

TITLE: EFFECTS OF EU WASTE DIRECTIVES ON THE UK CONSTRUCTION INDUSTRY

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ABSTRACT. The growth of waste in the EU has driven the need to increase levels of effective waste minimisation and management. Current and future legislation will be a key driver for resource efficiency within the construction industry. It will challenge the industry to manage their resources effectively and efficiently. There are obvious advantages and opportunities for the waste management industry too, with clients and main contractors requiring material waste management strategies for particular types of materials and sites. This paper gives an introduction to the key legislations and policies that may have an impact on the construction and demolition industry and their waste management strategies.

Keywords: Construction and Demolition Waste, Landfill Directive, European Waste Catalogue, Packaging Waste Directive.

INTRODUCTION

The latest figures from the Symonds Report (Symonds 2001) show that the construction and demolition (C&D) sector produce 94 million tonnes of inert waste, of which, 38.02 million tonnes are recycled into aggregates. However, we have to bear in mind that these figures only include inert materials, like, concrete, bricks and blocks, cement and soil etc. The Centre for Resource Management (CRM) at BRE estimates the true figure of C&D waste production to be circa 140 million tonnes. This figure includes all waste produced in the C&D process taking into consideration other waste that is not commonly included, for example, timber, metals, plastics, packaging, furniture and many more. The BRE SMARTWaste auditing tool uses twelve waste groups and a list of 500 waste products with the potential for an infinite list. The waste groups are currently being adapted to the European Waste Catalogue. With such staggering amounts of waste involved, current and future legislation will be a key driver for resource efficiency within the construction industry. It will challenge the industry to manage their resources effectively and efficiently. There are obvious advantages and opportunities for the waste management industry too, with clients and main contractors requiring material waste management strategies for particular types of materials and sites. This paper gives an introduction to the key legislations and policies that may have an impact on the construction and demolition industry and their waste management strategies but will focus mainly on the Landfill Directive, the European Waste Catalogue and the Packaging Waste Directive.

COMMON EU STRATEGY: 6TH ENVIRONMENTAL ACTION PROGRAMME

The 6th Environmental Action Programme is a European Community framework that has been established to limit the environmental and health impacts arising from the use of natural resources. This includes taking measures to improve the resource efficiency of energy use, and implementing the sustainable use of water and of soil. However, for non-renewable resources, although affected indirectly by many different policies, there lacks a coherent Community policy focused on the overall de-coupling of resource use (resulting in environmental impacts and degradation) from economic growth. Therefore, an objective of the 6th Environmental Action Programme, is to outline the priorities for action on the environment for the next 5 to 10 years, in order to,

“... ensure the consumption of renewable and non-renewable resources and the associated impacts do not exceed the carrying capacity of the environment and to achieve a decoupling of resource use from economic growth through significantly improved resource efficiency, dematerialisation of the economy, and waste prevention.”

One of the key objectives related to resource efficiency is to de-couple the generation of waste from economic growth and achieve a significant overall reduction in the volumes of waste generated through improved waste prevention initiatives, better resource efficiency and a shift to more sustainable consumption patterns. Also, for wastes that are still generated the aim is to achieve a situation where:

- The waste is non-hazardous or at least presents a minimal risk to the environmental and human health.

- The majority of the waste is incorporated back into the economic cycle, especially through recycling, or returned to the environment in a useful (e.g. composting) or harmless form.
- The waste that still has to go for final disposal is reduced to an absolute minimum and is safely destroyed or disposed of.
- Waste should be treated as closely as possible to its source.

From these objectives a number of targets to be achieved within the lifetime of the Community programme have been set, so as to observe a significant reduction in the volume of waste going for final disposal and in the volumes of hazardous waste generated. To keep with the general strategy of waste prevention and increased recycling, the following aims have been decided:

- To reduce the quantity of waste going for final disposal by around 20% by 2010 compared to 2000 and 50% by 2050.
- To reduce the volume of hazardous wastes generated by the same target as above.

KEY EU LEGISLATION AND REGULATION

Working Group on Sustainable Construction

As one of the fourteen priority actions for improving competitiveness within construction, a Working Group on Sustainable Construction was established in 1999 which included three Task Groups, one of which was TG3 on C&D waste management. The main function of TG3 was to provide a document of recommendations on how to improve C&D waste management through improved planning, prevention and reclamation.

