyclers impose strict constraints on the quality, level of cleanliness and separation of this waste stream. A price of £80 - £100/tonne is paid for this type of sorted plastic material.

Table 4 Optimum times for waste segregation

What to segregate	When to start
Timber	From beginning of project onwards
Polythene	At 20-40% of project completion
Cardboard	At 40-50% of project completion

Source: *Establish tonnages, and cost-effectiveness of collection, of construction site packaging waste*, WRAP, 2005

¹⁹ *Establish tonnages, and cost-effectiveness of collection, of construction site packaging waste*, WRAP, 2005.

5.3 National colour coding scheme for construction waste

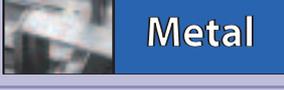
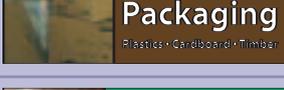
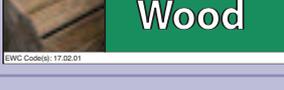
A nationally recognised set of colours for waste segregation has been developed by Waste Aware Construction and the Institution of Civil Engineers (ICE). It has proved extremely successful at many sites where it has been employed in:

- reducing the amount of construction waste sent to landfill;
- providing cost savings to construction companies.

The use of these colour-coded signs is crucial to the success of any waste segregation and recycling efforts. Packaging waste has its own specific sign alongside the other raw materials that a site produces as waste (see Table 5).

Full details of the colour coding scheme are given on the Waste Aware Construction website (www.wasteawareconstruction.com).

Table 5 Colour coding scheme for different waste categories

Material	Colour	Symbol
Gypsum	White	 EWC Codes: 17.08.02
Hazardous	Orange	 EWC Codes: 15.01.10
Inert	Grey	
Metal	Blue	
Mixed	Black	
Packaging	Brown	 Plastics • Cardboard • Timber
Wood	Green	 EWC Codes: 17.02.01

Source: www.wasteawareconstruction.com

5.4 Labels on plastic packaging

Plastic packaging needs to be sorted before it can be recycled. To aid the sorting of plastics, the American Society of Plastics Industry developed a standard marking code to help consumers identify and sort the main types of plastic (see Table 6 overleaf).

Sorting increases the amount of plastics that can be recycled, as many plastics collectors pay a premium for sorted plastics and may only collect specific types. This not only reduces landfill costs, but could generate an income stream from the waste plastics.

Table 6 Standard labels for different plastics

Symbol	Full name	Common uses
 PET	Polyethylene terephthalate (PET)	Paint cans Fizzy drink bottles Oven-ready meal trays
 HDPE	High density polyethylene (HDPE)	Plastic sheeting Milk bottles Bottles for washing-up liquid
 PVC	Polyvinyl chloride (PVC)	Food trays Cling film Bottles for squash, mineral water and shampoo
 LDPE	Low density polyethylene (LDPE)	Plastic heat wrap General plastic sheeting Carrier bags Bin liners
 PP	Polypropylene (PP)	Paint cans Margarine tubs Microwaveable meal trays
 PS	Polystyrene (PS)	Packaging impact protection Vending cups Foam meat or fish trays Plastic cutlery Protective packaging for electronic goods
 OTHER	Any other plastics that do not fall into any of the above categories.	Melamine - often used in plastic plates and cups

Source: www.wasteonline.org.uk/resources/InformationSheets/Packaging.htm#4

5.5 Practical tips

- Place skips/bins in the most convenient location and as close as possible to where packaging waste occurs. This maximises their potential use.
- If you only produce a small amount of packaging waste and having separate skips is not viable, talk to your waste management contractor about an appropriate solution. This might be to have a single skip for all packaging waste.
- Increase the efficiency of your skip space and reduce the costs of skip hire by simple measures such as:
 - packing cardboard flat;
 - breaking down off-cuts of plywood or plasterboard to manageable sizes.
- Pay attention to signage on packaging that shows its recyclability and type (particularly plastics packaging).
- You may be able to save money by not adopting a 'one size fits all' approach to skip hire for the duration of a project. There are specific phases of the build when a larger skip is more efficient in terms of usage and other stages when a smaller one is better. This also has the additional benefit of minimising transport emissions to and from site by the waste contractor. Build such flexibility into your contract with the waste management company in order to maximise savings.

