Annex 6

Measures Which Influence the Management of C&DW

Presented in descending order of ‘Core’ C&DW arisings

1  Germany
2   UK
3  France
4  Italy
5  Spain
6  The Netherlands
7  Belgium
8  Austria
9  Portugal
10 Denmark
11 Greece
12 Sweden
13 Finland
14 Ireland
15 Luxembourg

All of the information was collected in mid-1998.
1. GERMANY

1.1 Restrictions or bans on disposal

In general, mineral demolition waste and unsorted C&DW may not be disposed to landfill - see sections 1.3 and 1.4 below. The landfilling of other C&DW is strongly affected by the Closed-Cycle and Waste Act, and by the implementation of environmentally sound waste disposal practices (see below).

1.2 Mono landfill

According to ‘Daten zur Umwelt, Umweltbundesamt, 1997’ (page 451) there were 1,616 landfills for C&DW and 694 landfills for excavated soil in use in 1993.

1.3 Other environmental or planning controls

Since 1996 the Closed-Cycle and Waste Act has been in force. This gives waste recycling priority over waste disposal. According to §5(4) the obligation to recycle waste should be met to the extent that this is technically possible and economically reasonable, especially when a market exists, or can be created. Waste recycling is considered to be economically reasonable if the costs it entails are not disproportionate to the costs which disposal would entail.

With effect from 1 January 1999 the destination of C&DW (whether for recycling or disposal) has to be documented. There will be different notification systems for hazardous and non-hazardous wastes. More detailed background on the workings of the new system are given in a footnote at the end of this Section.

With a separate technical instruction for municipal waste (the ‘Technische Anleitung Siedlungsabfall, 1993’) coming into force in stages (in 2001 for C&DW and in 2005 for municipal waste), environmentally sound requirements are being set out for landfills and the waste materials to be accepted by them. The general objective is to landfill only those wastes which are by nature or after pretreatment actually or almost inert. This will particularly affect mixed C&DW, which will have to be separated before being landfilled. Those fractions which do not meet the requirements set out in the ‘Technische Anleitung Siedlungsabfall’ will not be allowed to be landfilled, and will have to be treated further.

1.4 Taxes (landfill and others)

There are no federal taxes or levies applied to the disposal of C&DW or other wastes. Some Länder had imposed their own levies on waste incineration and disposal, but on 7 May 1998 this power was overturned in the courts. There are different prices for landfilling according to the nature and composition (eg hazardousness - see below for examples). Mixed C&DW is not considered to be hazardous.

Apart from the obligation in respect of recovery, an incentive to sort C&DW is given through landfill tariffs, which differ considerably depending on the composition of the waste.

Between 1990 and 1996 the tariffs for mixed C&DW increased from approximately 75 DM/tonne to over 270 DM/tonne (38 to 138 ECU/tonne), while tariffs for (mineral) demolition waste have remained constant at approximately 15-20 DM/tonne (7.70-10.20 ECU/tonne). In 1996 tariffs for mixed C&DW ranged between 100 and 800 DM/tonne (51-408 ECU/tonne). The source for these data is Gallenkamper B et al, ‘Verstärkte Erschließung des Verwertungspotentials von Baustellenabfällen durch organisatorische und technische Maßnahmen, Hrsg.: Umweltbundesamt 1997’.

Tariffs for the treatment or disposal of selected C&DW streams are as follows:

PVC:

<table>
<thead>
<tr>
<th>Description</th>
<th>Tariff Range</th>
</tr>
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<tbody>
<tr>
<td>Disposal to landfill</td>
<td>60-450 DM/t (31-230 ECU/tonne)</td>
</tr>
<tr>
<td>Incineration</td>
<td>250-600 DM/t (128-306 ECU/tonne)</td>
</tr>
<tr>
<td>(with locally reduced prices from about)</td>
<td>200 DM/t (102 ECU/tonne)</td>
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</tbody>
</table>
Gypsum containing wastes:
Currently the arisings of C&DW containing gypsum amount to 1 million tonnes (approximately 2.5% of the mineral fraction of C&DW). A study by Bundesverband der Gips- und Gipsplattenindustrie e.V. on the current and future recycling and disposal possibilities for waste containing gypsum provides the following 1997 prices for different recycling and disposal options:

- disposal to Class I landfill (until 2001) 10-20 DM/t (5.10-10.20 ECU/tonne)
- disposal to Class II landfill 100-600 DM/t (51-306 ECU/tonne)
- disposal to C&DW landfill 10-20 DM/t (5.10-10.20 ECU/tonne)
  (problems may occur because of eluate criteria)
- landscaping 100-200 DM/t (51-102 ECU/tonne)
- disposal in mines 100-200 DM/t (51-102 ECU/tonne)
- thermal treatment and recovery 120-140 DM/t (61-71 ECU/tonne)
  (limited capacity)
- recycling (only clean materials) 200 DM/t (102 ECU/tonne)
  (limited capacity)

Disposal costs for non recoverable C&DW:
Tariffs for disposal to landfill and incineration vary widely between regions. The tariffs shown below, (from a report on selective demolition and recycling - Renz O et al ‘Demontage und Recycling von Gebäuden, 1997’) can only give an idea of disposal costs for these wastes:

- used oil 2,200 DM/t (1,122 ECU/tonne)
- waste containing PCPs 4,000 DM/t (2,041 ECU/tonne)
- paints 750 DM/t (383 ECU/tonne)
- waste which contains lead and mercury 1,000 DM/t (510 ECU/tonne)
- oil which contains metals 1,700 DM/t (867 ECU/tonne)
- plastics / mineral wool 180 DM/t (92 ECU/tonne)
- asbestos 300 DM/t (153 ECU/tonne)

1.5 Subsidies
There are no direct subsidies on C&DW recycling or re-use.

1.6 Positive waste planning measures
Waste planning measures are taken at a regional level, and the regional authorities issue guidance and information on how to deal with C&DW in order to increase recovery and to reduce landfilling. In some Länder (such as Hamburg and Mecklenburg-Vorpommern) recovery levels have reached 80-90%.

In 1992 a statutory ordinance was drafted with national targets for recovery. This ordinance has not yet come into force, but a VA with reduction targets was signed (see below). From 31 December 1999 onwards, waste management planning will be required under the terms of §29 KrW-AbfG, which transposes the planning obligations contained in the EU’s ‘framework’ waste directive.

1.7 Research and development support
There are various programmes concerned with the use of contaminated soil, recycled materials and selective demolition. See also comments on Voluntary agreements (below).

1.8 Pilot and demonstration schemes
Demonstration schemes have been carried out on selective demolition and the general logistics of C&DW site management.
1.9 Voluntary agreements

VAs exist at both the national and regional levels. As an example of a regional VA, the agreement between the environmental authorities of Berlin and Brandenburg and their respective industrial and recycling organisations contains the following objectives:

- only re-use or recycling of C&DW to be allowed - disposal only possible for the non-recyclable fractions;
- proper separation of hazardous materials to be achieved;
- C&DW to be sorted on site, or if not possible, separation to be ensured at an adequate sorting/treatment plant;
- comparable quality standards for recycling and disposal of C&DW, particularly through implementation of the requirements and standards set in 'technical requirements for recycling of mineral waste';
- provide/ensure transparency of the C&DW-stream from source to re-use (after recycling operations) or disposal.

A national VA contains the following targets and measures (among others):

- a 50% reduction (from 1995 levels) in the disposal of recyclable C&DW by 2005;
- information and advisory services to be made available to construction and demolition companies;
- R&D into the avoidance of C&DW arisings, separation and sorting of wastes and recovery measures; quality assurance for recycled materials; and promotion of applications for recycled materials.

The industrial organisations that signed the agreement will set up an advisory committee or board responsible for monitoring progress and for reporting annually to the Ministry of Environment.

1.10 Education and training

See under Voluntary agreements (above).

1.11 Advisory services

See under Voluntary agreements (above).

1.12 Waste exchanges

National and regional Internet-based waste exchanges have been organised, offering the following uncontaminated materials:

- 31410 - Straßenaufbruch (road construction waste);
- 31409 - Bauschutt (concrete, bricks, natural stone, crushed and uncrushed);
- 31411 - Bodenaushub (soil and stones);
- 17202 - Bau- und Abbruchholz (uncontaminated wood).