The scope of the document focused on the whole construction process including design, pre-construction, construction, demolition, reuse, recycling, final disposal, research and education. The output was to make recommendations to three core sectors of construction including Industry, Member States and their public authorities, and the European Commission and incorporated other requirements of industry and member states. For example, member states are requested to provide waste management plans to facilitate self-sufficiency, reduce movements of waste materials and establish inspections of disposal and reclamation. Reports to the Commission by individual States is to be submitted every three years, for agglomeration into a single report.

Project Group on C&D Waste

In addition to TG3, the European Commission set up the “Priority Waste Streams Programme” in 1992 and, six priority waste streams programmes were initiated including:

- Used Tyres
- End-of-Life Vehicles
- Chlorinated Solvents
- Healthcare Waste
- Construction and Demolition Waste
- Waste from Electrical and Electronic Equipment

Project groups were set up for each of the six waste streams to discuss and recommend ways that member states could improve methods of waste management of these.

In April 2000 a working document produced by the C&D waste project group described the measurement of the C&D waste stream in member states, and detailed the aims and instruments that are likely to improve C&D waste management. The document also includes a selection of recommendations which member states need to consider when developing their own waste management policies.

Currently, the European Commission wishes to introduce a recommendation (a non binding measure) for C&D waste with the aim of improving the management of the C&D waste stream by following the waste hierarchy, giving preference to prevention over reuse, material recycling, energy extraction and lastly disposal. It will aim to reduce the impact of C&D waste on the environment whilst better utilising natural resources.

The recommendation will also encourage the substitution of hazardous substances in new buildings and make sure that waste from construction (bricks, glass, wood etc) is sorted at the point of generation. It would also include proposals for recycling targets set initially at 50% to 70% by 2005 and an increase in landfill charges. It is thought that the European Parliament would prefer binding legislation rather than just a recommendation. So far progress has been very slow. If adopted, this recommendation/legislation will have a significant impact on the demolition industry which supplies the construction sector.

European Waste Catalogue

In providing a European position on waste, it has also been necessary to provide a common reference system for waste. The European Waste Catalogue (EWC) came into force in January 2002 through an amendment to the Duty of Care regulations. It applies to all wastes in Europe whether for disposal or reclamation, and is a harmonised, non-exhaustive list using common terminology across the Community. However the inclusion of a material in the EWC does not mean that it is a waste, only when the relevant definition is satisfied is it considered waste. The EWC identifies 20 broad categories of waste and over 800 waste types based on the process, giving rise to the waste. It took effect in January 2003 in the UK under the Landfill Directive regulations where the classifications will replace the simple waste identification system on the Duty of Care transfer note.

An expert working group drawn from Member States, DGXI and Eurostat is currently reviewing the EWC. According to a Symonds' report (Symonds 1999) to the EU, Member States are interpreting the EWC in different ways. The "Top down" classification adopted by Germany and the Netherlands involves finding the most appropriate top level classification and recording the waste there, whether or not it can be assigned to one of the sub-categories. The UK uses the "Bottom up" classification by finding the most appropriate sub-category and calculating the totals of the top level classifications by adding values for each sub-category. Both approaches used should ideally lead to a common result but it does not. In other words, the "top down" approach would categorise e.g. concrete, bricks, tiles and ceramics as 17 01 00 (concrete, brick, tiles, ceramics), whether mixed together or not, while the "bottom up" approach would classify any mixtures of these waste as 17 07 00 (mixed C&D waste).

The main waste codes most relevant to C&D waste production includes:

Waste Classifications	Type of Waste
15	Packaging; absorbents, wiping cloths, filter materials and protective clothing
17	Construction and demolition waste (including excavated soil from contaminated sites)
20	Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions

Waste Packaging

Classifications	Type
15 01	Packaging (including separately collected municipal wastes)
15 01 01	Paper and cardboard packaging
15 01 02	Plastic packaging
15 01 03	Wooden packaging
15 01 04	Metallic packaging
15 01 05	Composite packaging
15 01 06	Mixed packaging
15 01 07	Glass packaging
15 01 09	Textile packaging
15 01 10 (Hazardous)	Packaging containing residues of or contaminated by dangerous substances
15 01 11 (Hazardous)	Metallic packaging containing a dangerous solid porous matrix (for example, asbestos), including empty pressure containers