5.6 Monitoring progress

Monitor progress by looking at the quality and quantity of your segregation efforts.

- You may need a larger skip for all packaging goods towards the end of the project than you did at the start.
- Make sure there is no contamination of wood with cardboard, etc.
- Use the Construction Packaging Waste Estimator (see section 7.3) to help monitor progress.

Management issues

The 'people measures' outlined below are designed to help you implement the practical ideas suggested in section 4 and to overcome the barriers to improved packaging waste management summarised in Table 2 (see section 1.4).

Section 7 gives details of tools and resources designed to help you implement a systematic programme to improve packaging waste management at your site.

6.1 Appoint a packaging waste champion

This could be the same person as your general waste champion. The role of the champion is to look specifically at how packaging is being handled, collected and disposed of. The person appointed should be someone with enthusiasm for the issue - perhaps someone to whom resourcefulness is second nature and who finds wastefulness unacceptable. Alternatively, you could appoint a crane driver - they see everything - or a dumper driver - they go everywhere.

If you have a large or complex site, consider setting up a team of people to help your packaging waste champion.

Saving money through waste minimisation: teams and champions (GG27)²⁰ offers advice on how to select a waste team and champion.

6.2 Educate the workforce

Much of the performance on-site - particularly in terms of waste minimisation - is about culture and awareness. Education of the workforce is, therefore, vital for the success of any initiative.

6.2.1 Toolbox talks

Toolbox talks are an excellent opportunity to communicate the message on minimising waste and packaging waste in particular. An example toolbox talk for you to use (see section 7.1) is provided in one of the pockets of this Guide.

- Tell workers about the standard signs and colour coding for different types of waste (see section 5.3).
- Emphasise the need to use the colour-coded bins and other containers to segregate packaging waste to boost re-use and recycling.
- Remind workers regularly about the need to follow on-site procedures for waste (segregation, correct use of skips, etc).
- Make sure all sub-contractors and new workers are aware of these procedures.

6.2.2 Poster campaign

As well as toolbox talks, put up posters on-site to:

- raise awareness;

²⁰ Available free through the Environment and Energy Helpline on 0800 585794 or via the Envirowise website (www.envirowise.gov.uk).

- identify waste segregation and collection opportunities, eg:
 - what to segregate;
 - where to put materials.

Good locations for posters include:

- toolbox talk space;
- site canteen;
- welfare facilities;
- corridors;
- meeting rooms;
- above photocopiers and kettles.

Waste Aware Construction in conjunction with the Institution of Civil Engineers has developed a poster creator featuring the standard colour coding scheme for waste containers (see section 5.3).

Example posters are provided with this Guide to give you ideas or for you to use at your site.

6.3 Monitor and police skips

Having raised awareness, you need to monitor waste generation to ensure the training is being implemented. Feed your observations back into further education and training activities.

If you find large amounts of non-segregated materials in skips, provide additional facilities for them to be segregated.

Tools and resources to improve packaging waste management

This section describes tools to help you improve the management of your site's packaging waste. Look in the pockets at the front and back of this Guide to find:

- an example toolbox talk (see section 7.1);
- example posters (see section 7.2);
- a CD-ROM containing a spreadsheet-based Construction Packaging Waste Estimator (see section 7.3) for you to download onto your PC;
- Site Packaging Waste Management Plan (SPWMP) checklist and guidance (see section 7.4).

Section 7.5 gives details of example contract specifications available free from the National Green Specification website (www.greenspec.co.uk).

7.1 Toolbox talk

The example toolbox talk provided with this Guide is designed to:

- focus on packaging waste issues;
- be used alongside other toolbox talks on-site.

7.2 Poster creator

The Waste Aware Construction website (www.wasteawareconstruction.com) contains a number of free tools to encourage waste reduction including:

- images of the waste colour code symbols (see section 5.3);
- an online poster creator that allows you to generate posters to encourage waste segregation at your site.

The two posters provided with this Guide highlight:

- the types of packaging waste found on construction sites;
- the key messages for workers and sub-contractors on the site.