1.13 Standards and norms for recycled materials

The ‘technical requirements for recycling of mineral waste’ (Anforderungen an die stoffliche Verwertung von mineralischen Reststoffen/Abfällen - Technische Regeln LAGA Länderarbeitsgemeinschaft Abfall, 5 September 1995) have set out requirements for the use of recycled C&DW. C&DW-derived aggregates and recycled soil (for which there are quality standards set by the Quality Association of Construction Material Recyclers: RAL 501-1 Recycling-Baustoffe für den Straßenbau - recycled materials for road construction - and RAL 501-2 Kontaminierte Böden - contaminated soil) are mainly used for road construction. The use of recycled materials in road construction is regulated through technical terms of delivery for recycling products (Technische Lieferbedingungen für Recycling-Baustoffe in Tragschichten ohne Bindemittel - TL RC-ToB 95; Forschungsgrellschaft für Straßen- und Verkehrswesen, Arbeitsgruppe Mineralstoffe im Straßenbau). Generally, secondary and recycled materials have to comply with the same requirements as raw materials.

There is a new standard for recycled materials as aggregates in concrete and the use in building construction (Deutscher Ausschuß für Stahlbeton - Richtlinie als Ergänzung zu DIN 1045, August 1998).
1.14 C&DW processing facilities

Processing facilities are operated by the private sector. According to information from the German Building Materials Recycling Federation (Bundesverband der Deutschen Recycling-Baustoff-Industrie) there are approximately 650 companies operating around 1,040 crushers, including mobile, semi-mobile and fixed machines, the latter group being mainly operated at fixed C&DW management sites.

Since 1991 there have been some separate collection and recycling systems for window frames, pipes, floor-covering and other items made of PVC. In 1997 around 25,000 tonnes of PVC waste from window frame manufacturing was collected, along with approximately 3,000 tonnes from end-of-life window frames, approximately 1,000 tonnes from flooring, approximately 1,000 tonnes from roofing materials, and approximately 500 tonnes from pipes.

1.15 Other measures

All demolition activities need approval from the relevant authorities (Landesbauerordnungen).

A new standard is presently under development describing demolition works (E DIN 18007 Abbrucharbeiten). The objective of this standard is to specify definitions and to describe different demolition activities. Primarily it should facilitate the understanding of different actors in relation to demolition activities, and it is seen as a starting point for further development, e.g. as a reference and to determine demolition works.

According to the German Waste Management Act, federal authorities and many other public agencies under federal supervision are obliged to contribute through their behaviour to the attainment of the aims of the Act. In the context of construction projects they are required to consider whether, and to what extent, products can be used that are either particularly durable; or that result in less or less-polluting waste, or that are made from recycled materials.


Guidance for public works with information about the ecological impact of construction products and environmentally friendly products is given through Planungshilfen Umweltschutz im Bauwesen; Fachkommission Standardisierung und Rationalisierung des Hochbauausschusses (LAG) der ARGEBAU’.

Closing Comment on the Relative Effectiveness of the Different Measures

High disposal costs combined with the prospect of future changes to landfill management practices (see section 1.3 above) drive most decisions. The recycling industry considers the ‘obligation to recycle’ to be unclear and open to conflicting interpretations.

* * * * * * *

(See next page for footnote)
Introduction

The supplementary subsidiary regulations of the Closed Substance Cycle and Waste Management Act consist of various ordinances that restructure supervision under waste management law and align it with EU law. These include:

- Waste Classification Ordinances (the Ordinances on the Classification of Waste Requiring Special Supervision and of Waste for Recovery that Requires Supervision;
- the Ordinance on Furnishing of Proof; and
- the Ordinance on Licensing of Transport.

The subsidiary regulations also include ordinances that create a basis for further deregulation of supervision. Holders of waste are largely exempted from supervision in cases in which environmental compatibility of waste management has been documented, by means of concepts and waste life-cycle analyses, or in which waste management is carried out by specially qualified waste management companies. The formal basis for these changes is provided by:

- the Ordinance on Waste Management Concepts and Waste Life Cycle Analysis;
- the Ordinance on Specialised Waste Management Companies; and

The new supervision regulations will be phased in gradually in order to help waste holders and authorities to make the transition to the new laws. Full compliance will not be required until 1 January 1999.

1. Waste Classification Ordinances

The Closed Substance Cycle and Waste Management Act applies criteria of hazardousness to differentiate between waste requiring supervision and waste requiring special supervision. While documentation procedures are already mandated by law for waste requiring special supervision, authorities must mandate such documentation procedures, in individual cases, for waste requiring supervision.

(a) The Ordinance on the Classification of Waste requiring Special Supervision (Verordnung zur Bestimmung von besonders überwachungsbedürftigen Abfällen) transposes the EU's catalogue of hazardous wastes. In addition, it contains regulations for wastes that require special supervision, as a result of hazardous characteristics listed in the Closed Substance Cycle and Waste Management Act.

(b) The Ordinance on the Classification of Waste for Recovery that Requires Supervision (Verordnung zur Bestimmung von überwachungsbedürftigen Abfällen zur Verwertung) applies to wastes that, while less hazardous, tend to fall into a grey area between recovery and disposal. In the past this uncertainty often encouraged illegal disposal of the waste covered by this ordinance. Authorities now have better options for supervision of the waste types mentioned in this ordinance. Waste producers are required to keep documents on file relative to the disposal of such waste. All relevant fractions of C&DW are listed in this Ordinance.

2. Ordinance on the Furnishing of Proof

The heart of the subsidiary regulations is the Ordinance on the Furnishing of Proof (Nachweisverordnung). It governs the supervision procedure set forth by the Closed Substance Cycle and Waste Management Act for waste for disposal and waste for recovery. The Ordinance on the Furnishing of Proof replaces the old Ordinance on Supervision of Waste and Residual Materials (Abfall- und Reststoffüberwachungsverordnung).

The new Ordinance makes the supervision procedure simpler and less bureaucratic, for both waste holders and the authorities. The authorities are no longer required expressly to approve disposal procedures. Pursuant to the new Ordinance on Furnishing of Proof, a waste producer's disposal procedures are considered officially approved if the authorities do not reject the relevant application within 30 days. In addition, authorities are not required to apply any proof procedures in cases in which disposal is handled by specialised, certified waste management companies, and that takes
place in facilities that meet strict environmental standards for waste management. These changes will facilitate and accelerate procedures.

3. Ordinance on Licensing of Transport

The Ordinance on Licensing of Transport (Verordnung zur Transportgenehmigung) replaces the relevant approval regulations contained in the old Ordinance on the Supervision of Waste and Residual Materials.

The Ordinance sets forth requirements for the technical expertise, know-how and reliability of waste collectors and transporters. It considerably simplifies transport licensing legislation. Transport licences, which in future are also required for transport of wastes for recovery that require special supervision, are to be issued independently of specific instances of transport, and will have indefinite validity in relevant areas throughout all of Germany.

4. Ordinance on Waste Management Concepts and Waste Life Cycle Analysis

Pursuant to the Closed Substance Cycle and Waste Management Act, the Ordinance on Waste Management Concepts and Waste Life Cycle Analysis (Verordnung über Abfallwirtschaftskonzepte und Abfallbilanzen) requires waste producers to prepare waste-management concepts and waste life cycle analyses when their waste production exceeds a certain volume threshold. Such concepts and analyses contain information about the type, amount and final whereabouts of the waste-producer's waste, and about measures planned or taken to prevent, recover and dispose of this waste. Consequently, they are tools for internal company planning and supervision that enable companies to optimise their waste management.

Companies that properly prepare and submit waste-management concepts and life cycle analyses, if they dispose of their waste in their own facilities, are exempted from procedures for furnishing proof. Waste producers are rewarded for responsible conduct and initiative. The Ordinance governs the requirements relative to the content and form of these concepts and life cycle analyses.

5. Ordinance on Specialised Waste Management Companies, and the Directive on the Activities and Approval of Waste Management Partnerships

Pursuant to the Closed Substance Cycle and Waste Management Act, a specialised waste management company is a waste management company that is entitled to advertise a quality certification received from a recognised waste management association, or that has concluded a supervision contract with a technical supervision organisation. The law mandates that certified waste management companies, because they supervise themselves, require neither transport licences nor licences to carry out agency transactions. The Ordinance on the Furnishing of Proof also considerably eases the proof procedures for such companies. Proof procedures are not required in cases in which waste management is handled by specialised waste management companies. The Ordinance on Specialised Waste Management Companies (Entsorgungsfachbetriebeverordnung) and the Directive on the Activities and Approval of Waste Management Partnerships (Entsorgergemeinschaftenrichtlinie) set forth the requirements for the organisation and activities of such companies, as well as the requirements relative to the reliability and technical expertise of relevant persons within such companies.