Construction and Demolition Waste

Classifications	Type
17 01	Concrete, bricks, tiles, ceramics
17 02	Wood, glass and plastic
17 03	Bituminous mixtures, coal tar and tarred products
17 04	Metals (including their alloys)
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil
17 06	Insulation materials and asbestos-containing construction materials
17 07	Mixed C&D waste
17 08	Gypsum-based construction material
17 09	Other construction and demolition wastes

Municipal Waste (relevant classifications)

Classifications	Type
20 01	Separately collected fraction
20 01 01	Paper and cardboard
20 01 02	Glass
20 01 08	Biodegradable kitchen and canteen waste
20 01 11	Textiles
20 01 13 (Hazardous)	Solvents
20 01 14 (Hazardous)	Acids
20 01 15 (Hazardous)	Alkalines
20 01 21 (Hazardous)	Fluorescent tubes and other mercury-containing wastes
20 01 23 (Hazardous)	Discarded equipment containing chlorofluorocarbons
20 01 27 (Hazardous)	Paint, inks, adhesives and resins containing dangerous substances
20 01 28	Paint, inks, adhesives and resins other than those mentioned in 20 01 27
20 01 29 (Hazardous)	Detergents containing dangerous substances
20 01 30	Detergents other than those mentioned in 20 01 29
20 01 35 (Hazardous)	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous substances
20 01 36 (Hazardous)	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23
20 01 37 (Hazardous)	Wood containing dangerous substances
20 01 38	Wood other than that mentioned in 20 01 37
20 01 39	Plastics
20 01 40	Metals
20 01 99	Other fractions not otherwise specified
20 03	Other municipal wastes
20 03 07	Bulky waste

Hazardous Wastes 91/689/EEC & 94/904/EC

Member states are required to implement controlled management of hazardous waste. These indicate the appropriate means necessary to collect, transport, store and manage hazardous wastes. These are defined in Annexes covering generic types of hazardous waste including pigments, paints, resins, and plasticisers, and properties of waste which render them hazardous including oxidising, harmful, carcinogenic and corrosive substances, as well as substances that yield damaging leachate or ecotoxic risks. In 2001, the hazardous waste list created by EC Decision 94/904/EC was incorporated into the EWC.

UK Special Waste Regulations

The current Special Waste Regulations are undergoing a major review, which will simplify some procedures. However, a re-designation of 'special waste' to 'hazardous waste' will reveal more types of waste covered under the new regulations. It is expected that the new regulations will take effect in 2003 as the Hazardous Waste Regulations. The two

Regulations identify all hazardous wastes with those items not currently designated special waste such as fluorescent tubes and timber creosote sleepers becoming hazardous wastes when the new regulations take effect.

Under the Landfill Directive, pre-treatment will be necessary for most hazardous wastes which are to be landfilled. Pre-treatment can reduce the hazardousness of waste or, in some cases, render it non-hazardous. Certain treatments may be used which do not alter the hazardous properties of a waste but significantly reduce the probability of the hazard having an effect. A wide variety of pre-treatment techniques are available, with biological, thermal and some physico-chemical treatments most suitable for organic wastes and physico-chemical treatment most suitable for inorganic wastes.

A number of waste streams arising from C&D waste may be deemed hazardous waste depending on the concentration of contaminants e.g. contaminated soils, asbestos, tar and tar products, treated timber, paint and varnish. Paint waste is generated by construction activities and some paints are hazardous wastes. Waste paint can be reused either by the construction company for the next job or through community repaint schemes. Between 30,000 and 40,000 tonnes of waste paint was generated in 1997/8 and 1998/9, although it is not possible to say how much of this came from the construction and demolition sector.

All wastes containing greater than 0.1% asbestos are classified as hazardous waste. Cement or bonded asbestos is a major hazardous waste stream. Re-use and recycling are not suitable options for asbestos wastes, as asbestos is banned for use in virtually all new applications. Treatment of asbestos wastes is difficult and expensive, although technologies to destroy asbestos using heat treatment or acid digestion are being explored. In the meantime the only practical option for asbestos wastes is disposal to landfill. Asbestos wastes must not be allowed to enter the inert waste stream destined for recycling as secondary aggregates. Crushing of asbestos wastes, or their use in roadways or as hardcore will result in the wastes breaking up and could release fibres into the atmosphere. There is a shortage of facilities accepting asbestos cement wastes in some areas. When co-disposal stops in 2004, asbestos can be landfilled in a non hazardous landfill site in separate cells according to the Landfill Directive Regulatory Guidance Note 11 (EA 2002).