7.3 Construction Packaging Waste Estimator

The CD accompanying this Guide contains a spreadsheet designed to help you estimate the weight and volume of packaging that will be created from a construction project. The tool is based on a set of predetermined levels of packaging for certain common construction products.

To use the Estimator, you need to refer to the bill of quantities or some other form of materials schedule for the project. You may also need to contact suppliers for information on crate numbers and box sizes.

Instructions on how to use the Estimator are found when you open up the spreadsheet. If you have any problems using the spreadsheet, please contact the Environment and Energy Helpline on 0800 585794.

7.4 Site Waste Management Plans

In July 2004, the DTI published a voluntary code of practice on Site Waste Management Plans (SWMPs).²¹ Such plans are an important tool for construction companies of all sizes to:

- improve their environmental performance;
- meet regulatory controls;
- reduce the rising costs of disposing of waste.

The pockets of this Guide contain a packaging-specific version of the Site Waste Management Plan (SWMP) checklist. Two versions of the checklist are provided:

- one contains guidance on what to consider in each question;
- the other is blank and can be photocopied and completed for a specific project.

The checklist can be used either as a stand-alone document or as an aide-mémoire to ensure that packaging requirements are included within your overall site waste management plan or site environmental management plan.

7.5 National Green Specification contract clauses

The biggest improvements in packaging waste reduction are likely to come from working with the supply chain on a project. A strong and collaborative relationship with your suppliers will make it easier to implement many of the practical measures suggested in this Guide.

Incorporating your requirements into sub-contract agreements will help to ensure that a culture of packaging waste reduction is embedded throughout a construction project.

The National Green Specification (NGS) offers free online resources for building designers, constructors and manufacturers involved with sustainable construction. Specification Clause A39 'Construction packaging resource efficiency/waste minimisation' is intended to help companies draw up suppliers' contracts to incorporate measures to reduce packaging waste. This specification and others can be downloaded free of charge from the NGS website (www.greenspec.co.uk). Fig 26 contains extracts from Specification Clause A39.

²¹ *Site waste management plans: guidance for construction contractors and clients. Voluntary code of practice.* DTI, July 2004. Available for downloading from the Envirowise website (www.envirowise.gov.uk/construction).

Fig 26 Extracts from National Green Specification Clause A39

A39 CONSTRUCTION PACKAGING RESOURCE EFFICIENCY/WASTE MINIMISATION
To be read with the Preliminaries/General Conditions A10-A55 & A38.

**MATERIAL SUPPLY CHAIN MANAGEMENT
PACKAGING, PROTECTION, STORAGE & PRODUCER RESPONSIBILITIES**

200 SEEK OUT OPPORTUNITIES TO RETURN PACKAGING AND PROTECTION MATERIALS TO SOURCE:

Under the Producer Responsibility Obligations (Packaging Waste) Regulations, manufacturers are under obligation to account for reprocessing or recycling costs of packaging, whether carried out by themselves or on their behalf by others:

Invite/require manufacturers or suppliers to propose any opportunities to collect or receive, re-use and/or recycle their own protection and packaging materials arising from the works.

Seek out solutions and endeavour to overcome any limitations that could reduce or prevent the opportunity for such collection/receiving, re-use and/or recycling on-site and off-site.

Collect together pallets, packaging, protection materials and return them to the supplier or manufacturer of any multiple delivery goods on the returning vehicle.

Where protection and packaging materials are collected to return to producer, use the original packaging to collect the materials, identify and store them on-site ready for collection or return.

Collect together and place in appropriate container and store conveniently in or adjacent to materials delivery area(s) and keep secure to prevent fly-tipping of other materials in the containers.

Invite/require manufacturers or suppliers to return to site to collect segregated packaging and protection materials that can be re-used or recycled.

Where manufacturers have an off-cuts take back scheme in place, use the manufacturer's original packaging to help identify the contents and make available for collection or return along with packaging materials.

Determine any other economical transport systems, e.g. courier returns vehicles running empty to return materials without deadlines to manufacturers.

Make use of palletised delivery services to return pallets, packaging and protection materials to supplier or manufacturer for re-use.