The specialised waste management company certification - like an eco audit - is completely voluntary. As a result of the privileges and competitive advantages such certification can provide with respect to statutory procedures, large numbers of waste management companies can be expected to apply for certification.
2. UNITED KINGDOM

2.1 Restrictions or bans on disposal

No such measures exist in the UK other than particular requirements relating to controls on the disposal of hazardous components of C&DW.

2.2 Mono landfill

There are no requirements that particular C&DW streams must be sent to mono landfills in the UK.

2.3 Other environmental or planning controls

There are no specific measures within UK Town and Country Planning legislation which require developers to deal with particular C&DW streams in a specified manner. However, guidance issued by the UK Department of the Environment, Transport and the Regions (DETR) does allow Local Planning Authorities to consider a developer’s proposals on waste management measures when they are deciding on any planning applications, and the new ‘British Standards Code of Practice for Demolition (BS6187)’ is due to be published in the spring of 1999. Furthermore, Local Planning Authorities are empowered to attach conditions to planning consents, and these can include controls on waste management practices. Such controls may be challenged if they are considered by applicants to go beyond the scope of the relevant law (ultra vires).

The UK Environment Agency has responsibility for licensing waste management site operations in respect of the potential impacts of emissions and discharges on soils, air quality, ground and surface water quality. Authorisation from the Environment Agency is also required for the operation of crushers on sites which are otherwise exempt from waste management licensing. Controls imposed under these regulations will affect waste management practices at waste management sites.

2.4 Taxes (landfill and others)

Wastes going to licensed landfills in the UK have, since October 1996, been subject to a landfill tax. There are two tax bands, applied to ‘active’ and ‘inactive’ (inert) wastes. The applicable rates are £7/tonne and £2/tonne (10.10 and 2.90 ECU/tonne) respectively. C&DW used for daily cover at landfills, or for preparing access roads within the landfill, or for engineering waste cells, is subject to the landfill tax.

C&DW used for landfilling or land raising on the site of origin (provided it is a site which has been registered as exempt) is not liable to the landfill tax. Nor is waste used for ‘environmentally beneficial purposes’ elsewhere, such as land restoration, bunding and farm roads.

Changes announced in the 1998 Budget will see the active waste tax rate rise from £7/tonne to £10/tonne (10.10 to 14.50 ECU/tonne) in April 1999 with the inactive tax rate being frozen at £2/tonne (2.90 ECU/tonne). A new exemption will be introduced in October 1999 which will apply to inactive waste used for the restoration of landfills and quarries.

In addition to the current landfill tax the UK Government is in consultation regarding a possible aggregates tax, which would be payable where natural (non-waste) materials are won from quarries and pits.

2.5 Subsidies

The Department of Trade & Industry provides grants to companies in Assisted Areas (these being areas which qualify for financial aid primarily as a result of the decline of local industry or agriculture). These grants can be used to finance the purchase of crushing plant, among many other things.
2.6 Positive waste planning measures


Government guidance on waste planning, in particular relating to the allocation of responsibilities between the Environment Agency, Local Planning Authorities and Environmental Health Officers, is provided through Planning Policy Guidance No.23 (PPG23, entitled ‘Planning and Pollution Control’), issued in July 1994. A new guidance note (PPG10, entitled ‘Waste Disposal and Management’) is undergoing consultation and is expected to be issued later in 1998.

Responsibility for waste management planning is divided between the Environment Agency (in England and Wales) or the Scottish Environment Protection Agency (in Scotland) or the Department of the Environment (NI) (in Northern Ireland) and Local Planning Authorities.

The Environment Agency and the Scottish Environment Protection Agency have responsibility for identifying the nature and volume of waste arisings and the facilities required for their management. Responsibility for identifying land suitable for waste management facilities lies with the Local Planning Authorities. However, around London and certain other large cities there are statutory ‘Green Belts’ in which there is a general presumption against locating waste management facilities. In general the Town and Country Planning system requires Local Authorities to designate land within their area for different uses, including waste management and waste disposal. It focuses on whether the development itself is an acceptable use of the land, rather than on the control of the processes or substances themselves. Pollution control and licensing is the responsibility of the Environment Agency and the Scottish Environment Protection Agency (see 2.3 above).

2.7 Research and development support

The DETR supports a range of research projects. These have included several projects in recent years concerned with the re-use and recycling of C&DW as a means of reducing reliance on virgin aggregates.

The DETR also contributes money to research projects managed by other bodies, such as the Building Research Establishment (BRE, an executive agency of the DETR) and the private sector Construction Industry Research and Information Association (CIRIA). Both the BRE and CIRIA have run research projects into C&DW-related topics. CIRIA has recently completed a study entitled ‘Waste Minimisation and Recycling in Construction’ which included the development of good practice guides for designers and construction personnel.

The Highways Agency and the Transport Research Laboratory are also involved in research into the use of C&DW in road construction, particularly regarding specification issues.

2.8 Pilot and demonstration schemes

The BRE has undertaken a demonstration programme called Phoenix, which involved the construction of a new office building primarily from recovered and recycled C&DW.

Somerset County Council, the Highways Agency, the County Surveyors Society, the Transport Research Laboratory and Colas Ltd have recently completed the Linear Quarry Project (the reconstruction of part of the A3088 trunk road using in-situ recycling techniques) to test draft specifications.

2.9 Voluntary agreements

There are no formal VAs (using the term in the sense in which it is used by DGXI) relating to C&DW in the UK, though a national VA between the Department of the Environment (now the DETR) and the British Rigid Urethane Foam Manufacturers’ Association was signed in 1996 with the objective of reducing adverse environmental impacts as the insulation sector switches from HCFCs to CFCs. This should reduce the hazardousness of some future C&DW.

2.10 Education and training
The Government does not operate any formal educational or training programmes specifically geared to C&DW management in the UK, though it provides financial support to bodies such as CIRIA (see above) which do. A CIRIA research project (see 2.7 above) led to the production of a set of good practice guides for construction sites. A further handbook to encourage wider use of reclaimed and recycled materials in construction projects is to be published shortly by CIRIA.

The Environmental Services Association (which represents waste management companies) runs training courses on waste management in general, which include aspects of C&DW management.

2.11 Advisory services

The DETR has been funding a pilot information service, the Aggregates Advisory Service (AAS), since March 1996. The project is programmed to run until March 1999, and alternative methods of providing a similar service after March 1999 are being studied at present. The AAS collects and collates information from other bodies and advises the construction industry and others free of charge of the information available. A specific aim of the AAS is to assist the Government to achieve its objective of reducing reliance on virgin aggregates by increasing the contribution from secondary and recycled materials, including C&DW.

2.12 Waste exchanges

There is an active market for C&DW in the UK. Recoverable items are sold by demolition contractors, and there is a well established demand for recycled materials, including C&DW-derived aggregates.

The DETR and the BRE operate the Internet-based Construction and Demolition Materials Information Exchange. A similar scheme is run for the County of Berkshire.

2.13 Standards and norms for recycled materials

Historically UK standards and norms have been ‘recipe’ based rather than ‘performance’ based. As a result the use of secondary and recycled aggregates has often been discouraged because they are not specifically mentioned.

One standard which applies to both new and recycled materials, and which sets an upper limit on the percentage of recycled materials is the ‘Specification for Highway Works (1993)’, prepared by the Highways Agency for the Department of Transport.

The only key standard which relates specifically and solely to the use of recycled materials is ‘BS6543: 1985 British Standard Guide to the Use of Industrial By-products and Waste Materials in Building and Civil Engineering’.

2.14 C&DW processing facilities

All C&DW processing centres in the UK are operated by the private sector. It can be assumed that all such centres operate at least one concrete crusher. Research recently published by the AAS identified 383 companies in England and Wales as holding process authorisations or waste management licences in 1997 in respect of mobile and fixed C&DW management operations or primary aggregates crushing in quarries. No comparable data are presently available for Scotland or Northern Ireland.

2.15 Other measures

As mentioned above (see Section 2.3) a new ‘British Standards Code of Practice for Demolition (BS6187)’ is due to be published in the spring of 1999.

The DETR considers that the broad public educational role described as ‘policy advocacy’ is one of the most important measures available to Government in promoting a greater awareness of issues related to C&DW management, and specifically to recycling.