A large amount of contaminated waste is consigned to landfill in England and Wales. Research and development of soil treatment and cleaning technologies are allowing soils to be recycled for beneficial use, break down contaminants or extract them for further treatment and/or disposal. It is expected that there will be increasing use of such technologies to recover soils and remove contaminants both on and off site. The increasing use of treatment and recovery of contaminated soils may lead to a reduction in the quantities of waste soils being consigned as hazardous waste. However, a number of factors such as increased redevelopment of brownfield sites and the implementation of the new contaminated land regulation, may result in the redevelopment and remediation of more contaminated sites. This could lead to an increase in the quantity of waste contaminated soils being generated.

Packaging and Packaging Waste Directive 94/62/EC

The Packaging and Packaging Waste Directive introduced in 1994 sets targets to be achieved for both the recovery and recycling of packaging waste, which are revised every five years. In December 2001 the European Commission released a proposal for a revision of the

Packaging and Packaging Waste Directive which focuses on the new five year targets to be met by June 2006 (30 June 2009 for Greece, Ireland and Portugal). It also clarifies some of the definitions of the original text.

The European Parliament voted on the proposal and an amended version was then passed to the European Council of Ministers for review in October 2002. The targets were again altered and the deadline date was changed to 31 December 2008 (2012 for Greece, Ireland and Portugal). The targets put forward by the Council were:

- Overall recovery (recycling plus energy recovery), minimum 60% with no maximum.
- Overall recycling 55% minimum (80% maximum).
- Minimum material specific recycling targets:
 - Glass 60%
 - Paper and board 60%
 - Metal 50%
 - Plastics (mechanical and chemical recycling) 22.5%
 - Wood 15%

Currently, the next stage for the EU Environment Council is to decide on a common position between the Parliament and Council's view. Their proposal will then be sent back to the Parliament for a second reading. It is thought that a compromise of 2007 may be chosen for the deadline.

UK Producer Responsibility Obligation (Packaging Waste) Regulations

The Packaging Waste Regulations implements the recovery and recycling targets set out in the EC Directive on Packaging and Packaging Waste. The UK recovery and recycling targets for 2003 are 59% for overall recovery and 19% for material specific recycling. Shared producer responsibility means that all parts of the UK packaging chain contribute towards meeting the recycling and recovery targets. The percentage obligation depends on the type of activity undertaken by the company on the packaging. The share of responsibility is: 6% for raw material manufacturers, 9% for converters, 37% for packer/fillers, and 48% for sellers. Also, there is 100% obligation on transit packaging around imported goods. All businesses with an annual turnover of £2 million or more that handle 50 tonnes or more of packaging each year must comply with the regulations.

The construction sector is obligated to the packaging waste regulations but is currently unregulated. However, the Environment Agency is beginning to show an interest in this sector as the amount of packaging generated is relatively large. Packaging plays an important role, it protects products, and is used to promote and identify the products. In terms of its use in the construction process, almost every product used on a site is delivered wrapped in, sat on or held together by packaging of some kind

There is a plethora of information on the recovery and recycling of packaging waste from households, but very little concerning packaging waste from construction sites. The majority of studies relating to waste on construction sites cover the topic of material waste management, which does not pay particular attention to the levels of packaging on sites. Little is known regarding the amount, type and cleanliness of packaging material being disposed of on construction sites. Previous BRE studies however, have shown that packaging materials can constitute as much as 50% of the volume of waste leaving a construction site. The recyclability of the packaging products found in a BRE waste audit of nine sites is

presented in Figure 1. As much as 34% of the packaging could have been recycled without the need for cleaning. More than 9% was reusable referring mainly to timber pallets that can be used again. Reusable packaging that is broken also consisted of timber materials (broken timber pallets or broken timber packaging) which can be recycled with the rest of the timber materials. About 27% of the packaging was recyclable but contaminated mainly by soil that could be recycled after some cleaning. Only 7% of the packaging was not recyclable or reusable, in other words, 93% of packaging waste can be diverted from landfill. And if packaging waste makes up approximately 26% of overall waste in a construction project, the amount of waste, if segregated, can be very significant.