205 PACKAGING METHOD STATEMENT:

Include an item in the main Method Statement (see A39/20) addressing:

How the packaging will be collected, segregated and handled; options might include (in order of preference):

- On-site collection/segregation from general waste, for collection by producer for off-site segregation, re-use, recycling or disposal.
- On-site collection for return to producer for off-site segregation, re-use, recycling or disposal at producer's expense.
- On-site collection and segregation for disposal from site at the producer's expense.
- On-site collection, on or off-site segregation for re-use, recycling or disposal at the producer's expense.
- On-site collection and deposit in mixed waste skips, to landfill at the producer's or contractor's expense.

Fig 26 Extracts from National Green Specification Clause A39 (continued)

206 LOCAL AUTHORITY WASTE COLLECTIONS OF COMPACTABLE PACKAGING WASTE:

Contact the LA to determine the existence, frequency of any free collection services for compactable, lightweight packaging and protection materials and office paper waste to be segregated and recycled.

Determine containers collected from and any limitations on the materials collected.

Make maximum use of the service and optimise site layout and practices to ensure compliance with the LA requirements.

Consider and determine site layout to ensure access for vehicles, placement of the skips, access routes for wheeled bins if use of these services is to be made.

See also A39/450

210 PACKAGING & PROTECTION OF GOODS:

Provide appropriate and not excessive packaging and protection conforming to the following:

Function:

To protect corners, edges and surfaces.

To separate materials and components from each other, to prevent damage.

To protect materials from degradation by ozone, UV light, and other agents.

To exclude moisture but release any moisture forming internally.

To resist degradation by ozone, UV light, and other agents, avoid adhesion to surfaces, damaging surfaces of protected goods.

To allow easy removal for inspection of goods and easy re-protection.

Properties:

Compatible with protected material.

Fire performance: if appropriate or site requirement.

Simple single material.

Multiple materials:

to be minimum number practical,

to be easily separated,

should not be composite requiring effort, processes, chemicals or equipment to separate.

Easily unfolded and flattened, stacked, baled, banded and wrapped for return for re-use.

Easily compacted, folded, baled, banded for transport to recycling, etc.

Sufficient to protect without use of excess materials and avoid delivering damaged goods.

Returnable and re-usable, for re-use by packaging producer or product manufacturer.

Materials:

Paper and cardboard: compostable, dissolvable and/or biodegradable.

Avoid PVC, vinyl.

Plastics: recycled, re-usable, returnable, recyclable, and recycled by packaging producer or product manufacturer.

Bubble wrap.

If using cling-film, do not use to excess.

Bio-plastics: dissolvable or rapid biodegradable, e.g. potato starch bio-plastic in place of expanded polystyrene or expanded polyethylene, will dissolve in water.

Fig 26 Extracts from National Green Specification Clause A39 (continued)**211 LABELLING:**

Provide appropriate labelling conforming to the following:

Function:

To identify contents, manufacturer and product reference, batch numbers.

To include fire performance of packaging if applicable.

To include return address for defective materials, return-to-stock, off-cuts and packaging.

To include shelf life of protection and protected materials.

If protection to be retained for long periods, include date of packaging/dispatch indicating period permitted for use and its removal deadline.

To include any packaging guarantee limitations.

215 PALLETS, PALLET BOXES, CRATES & KEGS:

Provide appropriate support and containment conforming to the following:

Size: standard size wherever practical, (to encourage re-use).

Type: re-usable, returnable, ultimately recyclable.

Non-standard sizes to be made of standard sizes attached and demountable.

Duty: multi-journey (not single journey, as carried materials can easily be damaged).

Material: reclaimed and re-used durable and tough hardwood or softwood, recycled plastic, recycled wood particle.

Avoid: virgin wood particles, virgin plastic, composites and conglomerates, and PVC.

See Appendix APP PPBC Pallets, Pallet Boxes & Crates

220 PALLETISED GOODS:

Design packages to be sub-modules of standard size pallet in two horizontal dimensions.

Stack using interlocking alternate direction layers to ensure stability.

Stability should not rely on strapping which, once cut, results in collapse of materials onto site mud or slurry.

Ensure stability for handling, transport and site storage.