According to the DETR, some Local Authorities give preference to recycled C&DW for their own construction projects.
Closing Comment on the Relative Effectiveness of the Different Measures

The DETR considers that the greatest single impact on C&DW management practices has come about as a result of the introduction of the Landfill Tax. However, this followed a gradual trend towards the commercialisation of waste management, and the impacts of all the other measures described above.
3. FRANCE

3.1 Restrictions or bans on disposal

There is no restriction on disposal of C&DW, other than disposal of packaging. Non-household packaging management is regulated by Decret n°94-609 (13 July 1994), which only allows re-use, recycling or energy recovery. Landfilling and incineration without energy recovery are forbidden.

The disposal of asbestos cement products (which is mainly a problem because of emissions of asbestos fibres to the atmosphere) is covered by Circulaire n°97-15 (9 January 1997). This defines the conditions for processing, transport and final disposal. Only specific landfills can receive this kind of waste, and they must have specific cells, must prevent any crushing, and must be covered. About 15 landfills have been approved to accept asbestos cement waste.

Disposal of embodied asbestos products is governed by Circulaire n°97-0320 (12 March 1997), which complements two earlier Circulaires (n°96-60 and n°97-15). It sets out the elimination process for each type of product. In all cases the enterprise responsible has to provide information on the characteristics of their asbestos waste, in order to determine the appropriate disposal route.

There are restrictions on the disposal of gypsum waste designed to protect groundwater. Landfills which receive gypsum waste must have specific (and covered) cells. Although plaster mixed with inert construction materials (such as bricks and concrete) can go to a ‘Class 3’ (inert waste) landfill, gypsum which has been mixed with other wastes (such as wood, cardboard or polystyrene) can only be disposed of in a ‘Class 2’ landfill. The classification of landfills is as follows:

- ‘Class 1’ landfills (one per region) are for special industrial wastes;
- ‘Class 2’ landfills are for household and similar wastes;
- ‘Class 3’ landfills are for inert wastes.

3.2 Mono landfill

There are no specific requirements other than those described above for asbestos products.

3.3 Other environmental or planning controls

There are no other specific measures to report yet.

Regulations are fixed at the national level, and neither the communes nor the regions can vary them. However, if they collect ‘craftsmen’s waste’ with household waste, they can impose a special charge (assuming that the main final destination is landfill).

3.4 Taxes (landfill and others)

There is a nationally-applicable waste tax set by ADEME. Until 2002 the level of tax will be 40 FF/tonne (6 ECU/tonne) for all ‘Class 1’ and ‘Class 2’ landfills and for all other destinations other than recovery. There is no ADEME tax on ‘Class 3’ (inert) landfills.

Tariffs vary from region to region, and they are set by the landfill owners/operators. Typical tariffs (including the ADEME tax where applicable) are up to 80 FF/tonne (12 ECU/tonne) for inert wastes (‘Class 3’ landfills), and 200-500 FF/tonne (30-76 ECU/tonne) for ‘Class 2’ landfills.

Tariffs for ‘Class 1’ landfills depend heavily on the type of waste concerned. In a guide published by ADEME, the tariff given for hazardous C&DW is 900 FF/tonne (136 ECU/tonne) except for asbestos waste, for which it is between 2,200 and 2,800 FF/tonne (333-424 ECU/tonne).

3.5 Subsidies

There are no direct subsidies.
3.6 Positive waste planning measures

There is no target for re-use, but the French Housing Ministry and ADEME have taken several actions to discourage the generation of C&DW and to promote its re-use, including:
- the ‘Chantiers Verts’ programme started in 1993, covering new housing construction and renovation: 12 experimental sites;
- several calls for tender since 1993 to support research programmes dealing with C&DW recovery;
- a current call for tender dealing with selective demolition;
- publication of many information documents for architects, building contractors, industrialists etc;
- the introduction of a new specific qualification (QUALIBAT) for demolition contractors.

3.7 Research and development support

Several government programmes and departments (such as the ‘Plan Urbanisme Construction et Architecture’ and the ‘Direction Générale de l’Urbanisme, de l’Habitat et de la Construction’ from the Housing Ministry), local authorities and other public sector organisations (including CSTB, CEBTP, LCPC and ADEME) run their own R&D programmes in the field of prevention, re-use and recycling of C&DW, as well as providing financial and management support for feasibility studies, research projects etc. carried out by others. Such studies and investigations are often carried out by industrial companies, consultancy firms, universities, contractors and laboratories.

3.8 Pilot and demonstration schemes

The following are the only pilot and demonstration schemes in France:

<table>
<thead>
<tr>
<th>Application</th>
<th>Secondary raw material</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road sub-base material</td>
<td>Concrete, masonry, mixed aggregates</td>
<td>No specific projects: many examples</td>
</tr>
<tr>
<td>District heating</td>
<td>Wood</td>
<td>REX Voglans (Savoie)</td>
</tr>
<tr>
<td>Sports ground (tennis court)</td>
<td>Terracotta products</td>
<td>REX Demolition Mulhouse</td>
</tr>
</tbody>
</table>

REX is the ‘Réalisation Expérimentale (Chantiers Verts)’ programme.

3.9 Voluntary agreements

There are no VAs relating to prevention and re-use of C&DW.

3.10 Education and training

Two organisations representing the construction industry, the Fédération Nationale du Bâtiment (FNB) and the Confédération de l’Artisanat et des Petites Entreprises du Bâtiment (CAPEB), have set up some training sessions at a national level for contractors.

Some local authorities (such as the Conseil Régional Languedoc Roussillon) also finance some initiatives in education and training, including courses provided by ADATIRE in professional schools.

3.11 Advisory services

Both commercial and not-for-profit organisations such as ADEME, CSTB (Centre Scientifique et Technique du Bâtiment) and ADATIRE provide advisory services in the field of prevention and re-use of C&DW.

3.12 Waste exchanges

No waste exchanges relevant to the construction sector are yet active.

3.13 Standards and norms for recycled materials

There are no specific standards and norms for recycled materials. All new products, including recycled materials, have to get an ‘Avis Technique’ (technical agreement).

3.14 C&DW processing facilities
There are approximately 50 fixed crushers operating in France with a joint capacity of 5 million tonnes. Most of them are operated by members of SNPGR (the Syndicat National des Producteurs de Granulats Recyclés).

3.15 Other measures

There are no other measures to report.

Closing Comment on the Relative Effectiveness of the Different Measures

C&DW recycling is felt to be at a very early stage in France, with considerable scope for development in several geographical areas. This was implicitly acknowledged in a letter sent in mid-1998 by the Ministry of the Environment to all Prefects which asks them to use their influence to encourage recovery and recycling activities in their areas.
4. Italy

4.1 Restrictions or bans on disposal

No such measures exist in Italy, where regulation of landfills in general has been much more of a focus than regulation of specific waste streams. Much C&DW is understood to be dumped on unregulated sites or simply fly tipped.

4.2 Mono landfill

There are no formal requirements that particular C&DW streams must be sent to mono landfills in Italy.

4.3 Other environmental or planning controls

Controls on demolition and recycling activities may be exercised by Regional, Provincial and Municipal authorities, depending on the activity concerned. There are no specific measures which require developers to deal with particular C&DW streams in a specified manner, and in practice very few controls on the disposal of C&DW. Demolition is tightly controlled, and in recent years outright demolition has become less common. Most C&DW comes from renovation sites.

4.4 Taxes (landfill and others)

There is a tax of 2 Lire/kg (1.00 ECU/tonne) on inert wastes going to landfill. For other wastes, the rate can rise to 10 ECU/tonne.

4.5 Subsidies

We are unaware of any subsidies being granted to C&DW recycling activities.

4.6 Positive waste planning measures

There is a national waste strategy for Italy, which raises the basic issues related to C&DW recycling. Some municipalities have taken initiatives to put these objectives into local practice. For example a consortium of local authorities and construction companies in the north of the country established a C&DW recycling centre near Como several years ago, which is one of the largest in the country.

4.7 Research and development support

The Italian government has a limited research programme.

4.8 Pilot and demonstration schemes

Further information on this subject is being requested.

4.9 Voluntary agreements

There are not believed to be any national or local VAs in Italy related to C&DW.

4.10 Education and training

No formal educational or training programmes specifically geared to C&DW management are offered in Italy.

4.11 Advisory services

There is not believed to be an advisory service available to C&DW recyclers in Italy.
4.12 Waste exchanges

There is a conventional market for high value materials (metals, architectural salvage etc), but we are unaware of any formal waste exchange.

4.13 Standards and norms for recycled materials

There is not believed to be any formal standard for recycled materials in Italy, though laboratories as the University of Milano’s geotechnical laboratory can test recycled materials against the standards for acceptance for highways work (ANAS). However, in a significant move which facilitates the development of a market for C&DW-derived aggregates, the highway and railway authorities recently decided to accept C&DW on their schemes.