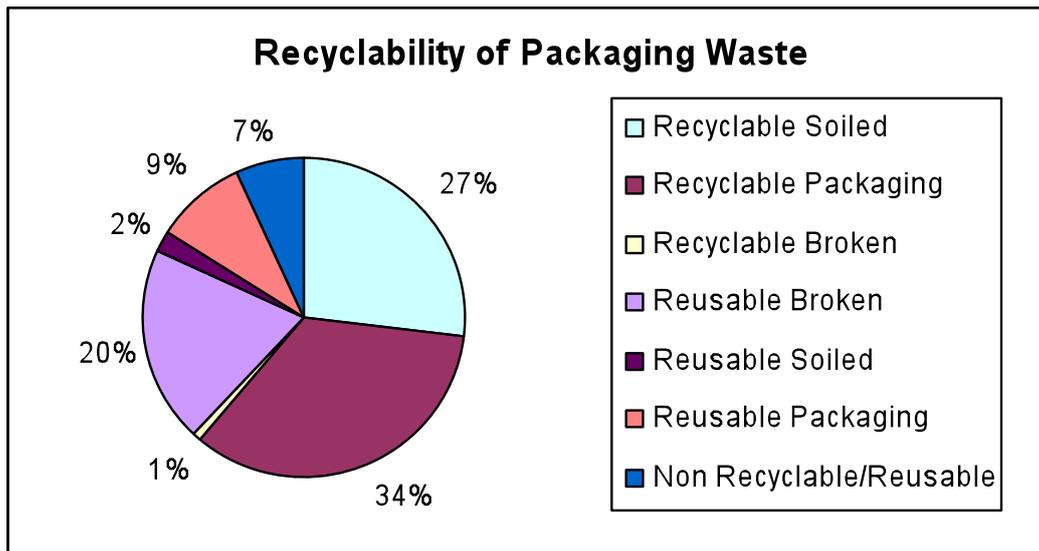


Figure 1. Recyclability of Packaging Products

The Landfill Directive

The Landfill Directive was introduced into UK law in 2002 through the Landfill (England and Wales) Regulations 2002. The Directive defines three classes of landfill depending on the type of waste they accept: hazardous, non-hazardous and inert waste. The co-disposal of waste is currently common practice in the UK. However, the Directive states that hazardous waste may only be landfilled in a hazardous waste site or if the hazardous waste is stable and non-reactive, landfilled in individual cells in a non hazardous site. Therefore the co-disposal of hazardous waste must cease by 2004. The following wastes are or will be banned from landfill by 2004:

- Explosive, oxidising or flammable wastes.
- Infectious clinical waste.
- Liquid wastes, except those suitable for disposal at an inert waste site.
- Tyres (whether whole or shredded).

The aim of the Directive is to provide measures, procedures and guidance to prevent or reduce negative effects to the global environment and all its cycles from landfilling of waste during the whole lifecycle of the landfill site. All waste, except for inert waste, is to be pre-

treated before landfilling to reduce its volume or hazardous nature, or to aid recovery. Pre-treatment may involve mechanical waste separation and sorting procedures followed by composting, anaerobic digestion, thermal treatment and other processes. It is expected that by mid 2007 at the latest, no waste will be able to be collected and taken to landfill without some weight reduction being applied, through source segregation or sorting at a waste transfer station. Treatment applies to new landfills from July 2001, landfills classed to receive hazardous waste from July 2004 and all others by July 2009. Existing sites can be classed as hazardous until July 2004, then reclassify as non-hazardous, when co-disposal ends.

The Landfill Directive also impacts on the type of waste accepted at landfills. Inert waste can be accepted for which treatment is not technically feasible. Landfills will be divided into hazardous, non-hazardous and inert. For inert landfills, operators can only accept waste that:

- Does not undergo any significant physical, chemical or biological transformations.
- Does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health;
- Its total leachability and pollutant content and the eco-toxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater.

Waste accepted at landfills for inert waste are:

European Waste Catalogue	Description	Exclusions
15 01 07	Glass (Packaging)	
17 01 07	Concrete	
17 01 02	Bricks	
17 01 03	Tiles and Ceramics	
17 02 02	Glass (C&D)	
17 05 04	Soil and stones	Excluding topsoil and peat
20 01 02	Glass (Municipal)	
20 02 02	Soil and stones	Excluding topsoil and peat

The Government proposed that appropriate measures for water control and leachate management should be determined by the Environment Agency on a site specific basis for inert sites. The tight definition of inert waste for the Landfill Directive is different to the definition used for the purposes of the landfill tax. The Government has confirmed that these definitions are for wholly different purposes and waste, which is defined as inert for the landfill tax, will remain inert for those purposes. The Government does not consider that the landfill tax regulations need to be amended to extend the definition to include the Directive definition of inert. The general requirements of the Directive for landfill engineering for the protection of soil and water will increase demand for inert waste in the construction, redevelopment and restoration of landfills. The demand for future inert waste landfill capacity is therefore likely to be reduced significantly, with a consequent reduction in future landfill numbers and licensing requirements.