Laterally brace inherently non-stable and non interlocked components.

Provide corner and edge protection.

Protected from weather and external conditions but able to release moisture that may enter or occur within.

Materials: to A39/210.

Submit proposals with Tender for review and seek further instruction to suit the programme.

221 PALLET BOXED OR CRATED GOODS:

Size pallet boxes or crates to contain materials stacked or placed to fit with no slack in all dimensions, or provide filling materials to reduce movement and possible damage during transport.

Crates may be filled randomly with tough material where surface damage is not an issue.

If crates are to be stacked, ensure they are constant sized, rigid and stable.

Ensure stability for handling, transport and site storage.

Laterally brace if required.

Provide corner, edge and surface protection.

Protect from weather and external conditions but able to release moisture that may enter or occur within.

Materials: to A39/210.

Submit proposals with Tender for review and seek further instruction to suit the programme.

Fig 26 Extracts from National Green Specification Clause A39 (continued)

222 UNPALLETISED OR UNCRATED GOODS:

Do not accept deliveries of materials stacked with no interlocking arrangement. Do not accept materials delivered strapped together which, once the straps are cut, collapse into site soil and then end up in a skip.

Avoid use of unpalletised delivery of goods which, when placed on-site soil, spoil the bottom layer of materials which will end up in a skip.

If the unpalletised goods are intended to stack on palletised goods, do not permit their delivery if there are no palletised goods to stack on to.

223 RE-USE OF PALLETS, PALLET BOXES AND CRATES:

Once materials are used and pallets etc. become free, return to manufacturer/supplier.

If manufacturer/supplier does not want pallets back, collect pallets and stack adjacent to materials delivery/storage area.

Permit and encourage all delivery vehicles to take back empty pallets, etc.

When excess pallets, etc. build up, contact a local pallet re-use and recycling company to collect pallets for repair, re-use and recirculation.

Do not put damaged or intact pallets into skips, set up a pallet repair bench to repair for re-use and recirculation, or recycled through local pallet recycling company.

Source: www.greenspec.co.uk

Complete text can be obtained from the website, or contact:

www.greenspec.co.uk/html/contact/contactcontent.html

Moving forward

This Guide contains numerous ideas about how you can improve the management of packaging waste on your site. Taking action to reduce, re-use and recycle packaging waste will:

- reduce your own direct packaging and material costs;
- reduce your waste disposal costs;
- reduce the effort and cost of handling waste;
- increase revenue through recycling;
- improve your business and environmental performance;
- improve overall site efficiency;
- improve your company's image.

To achieve cost savings and other benefits from improved packaging waste management:

- Appoint a packaging waste champion.
- Find out what types of packaging are used on your site.
- Use the Site Packaging Waste Management Plan checklist to ensure that packaging waste issues are taken into account in the project.
- Use the Construction Packaging Waste Estimator to calculate how much packaging waste your site produces.
- Look for opportunities to eliminate, reduce, re-use and recycle packaging waste. If necessary, discuss possible solutions and ideas with your suppliers and contractors.
- Provide bins/containers/skips to allow segregation of different types of packaging waste. Label these clearly with the appropriate colour-coded symbol.
- Educate the workforce about the need for waste segregation and collection. Include packaging waste as a topic for toolbox talks.
- Set up management procedures to monitor and police skips.
- Review progress regularly.

8.1 Free help from Envirowise

The Environment and Energy Helpline on 0800 585794 can:

- put you in touch with a technical expert - free of charge;
- provide free, up-to-date advice on environmental issues;
- tell you about relevant environmental and other legislation that could affect your business, eg the latest hazardous waste legislation;
- send you copies of free, relevant Envirowise publications;
- suggest other sources of information;
- arrange other appropriate support - workshops, training events, on-line tools and site visits.

All of Envirowise's free information and advice can also be accessed via its website (www.envirowise.gov.uk).

8.2 Other sources of information and advice

Waste and Resources Action Programme (WRAP)

WRAP aims to accelerate resource efficiency by creating markets for recycled materials, while removing barriers to waste minimisation, re-use and recycling. It is a not-for-profit company that works with the public, private and community sectors, and is funded by the Department for Environment, Food and Rural Affairs (Defra), the Department of Trade and Industry (DTI), the Scottish Executive, the Welsh Assembly Government and the Northern Ireland Executive.