4.14 C&DW processing facilities

There are believed to be roughly 10 C&DW recycling centres in northern Italy, including some operated by local authorities (see 4.6 above). The largest ones are near Reggio Emilia, Modena, Milano and Como, each with a processing capacity of around 200,000 tonnes a year. There are a further 50-100 mobile crushers, but there is not believed to be a central register of mobile crushing and sorting machines.

4.15 Other measures

We are unaware of any other measures in Italy.

Closing Comment on the Relative Effectiveness of the Different Measures

C&DW is generally treated as an inert waste in Italy, and its re-use is affected by the widespread availability of marble quarries’ waste materials. None of the measures listed above appear to have had a clear impact on C&DW management practice, though opening the way for C&DW-derived aggregates in road and railway construction (see 4.13 above) can only be positive.
5. SPAIN

5.1 Restrictions or bans on disposal

No such measures exist in Spain, where regulation of landfills in general has been much more of a focus than regulation of specific waste streams. The government is in the middle of a programme under which a large numbers of unregulated (but acknowledged) local landfills are being closed down and landscaped, with waste going instead to larger, formally managed facilities (see Annex 10, Ref 11.3).

5.2 Mono landfill

There are no formal requirements that particular C&DW streams must be sent to mono landfills in most regions of Spain, though in Catalonia a network of specialist C&DW landfills has been established to which C&DW is increasingly being directed.

5.3 Other environmental or planning controls

Controls on demolition and recycling activities may be exercised by Regional, Provincial or Municipal authorities, depending on the activity concerned. In most parts of Spain there are no specific measures which require developers to deal with particular C&DW streams in a specified manner (though see 5.6 below).

5.4 Taxes (landfill and others)

There are no taxes on waste or aggregates in Spain, nor are any planned at present. The Spanish Treasury dislikes hypothecation (allocation of tax revenues to a specific activity), which would probably be the only way in which such taxes could be ‘sold’ to industry and the public.

5.5 Subsidies

A new C&DW recycling centre is being developed on the outskirts of Madrid, for which LIFE funds have been used.

A C&DW recycling centre in Barcelona (see 5.6 below) was established with a major shareholding provided by a company in which the Area Metropolitana de Barcelona (a consortium of local authorities) holds a 25% share, and with a representative of the AMB acting as company president.

5.6 Positive waste planning measures

Waste planning is primarily a regional matter in Spain. In 1994 the Catalan government published a decree related specifically to C&DW management (Decret 201/1994). This imposes obligations on the owners of buildings and sites and on contractors, including the obligation that contractors be licensed to handle C&DW. It also requires a demolition plan to be lodged before a building can be demolished, and this plan has to show how much of the resultant C&DW is to be recovered or recycled, and by whom. An accompanying guide to the application of the decree has also been published by the Waste Board (Junta de Residus).

The Madrid provincial government has made allowance for recycling, and a centre is being developed on the outskirts of Madrid. The Basque government has issued a consultation document on C&DW recycling, and at least one quarry operator is believed to be seeking to identify a site close to Bilbao where a recycling centre could be developed.

Other C&DW recycling initiatives have been pursued around Valencia and Pamplona, but the scale of these has been relatively modest.
5.7 Research and development support

The Spanish government’s road research agency (CEDEX) has an active research programme covering road construction, the recycling of road materials and the use of other waste materials (including C&DW) in road construction.

Various universities and research institutes have R&D projects which touch on C&DW, but coordinated information is not available.

5.8 Pilot and demonstration schemes

Both CEDEX and some provincial authorities have treated road recycling R&D projects as demonstration projects.

The Madrid C&DW recycling centre (see above) will act as a demonstration project when it is complete.

5.9 Voluntary agreements

There are no national VAs in Spain related to C&DW.

5.10 Education and training

No formal educational or training programmes specifically geared to C&DW management are offered in Spain.

5.11 Advisory services

There is no advisory service available to C&DW recyclers in most of Spain, but considerable guidance is available through the Waste Board (Junta de Residus) in Catalonia.

5.12 Waste exchanges

In most of Spain there is a conventional market for high value materials (metals, architectural salvage etc), but no formal waste exchange. In Barcelona the ‘Borsa de Subproductes’ operates a, Internet-based waste exchange which includes C&DW.

5.13 Standards and norms for recycled materials

Although there is no formal standard for recycled materials in Spain, it is being considered by CEDEX (see above), AENOR (the Spanish standards agency) and ANEFA (the body that represents quarry owners).

In the meanwhile, the C&DW recycling centre which is being developed near Madrid offers materials to a standard which is certified by an independent research centre (the Instituto de Ciencias de la Construcción ‘Eduardo Torroja’).

5.14 C&DW processing facilities

There are believed to be three recycling centres in Spain, two near Barcelona and a second (under development) near Madrid. A fourth is being considered for Bilbao. There is no central register of mobile crushing and sorting machines, or road recycling equipment.

The centres near Barcelona are at Granollers and Terrassa, both with relatively small crushing and grading machinery. The main initiative in this region is coordinated by Gestora de Runes de la Construcció SA (GRC) a company established in 1994 with a brief to establish and manage C&DW landfills throughout Catalonia. The shares in GRG are held by the Junta de Residus (45%), 90-odd construction companies (45%) and the Catalan Construction Federation (10%). GRC in turn hold shares (between 25% and 100%) in the companies that operate 15 C&DW landfills, two transfer stations and the Granollers recycling plant (see above). Plans are in hand to create a further nine landfills.
One of GRC’s major ventures is Gestora Metropolitana de Runes SA (GMR), in which it holds 10% of the shares, with 45% being held by a public company (TERSA) and 45% by 67 construction companies. GMR operates three landfills/land reclamation schemes in Barcelona, and has plans to establish two or three waste transfer stations with mobile crushers. It is intended that other mobile crushers will go round GRC’s C&DW landfills on a rotational basis, crushing inert material and generating C&DW-derived aggregates.

Prior to the Barcelona Olympics there was a substantial C&DW recycling plant in Barcelona, and the personnel who are primarily responsible for GRC and GMR were involved with that venture. The reason why the plant is hardly used now is that landfilling is still too cheap to justify crushing and transporting C&DW. GRC/GMR plan to install a new C&DW crushing, sorting, separation and washing plant in the port area in 1999 which will be able to handle clean soil as well as C&DW.

Fourteen of the largest demolition contractors are represented by the Asociación Española de Empresarios de Demolición (AEDED). Some of these are starting to purchase mobile crushers for on-site processing.

5.15 Other measures

We are unaware of any other measures in Spain.

Closing Comment on the Relative Effectiveness of the Different Measures

In most regions it is fair to say that none of the measures listed above have yet had a clear impact on practice. The specific C&DW-related decree in Catalonia and the supporting initiatives taken by the regional government and other local entities has made a considerable difference there.
6. THE NETHERLANDS

6.1 Restrictions or bans on disposal

As from 1 January 1997 there has been a total national ban on the disposal of re-usable C&DW (through the ‘Besluit stortverbod afvalstoffen’). As a result only certified C&DW crushers and sorters are allowed to dispose of non-re-usable C&DW. It is expected that in the near future the same permission will be granted to certified demolition waste contractors. Guidance on which materials fall into which category is as follows:

<table>
<thead>
<tr>
<th>Re-usable C&amp;DW</th>
<th>Non-re-usable C&amp;DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masonry and concrete rubble</td>
<td>contaminated rubble</td>
</tr>
<tr>
<td>Metals</td>
<td>(coal)tar</td>
</tr>
<tr>
<td>Non-impregnated wood</td>
<td></td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td></td>
</tr>
<tr>
<td>PE-sheet</td>
<td></td>
</tr>
<tr>
<td>PVC</td>
<td></td>
</tr>
</tbody>
</table>

6.2 Mono landfill

With the exception of contaminated sludge, there are no requirements with respect to sending materials to mono landfills in the Netherlands.

6.3 Other environmental or planning controls

The ‘Soil Protection Decree’ provides the legislative basis for the use of primary as well as secondary raw materials. The aim of this decree is to protect the soil and surface water, and to promote re-use of materials.

Demolition waste contractors are also subject to several other laws and regulations. A regional environmental by-law (Provinciale Milieu Verordening) came into force on 1 January 1996. This by-law forces demolition waste contractors to segregate certain waste materials (which should already have been separately removed) when storing them. It covers:
- asbestos;
- wood;
- masonry and concrete rubble.