Waste materials that would most concern the C&D industry, with regards to the Landfill Directive, will mainly be gypsum, composites and any biodegradable materials like timber.

These materials will have to be diverted from landfill in one way or another. Certain preserved/treated timbers will be particularly difficult after 2004 when co-disposal is prohibited, pre-treatment will be required and there will only be 37 hazardous sites nationwide of which, only 10 to 15 will be accessibly to commercial uses. Gypsum, although classified as hazardous waste, can be landfilled in a non hazardous landfill site in separate cells according to the Landfill Directive Regulatory Guidance Note 11 (EA 2002).

Landfill Tax

The landfill tax scheme was introduced in 1996 and applies to waste disposed of in licensed landfills. The aim of the tax is to ensure that the price of landfill fully reflects the impact that the landfilling of waste has upon the environment. It provides an incentive to reduce the quantity of waste sent to landfill and increase the proportion of waste managed by processes higher up the waste hierarchy. The revenue raised from the landfill tax is used to encourage the use of more sustainable waste management practices and technologies.

There are two rates of tax, a standard rate of £14 (2003) per tonne and a lower rate of £2 per tonne. The higher rate for mixed (non-hazardous) waste will increase by £1 every year until it reaches a rate of £15 per tonne in 2004 and the standard rate of landfill tax will subsequently be increased by £3 in 2005-06 to £18 per tonne, and by at least £3 per tonne in the years thereafter, on the way to a medium- to long-term rate of £35 per tonne. The categories of waste to which the lower rate of tax apply – generally inert waste – are set out in the Landfill tax (Qualifying Materials) Order 1996 (SI No 1528).

Categories of waste described as inert for landfill tax purposes include:

Group	Description of Materials	Qualifying materials
Group 1	Rocks and soils (naturally occurring)	Clay Sand Gravel Sandstone Limestone Crushed stone China clay Stone from the demolition of buildings or structures Slate Topsoil Peat Silt Dredgings
Group 2	Ceramic or concrete materials	Glass (includes fritted enamel) Ceramics (includes bricks, bricks and mortar, tiles, clay ware, pottery, china and refractories) Concrete (includes reinforced concrete, concrete blocks, breeze blocks and aircrete blocks but excludes concrete plant washings)
Group 3	Minerals (processed or prepared, not	Moulding sands Clays (includes moulding clays and clay absorbents)

	used)	Mineral absorbents Man-made mineral fibres (includes glass fibres) Silica Mica Mineral abrasives
Group 4	Furnace slags	Vitrified wastes and residues from thermal processing of minerals where the residue is both fused and soluble Slag from waste incineration
Group 5	Ash	Bottom ash and fly ash from wood, coal or waste combustion
Group 6	Low activity inorganic compounds	Titanium dioxide Calcium carbonate Magnesium carbonate Magnesium hydroxide Iron oxide Ferric hydroxide Aluminium oxide Aluminium hydroxide Zirconium dioxide
Group 7	Calcium sulphate (disposed or either at a site not licensed to take putrescible waste or in contaminant cell which takes only calcium sulphate)	Gypsum and calcium sulphate plasters*
Group 8	Calcium hydroxide and brine (deposited in brine cavity)	
Group 9	Water (containing other qualifying material in suspension)	

* Plasterboard is excluded

Mixed loads may be subject to the inactive rate if there is no potential for pollution. For example stone and concrete with small amounts of plaster and wood attached may fall into the inactive category. Similar active waste mixed with inactive waste will attract the higher rate. Waste materials are also exempt if it is temporary disposed of with certain conditions attached. Exemptions also apply to inert materials that are used for landfill restoration or filling former quarries.