The WRAP Construction website offers practical guidance and tools to help companies improve materials resource efficiency at every stage of the construction process.

www.wrap.org.uk/construction/

Waste Aware

Waste Aware Scotland is a national campaign that aims to change public attitudes and behaviour towards waste. It is managed by the Scottish Waste Awareness Group (SWAG) and receives funding from the Scottish Executive and the Scottish Environment Protection Agency (SEPA).

www.wascot.org.uk/html/index.asp

The Waste Aware Construction website includes information about the national colour coding scheme for the source segregation of recyclable materials on C&D sites and offers a free poster creator to help companies promote waste segregation at their sites.

www.wasteawareconstruction.com

National Green Specification (NGS)

NGS is an independent organisation supported by the Government to help building designers, constructors and manufacturers understand what is meant by sustainable construction and to provide them with internet-based resources to achieve good practice. NGS is funded by the DTI and private sources. It offers free example specifications, information about 'green' products and advice about designing a greener specification.

www.greenspec.co.uk

SMARTWaste

SMARTWaste is a collection of software-based tools developed by BRE to help companies reduce waste, save money and maximise their resource use.

www.smartwaste.co.uk

Table 7 overleaf gives details of other organisations offering help with recycling packaging waste.

Table 7 Organisations offering help with recycling packaging waste*

Name	Role	Website**
Alupro	Encouraging and developing aluminium recycling and collection initiatives.	www.alupro.org.uk
British Glass	Represents the UK's glass industry.	www.britglass.org.uk
British Plastics Federation	Represents the UK's plastics industry.	www.bpf.co.uk
CHEP	Offers re-usable wood pallet system.	www.chep.com
Confederation of Paper Industries	Industry body that can provide advice on paper packaging and recycling.	www.confedpaper.org.uk
Corus Packaging	Major supplier of steel packaging and actively involved in recycling steel.	www.coruspackaging.com
Packaging Federation	Represents packaging manufacturers.	www.packagingfedn.co.uk
Recoup	Provides expertise and guidance across the plastics industry and throughout the supply, use and disposal chain. Can offer support and advice on plastic recycling.	www.recoup.org
Recovynyl	Supports the collection and recycling of PVC waste in the construction and demolition sectors.	www.recovynyl.com
Timber Packaging and Pallet Confederation	Represents the timber packaging industry.	www.timcon.org
Timber Research and Development Association	Industry body that can provide advice on wood packaging and recycling.	www.trada.co.uk

* This list is not intended to be exhaustive and Envirowise takes no responsibility for the contents of these websites or the services/information offered by these organisations.

** If you do not have access to the internet, contact the Environment and Energy Helpline (0800 585794) for more contact details.

Enclosed

- Example toolbox talk
- Example posters
- Site Packaging Waste Management Plan (SPWMP) checklist and guidance document



Envirowise - Practical Environmental Advice for Business - is a Government programme that offers free, independent and practical advice to UK businesses to reduce waste at source and increase profits. It is managed by Momenta, an operating division of AEA Technology plc, and Serco TTI. Envirowise is funded across the UK by the DTI and Defra and the Business Resource Efficiency and Waste (BREW) Programme in England, the Scottish Executive in Scotland and the Materials Action Programme (MAP) in Wales.

Envirowise offers a range of free services including:

- ✔ Free advice from Envirowise experts through the Environment and Energy Helpline.
- ✔ A variety of publications that provide up-to-date information on waste minimisation issues, methods and successes.
- ✔ Free, on-site waste reviews from Envirowise advisors, called *FastTrack* visits, that help businesses identify and realise savings.
- ✔ Guidance on resource efficiency clubs across the UK that provide a chance for local companies to meet regularly and share best practices in waste minimisation.
- ✔ Best practice seminars and practical workshops that offer an ideal way to examine waste minimisation issues and discuss opportunities and methodologies.



Harwell International Business Centre | Didcot | Oxfordshire | OX11 0QJ
E-mail: helpline@envirowise.gov.uk | Internet: www.envirowise.gov.uk



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