In the second part of this by-law (which comes into force during 1998) these measures will be tightened. Furthermore, waste materials that have not been removed separately will have to be separated on the demolition site by the demolition waste contractors. This covers the following materials:
- compostable wastes;
- cardboard and paper;
- wood;
- glass;
- textiles.

So far this regional by-law has not achieved its intended effect. Many demolition waste contractors remain poorly informed about its provisions, and there is little or no checking (control) by the regional authorities on the effectiveness of the actual separation. At present the regional authorities are concentrating on disseminating information on the by-law.

Local Authorities were previously empowered to require C&DW to be separated on site. According to the local building regulations C&DW has to be separated into at least:
- hazardous waste;
- metals;
- masonry and concrete rubble;
- non-impregnated wood.
Local Authorities have the power to extend this list to include:

- sheet glass;
- paper and cardboard;
- PVC and PE tubes;
- PVC wall cladding;
- mineral wool.

6.4 Taxes (landfill and others)

A levy system is applied to landfills in the Netherlands. Tariffs differ from region (province) to region, and they range from NFL 50 to 200/tonne (23-90 ECU/tonne). The Government wishes to see these tariffs harmonised.

6.5 Subsidies

The Dutch Government offers contractors the opportunity to earn bonuses if they use secondary (C&DW-derived) aggregates instead of natural gravel in public works which come under the supervision of the Ministry of Transport, Public Works and Water Management.

6.6 Positive waste planning measures

In order to reach its target of 90% re-use of C&DW by the year 2000, the Dutch Government has taken several actions to discourage the generation of C&DW and to promote its re-use. Since 1996 there has been a government program aimed at the promotion of environmentally friendly products in the building sector. This scheme includes a number of measures in the field of prevention and re-use of C&DW. Some basic measures, including requirements or recommendations that certain C&DW streams be separated (see 6.3 above), and that crushed rubble be used as a secondary raw material, can be applied to all building projects, whereas other (recommended) measures could only be applied to a more limited group of projects.

In order to assist national, regional and local government organisations, the Ministry of Environmental Planning has published a handbook which provides a number of practical measures and instruments on the use of secondary raw materials. The main issues covered by the handbook concern:

- the design of long-range plans;
- policy development;
- advisory services, such as checklists with information on secondary raw materials;
- the creation of (temporary) incentives;
- improving the balance between primary and secondary raw materials;
- building specifications and the use of secondary raw materials;
- selection of participants (building contractors, architects, developers, etc.) with experience and knowledge in the field of secondary raw materials.

For many years Local Authorities have had several instruments available to them to stimulate the use of secondary raw materials. They can include specific regulations into development plans, they can attach conditions to building permits when they are issued, and they can impose conditions which affect the sale of building land. It is also within the competence of local government to make appointments with building contractors and housing associations on sustainable building in general and in particular on the use of secondary raw materials.

Not only governmental bodies have taken initiatives in this field. The two largest employers’ organisations in the Netherlands (VNO and NCW) have also developed special programmes aimed at encouraging the use of environment-friendly products.

In order to promote separate collection of C&DW, the Dutch association of demolition waste contractors (BABEX) has set up a system of certification for its members. The certificate prescribes separate removal of C&DW as well as separate supply to recycling units. A similar system of certification has been set up by the equivalent body for crushers and sorters (BRBS).
6.7 Research and development support

Governmental and other public sector organisations (such as RIVM, CUR, CROW, NOVEM and SBR) run their own R&D programmes in the field of prevention, re-use and recycling of C&DW as well as providing financial and management support for feasibility studies, research projects etc. carried out by others. Such studies and investigations are often carried out by consultancy firms, universities, contractors and laboratories.

The R&D programme has investigated the use of C&DW-derived aggregates as a coarse material in concrete. Partial replacement (up to 20%) of natural aggregates (gravel) in concrete is becoming more and more common. Studies have also been established into the recycling of wood, aiming at the use of chipped processed wood in composite board materials.

6.8 Pilot and demonstration schemes

The following are among the most important pilot and demonstration schemes in the Netherlands:

<table>
<thead>
<tr>
<th>Application</th>
<th>Secondary raw material (processed C&amp;DW subwaste stream)</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landraising</td>
<td>Soil and dredging spoil</td>
<td>Coverage of dikes in Streefkerk and Hoek van Holland</td>
</tr>
<tr>
<td>Sub-base material</td>
<td>Concrete, masonry, mixed aggregates</td>
<td>No specific projects: many examples</td>
</tr>
<tr>
<td>Surface</td>
<td>Sieve sand</td>
<td>Stabilisation layer Rotterdam</td>
</tr>
<tr>
<td>Surface</td>
<td>Asphalt granulates</td>
<td>No specific projects</td>
</tr>
<tr>
<td>Surface</td>
<td>Masonry, mixed granulates</td>
<td>No specific projects</td>
</tr>
<tr>
<td>Coarse aggregates in concrete</td>
<td>Concrete, masonry, mixed aggregates</td>
<td>Police station at Hoogvliet, Dwellings in Amersfoort, Delft, Amsterdam and Rotterdam, Ministry of Housing Spatial Planning and the Environment, Sluices in Helmond, Office and production halls in Nijkerk</td>
</tr>
</tbody>
</table>

6.9 Voluntary agreements

In 1995 the Dutch Government and approximately 20 industry organisations, including BABEX (the demolition waste contractors’ organisation), agreed on measures to prevent and re-use C&DW. This VA has been incorporated into a policy declaration.

Several participants in the building process have already entered into VAs on the prevention and re-use of C&DW. Others intend to do so in the near future.

In 1996 demolition waste contractors and suppliers of aluminium building materials agreed on a joint effort to promote a ‘closed cycle/closed life cycle’ approach to aluminium building products. In the same year demolition waste contractors and a glass recycling company agreed on the separate collection of glass from demolition sites.

6.10 Education and training

The Dutch government does not operate any educational or training programmes specifically geared to C&DW management.

6.11 Advisory services

Advisory services in the field of prevention and re-use of C&DW are provided by commercial as well as not-for-profit organisations.
6.12 Waste exchanges

We are unaware of any officially-supported waste exchange programmes in the Netherlands.

6.13 Standards and norms for recycled materials

Standard performance specifications (RAW 1995) are available where recycled and mixed aggregates are to be used as a sub-base material.

The main standards and norms applicable to recycled aggregates are as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Application</th>
<th>Standards, norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete aggregates</td>
<td>Coarse aggregate in concrete</td>
<td>CUR recommendation 4 NEN 5905: 1988 NEN 5950: VBT</td>
</tr>
<tr>
<td>Masonry aggregates</td>
<td>Coarse aggregate in concrete</td>
<td>CUR recommendation 5 NEN: see above</td>
</tr>
<tr>
<td>Crusher sand</td>
<td>Fine aggregate in concrete</td>
<td>NEN 5905</td>
</tr>
</tbody>
</table>

6.14 C&DW processing facilities

There are approximately 120 crushers operating in the Netherlands with a joint capacity of 16.25 million tonnes. Roughly 15% of these crushers (around 20) operate on construction sites, with the others (around 100) located on fixed recycling centres. Some 55% of the companies active in this field are members of the BRBS.

Whereas old glass- and rockwool insulation materials from demolition sites are collected separately for landfiling, some unused new materials from construction sites are recycled. Rockwool Lapinus has its own recycling-system to collect clean unused materials for use in manufacturing new product. For Glasswool the costs of re-use in the manufacturing process are still too high.

A small part of the C&DW insulation stream consists of PUR insulation plates. PUR is incinerated with energy recovery.

6.15 Other measures

There are no other measures to report.

Closing Comment on the Relative Effectiveness of the Different Measures

The most effective single measure has been the ban on the disposal of re-usable C&DW.

Despite all of the actions described above, it is acknowledged that the overall effect on the more minor C&DW streams (such as wood, metals, plastics and glass) is disappointing, and the targets which have been set are far from being met. Consequently the Dutch Government is continuing its activities in the field of public/industry education.
7. BELGIUM

7.1 Restrictions or bans on disposal

**Flanders**
There are no legal restrictions or bans on disposal affecting C&DW in Flanders. However, the new VLAREA legislation (‘Vlaams reglement inzake afvalvoorkoming en –beheer’ of January 1998) states that unsorted industrial waste, the category to which most C&DW belongs, may not be landfilled from 1 July 1998. Indirectly, this means that C&DW should pass through some kind of sorting process. It is not yet clear if selective demolition and sorting *in situ* will suffice.