A principle concern following the introduction of the landfill tax was the reduction in quantity of inert materials, principally construction wastes, arriving at landfill sites. Currently the majority of waste on construction (not demolition) sites are not segregated and attracts the higher rate of tax. Landfill tax has led to a significant increase in recycling and beneficial reuse of inert C&D waste especially from the demolition sector. Instead of sending excavation spoil to landfill and buying in new filling material, companies are starting to use

their own wastes as a resource. Active waste to landfill has actually increased slightly and there is no clear evidence that the landfill tax is having any effect on behaviour in the construction industry. This can be attributed to the cost of landfill remaining very low even with the escalator. There has been much discussion recently over the cost of landfill tax and future increases. The tax is designed to make landfilling more expensive but is still very low in the UK currently at £14 per tonne, compared with £34 in Denmark and £45 in the Netherlands. Research has called for a doubling or tripling of the landfill tax in the UK. In the latest budget, it was announced that the tax would increase by £3 per tonne per year from 2005-6. The Government's aim is for the Landfill tax to reach £35 per tonne. The recent changes were lower than the waste industry had been expecting, with expectations that the tax should have been increased by £5 per year. As the increase was not as high as originally expected, it may not have had the immediate effect of discouraging landfilling of waste.

UK Waste Strategies

The UK waste strategies do not put too much emphasis on C&D waste, with the exception of Scotland. The Scottish National Waste Strategy identifies four priority waste stream projects, one of which is C&D waste requiring the development of a C&D Waste Action Plan that will reflect three key objectives and tasks:

- Comprehensive review of volume and location of C&D waste
- Levels of C&D waste reclamation, key players and barriers to reuse
- Future management and market development of C&D waste

The Scottish National Waste Strategy is the only Strategy in UK that has focused attention on C&D waste and identified it as a priority area. This will be watched closely by other Nations to see how its successes can be translated into their own Strategies.

Sustainable Construction Strategy

The need to reduce waste at all stages of construction was central to the message of "Rethinking Construction", the 1998 report of Sir John Egan's Construction Task Force on improving the quality and efficiency of UK construction. Improving the efficiency of the construction industry is a key objective for the Government, as set out in its strategy for more sustainable construction 'Building a Better Quality of Life', which identifies priority areas for action, and suggests indicators and targets to measure progress. It sets out action that the Government has already taken, further initiatives that are planned, and highlighted what others can do. The Government will use the strategy as a framework to guide its policies towards construction, and will encourage people involved in construction to do the same.

The Sustainable Construction strategy emphasises the importance of reducing waste at all stages of construction by focusing on the need to consider long term impacts of design, construction and disposal decisions so that materials and other resource use is optimised. The strategy encourages the industry (including clients) to consider refurbishment or renovation as an alternative to new buildings and structures. It highlights the need to avoid over-specification in materials and the scope for standardisation of components. The Office of Government Commerce published the government's own construction sustainability action plan, *Achieving Sustainability in Construction Procurement* in July 2000. Sixteen government departments and other bodies are now implementing this action plan.

The Construction Industry's main clients take the view that the UK Construction Industry does not deliver consistent quality and value for money. Too often the performance of the industry is unreliable; projects run neither to time nor budget and too much effort and resource is invested in making good defects, premature repair and replacement and in litigation. The central message of Rethinking Construction is that through the application of best practices, the industry and its clients can collectively act to improve their performance. The 'Rethinking Construction' report identified targets for improvement in construction productivity, profits, defect and accident reduction. As a follow up to the Egan report, the construction industry is currently looking at the future implementation of the Egan principles. In consultation with the wider public, the Strategic Forum for Construction has produced the report 'Accelerating Change', which focuses on the three improvement agendas of client leadership, integrated supply teams and people issues to deliver widespread improvement to construction processes on the ground.

CONCLUSION

The last decade has seen a very significant evolution of legislation, regulation and policy in relation to waste management, which is increasingly reflected in improved waste management practice. This process is ongoing. Representatives of industry, Federations, Associations and Trade Bodies working with BRE on various government funded projects have indicated that further legislation and regulations are required if we are to achieve the ambitious targets for sustainable waste management. However, this needs to be targeted at specific issues that are both economically viable and beneficial to the growth of the industry itself.

The Landfill Directive when implemented in 2004 will have a significant impact on co-disposal and pre-treatment, this together with the rising landfill tax will make site waste management more economically palatable. With the Landfill Directive and more attention being fixed on packaging waste on construction sites, a rise in the recycling rate will inevitably be the outcome.

As EU directives on waste management and the rising cost of landfill put increasing pressure on the industry, workable solutions for the management of C&D wastes need to be found. We can see it as both an opportunity and a challenge for the industry and also for those already involved in waste management and those who may diversify into C&D waste recycling.

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