**Brussels**
The order of 16 March 1995 regarding obligatory recycling of certain types of non-contaminated C&DW in both private and public works created an indirect ban on disposal. Contaminated C&DW can still be landfilled. Contractors without recycling or recovery facilities are required to deliver the uncontaminated C&DW to a recycling or sorting company. This obligation could in theory be waived if the contractor could show that no company within a range of 60km accepts this type of waste. However, many recycling and sorting companies are established within 60km of Brussels, so this order has proved to be an effective way to restrict landfilling of C&DW. Most of Brussels’ C&DW has traditionally gone to landfills in Wallonia.

**Wallonia**
In Wallonia there are no restrictions or bans on disposal. The Walloon government is currently running a public inquiry to approve controlled landfills (‘Centres d’Enfouissement Techniques’ or CETs). It is expected that for inert waste, which covers most C&DW, 33 such landfills will be available.

7.2 Mono landfill

None of the three Belgian regions have requirements governing the sending of materials to mono landfills for possible future recovery. In Flanders, however, there are mono landfills for, among other things, the disposal of environmentally sound dredging sludge originating from public waterways.

7.3 Other environmental or planning controls

None of the regions have public environmental or planning controls which directly affect the disposal of C&DW.

However the VVS, an association representing most Flemish C&DW recycling plants, has recently taken action by filing complaints with the authorities whenever apparently illegal practices were identified, or C&DW materials appeared to be wrongly used. These actions only achieved limited success, due to the absence of a proper legal framework. However, the VLAREA legislation (see above) is expected to change this situation.

7.4 Taxes (landfill and others)

The average cost to a demolition contractor for sending C&DW to a Class III landfill (of which there are none in Brussels) varies from about 5.75 to 16 ECU/tonne, excluding transportation costs. Regional variations (in 1994/95) were as follows:

<table>
<thead>
<tr>
<th></th>
<th>Flanders</th>
<th>Wallonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class III landfill charge</td>
<td>6.50 ECU/tonne</td>
<td>2.00-7.50 ECU/tonne</td>
</tr>
<tr>
<td>Environmental tax</td>
<td>9.50 ECU/tonne</td>
<td>3.75 ECU/tonne</td>
</tr>
<tr>
<td>Total (excluding transport)</td>
<td>16.00 ECU/tonne</td>
<td>5.75-11.25 ECU/tonne</td>
</tr>
</tbody>
</table>

7.5 Subsidies

One Flemish fiscal measure designed specifically to promote the prevention of C&DW arisings is described in section 7.10 below. In addition, the government of Flanders levies a lower rate of tax on the disposal of the final waste fraction after C&DW has been processed. This effectively encourages the sorting and recycling of C&DW.
In Wallonia the government plays quite an active part in the management, and more particularly, in the organisation of the processing, of C&DW. Besides its active control of both publicly and privately operated controlled landfills, the Walloon government is a shareholder in SPAQUE (‘Société Publique d'Aide à la Qualité de l'Environnement’), which in turn invests in the creation of recycling plants by Tradecowall. Indeed the Walloon government decided on 7 July 1994 to invest 140 million BEF in a 25.1% share of the capital of these recycling companies.

7.6 Positive waste planning measures

Flanders
The legal basis for waste policy in Flanders is set down in the Waste Decree of 2 July 1981, which was considerably modified by the new Decree of 20 April 1994. Issues of particular relevance to C&DW management are described below.

Article 11 explicitly opens the way to using waste materials as secondary raw materials or products. Subsequently an application order on the prevention and management of waste (the VLAREA legislation mentioned in 7.1 above) was approved by the Flemish government on 17 December 1997 and published officially on 16 April 1998. This defines the rules and conditions in some detail in Chapter 4 (‘The Use of Waste Materials as Secondary Raw Materials’).

Of greatest relevance to the construction industry is §4.2.2., in which the conditions for the use of waste in or as construction material are defined. Considerable scope is identified for C&DW-derived aggregates, provided certain requirements regarding composition, leachability and conditions of use are respected. C&DW crushers and processors require a permit to process waste, and a certified Quality Assurance system. Thus, not only do the products have to fulfil certain environmental conditions, but the processing company or unit is also subject to specific conditions. As well as C&DW-derived aggregates, the VLAREA legislation considers other wastes which can be re-used as secondary raw materials in the construction industry, such as slags, ashes and sludges.

Articles 35 and 36 authorise the waste authorities (OVAM) to develop implementation plans directed at specific industrial sectors. Since this opportunity was already provided in the Flemish Strategic Waste Action Plan for 1991-1995, OVAM (together with the construction industry) developed an Implementation Plan for C&DW in 1995 (‘Het Uitvoeringsplan Bouw- en Sloopafval’). The main objective of this plan is to achieve a level of 75% recycling of C&DW by the year 2000. A maximum of 25% will then need to be disposed of using effective and environmentally sound techniques. Another key objective is to reduce the quantities of C&DW produced through qualitative and quantitative prevention measures.

Brussels
In the Brussels Capital Region environmental issues in general fall under the competence of the IBGE/BIM (Institut Bruxellois pour la Gestion de l’Environnement/Brussels Instituut voor Milieubeheer), which was created in 1989. Waste management is mainly based on the Order of 7 March 1991 on the prevention and management of waste. This order obliges the Brussels government to develop a waste management plan every 5 years. The first such plan (1992-1995) included a 70% target (by 1996) for C&DW recycling. Apparently this objective was achieved by 1995, since at that time it was estimated that some 75% of C&DW was recycled or recovered.

Therefore, a new objective of 95% re-use or recycling of C&DW by 2002 was proposed in the draft Waste Management Plan for 1998-2002, which was under public inquiry from 19 January to 18 March 1998. Tools to realise this ambitious objective are the incorporation of specific clauses allowing the use of recycled C&DW in public works and the organisation of major awareness-raising campaigns directed at the construction and demolition industry in order to stimulate on-site sorting. With regard to the first of these two tools, it is interesting to note that a Ministerial Circular of 9 May 1995 already allows the re-use of certain C&DW in public road and infrastructure works.

Wallonia
Until recently the legal basis for waste policy in Wallonia was defined in the Waste Decree of 5 July 1985. However, a new Waste Decree was adopted on 27 June 1996. One of the key provisions of this decree is the encouragement which it provides to the re-use and recycling of waste materials (defined in French as ‘l'utilisation de matières assimilables à des produits’). A draft application order on the establishment of a list of recyclable waste materials fit for use in certain applications is currently under discussion.
Waste management plans also play an important role in implementing waste management policy. The first one (for 1991-1995) did not specify a clear recycling target for C&DW. Information and awareness raising campaigns aimed at both the public and private sectors on ways to prevent waste arising, and directing C&DW towards controlled landfills and recycling plants, were given a high priority. However, according to ‘Horizon 2010’ (the new Walloon waste management plan), some 1.1 million tonnes were still disposed of in an uncontrolled way in 1997.

‘Horizon 2010’ was published on 29 April 1998, following a public inquiry in June 1997. Rising recycling targets are proposed: 74% by 2000, 81% by 2005 and 87% by 2010. At the same time landfilling of C&DW should be reduced, reaching a level of 10% by 2010.

7.7 Research and development support

All three regions run separate and joint R&D programmes and feasibility studies in the field of prevention, re-use and recycling of C&DW. Consultancy firms, universities and/or construction research centres carry out studies financed partly or completely by the authorities to collect information, to develop action programmes and to execute market and technical research.

Specific R&D programmes concerning the use of recycled aggregates in concrete and the production of better quality recycled aggregates (in terms of less impurities and contamination) were and are still financed by the construction industry and the regional authorities of all three regions. Research into the environmental quality of recycled products in terms of possible heavy metal and other contamination, which is used as a basis for the legal framework for the recognition of secondary raw materials, is financed by the authorities.

7.8 Pilot and demonstration schemes

In the early 1980s some big demonstration projects were established, including the use of recycled crushed concrete aggregates in new concrete for use in the Berendrecht lock in Antwerp harbour.

Currently the regional authorities consider that public works offer an ideal opportunity to demonstrate the rational use of recycled materials. In recent years the relevant regional government organisations (Departement Leefmilieu en Infrastructuur in Flanders, Ministère d’Equipement et Transport in Wallonia and IBGE-BIM in Brussels) have established technical specifications which permit the use of recycled materials in a whole range of applications. In order to encourage a more consistent approach, an inter-regional committee established uniform definitions for C&DW-derived aggregates. As a result of all this, the use of recycled aggregates as sub-base and base materials has become quite common.

However, in response to the Implementation Plan for C&DW (see 7.6 above), the Flemish authorities recently felt the need for new demonstration projects to show new and higher grade applications. It was decided to develop at least one such project in each of the Flemish provinces. Special technical specifications, which would become obligatory for specific public works, were established by a technical committee on which the construction industry as well as the authorities were represented. The use of crushed concrete aggregates in concrete used for cycle ways is one of the high grade uses to be demonstrated.

Another important demonstration project, financed by the Walloon authorities, concerned the use of recycled aggregates in road construction and in concrete products, such as blocks and tiles. This was set up in 1995, and the results were presented at a conference held in Namur in November 1996.

7.9 Voluntary agreements

The Flemish Implementation Plan for C&DW (see 7.6 above) and the Walloon voluntary collaboration agreement (‘Accord de branche’) of 14 July 1994 between government and the construction and demolition industries are both considered to be excellent examples of fruitful voluntary collaboration aimed at less waste and better recovery. Wherever possible, the regions prefer voluntary agreements and consensus objectives to far-reaching regulation.

In 1997 the Flemish Federation of Contractors (VCB) and the Flemish Organisation of Sorting Companies (VSO) agreed that contractors who sort waste on site should be guaranteed a better price for their waste. A new voluntary initiative which is expected in Flanders in the near future concerns the voluntary use of technical specifications for demolition works in which selective demolition and
on-site sorting are promoted. Such technical specifications are being developed by a working group active in the context of the Implementation Plan for C&DW.

7.10 Education and training

**Flanders**

Two initiatives in Flanders merit special mention. The first, known as the PRESTI programme, had as its main objective the raising of awareness in the construction and demolition industry of environmental issues, including noise, energy and waste. It was quite successful, and several information documents aimed at the different sub-sectors of the industry were published. These contained legal as well as technical information. Two further PRESTI programmes have subsequently been started, both aimed at the prevention of waste and the protection of the environment. Companies which install prevention systems in their processes can get subsidies from the government. Through these actions, the government wants to demonstrate the effectiveness of prevention.

A second initiative, also financed by the government, was the production of a brochure directed at architects. Through this short pamphlet, the authorities wish to educate architects about recent developments in C&DW prevention and recycling. Experience has shown that many of them were unaware of the potential for de-mountable construction, selective demolition and recycling. The fact that architects have a major influence on the C&DW stream motivated the authorities to inform them.

**Brussels**

In 1995 IBGE-BIM published a guide to the management of C&DW which brought together all the legal and technical information concerning the treatment, sorting and processing of C&DW. IBGE-BIM is currently working at a new edition of this guide, containing all recent developments and information.

**Wallonia**

In Wallonia, the MARCO programme, which is directly comparable to the Flemish PRESTI programme (see above), is currently running. The main difference is that MARCO is specifically directed towards small and medium sized construction and demolition companies and construction product manufacturers.

Another programme which also considers C&DW is the Ecoforma project. This is an Internet-based educational and training programme for the construction industry in both Wallonia and Brussels.

7.11 Advisory services

From 1994 to 1997 the regional authorities and the construction industry financed a national advisory service called ‘Recycling in the construction industry’. A separate national advisory service covering recycling in road construction, financed by the regional authorities and the road contractors, is currently running.

7.12 Waste exchanges

There is a federal waste exchange office, but it appears to have little impact on the C&DW sector. On a regional scale, the Flemish waste agency OVAM is operating an Internet-based waste exchange, but little use is made of this service for C&DW so far. The authorities in Brussels and Wallonia are studying the impact which a waste exchange might have on the construction industry.

7.13 Standards and norms for recycled materials

On the initiative of the Flemish recycling association (VVS) and the regional governments’ technical authorities, a voluntary certification scheme for recycled aggregates for use in unbound applications, cement-treated sand and gravel and lean concrete was developed. COPRO is the body responsible for the certification of these aggregates. The basis for the certification scheme is provided by technical specifications provided by the authorities, though the COPRO certification scheme also includes a control of the QA systems at the recycling plants.

At the moment a technical prescription for recycled concrete, masonry and mixed aggregates is being drafted by a working group reporting to the National Management Committee for the Certification of
Aggregates. This will enable BENOR, the national standards agency, to grant a quality label to such C&DW-derived aggregates. It is expected that the normative document will be ready by the end of 1998.

7.14 C&DW processing facilities

**Flanders**

About 80 C&DW recycling installations (crushing facilities) are in operation, with a combined annual capacity estimated at 5 million tonnes. About 40 sorting facilities which process C&DW amongst other wastes are also available.

It is expected that the new VLAREA legislation will lead to some rationalisation of the C&DW recycling industry. The fact that only C&DW processed by plants with QA certification can be used as a secondary product will probably result in the closure of some smaller, low quality recycling plants.

**Brussels**

As explained above (see section 7.1), Brussels depends on Flemish and Walloon facilities to process and dispose of its C&DW. However, it is expected that in the near future one or more private recycling plants will be installed in the Brussels territory. However, due to the high population density environmental constraints with respect to noise and dust are quite severe.

**Wallonia**

In the Walloon region, 10 recycling plants with an annual capacity of 650,000 tonnes were being operated by private companies and by Tradecowall in mid-1997. Since then Tradecowall, together with the primary aggregates sector, has established two further recycling plants in Namur and Tournai. There are 33 controlled landfills available for the disposal of C&DW.

7.15 Other measures

There are no other measures to report.

**Closing Comment on the Relative Effectiveness of the Different Measures**

There is a clear preference in Belgium for consensus-based measures over traditional regulation. Having said that, a wide range of measures including taxes, subsidies, R&D projects, advisory services and specifications has been introduced in combination.

Flanders has generally led the way in waste management within Belgium, including C&DW management. Many of the initiatives in all three regions which are reported above are too recent for any effect to have shown up yet in C&DW statistics, but one difference between Flanders and Wallonia which has been evident for some time is the higher cost of landfilling in Flanders, reflecting the differences in the geology of the two regions and the higher population density in Flanders. It appears likely that this sub-set of factors has provided a major stimulus to the generally higher levels of recycling found in Flanders.
8. AUSTRIA

8.1 Restrictions or bans on disposal

§17 of the Waste Management Law enshrines the recovery and treatment principles for hazardous and demolition wastes, and since 1993 different regulations have come into effect covering the separation, recovery and disposal of C&DW. Currently there are approximately 400 C&DW landfills in Austria. From 1 January 1997 landfills have been classified as follows:

- landfills for excavated soil;
- landfills for C&DW;
- landfills for residues;
- landfills for ‘mass-wastes’.

Recoverable materials from demolition waste are required to be recycled, if reasonable under the economic circumstances, and non-recoverable wastes are to be treated before disposal. Recycling costs which are 25% higher than the cost of landfilling are considered to be reasonable according to the decree on C&DW dated 29 July 1993.

Subject to a minimum amount of waste being present, demolition waste has to be separated (according to the Ordinance on Separation / Trennungsverordnung BGBL Nr.259/1991) into different materials and recycled. The minimum quantities are as follows:

- excavated soil - 20 tonnes;
- concrete - 20 tonnes;
- asphalt - 5 tonnes;
- wood - 5 tonnes;
- metals - 2 tonnes;
- plastics - 2 tonnes;
- mixed C&D site waste - 10 tonnes;
- mineral C&DW - 40 tonnes.

8.2 Mono landfill

See 8.1 above, which describes the classification of landfills.

8.3 Other environmental or planning controls

Other than specific waste planning measures (see 8.1 and 8.6), there are no directly relevant planning measures.

8.4 Taxes (landfill and others)

There are no taxes for the disposal of C&DW, but according to the amended law (of 7 June 1989) to finance the remediation of contaminated sites there are fixed ‘rates’ for the disposal of waste on landfills. The rate differs depending on the landfill and on the type of waste, and the income is to be used exclusively for the remediation of contaminated industrial sites and old landfills.

Rates for disposal of waste on landfills which do not fulfil the requirements of available techniques are as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>C&amp;D Waste Landfills</th>
<th>Excavated Soil Landfills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ÖS/tonne</td>
<td>ECU/tonne</td>
</tr>
<tr>
<td>1 January 1997</td>
<td>60</td>
<td>4.34</td>
</tr>
<tr>
<td>1 January 1998</td>
<td>80</td>
<td>5.79</td>
</tr>
<tr>
<td>1 January 2001</td>
<td>100</td>
<td>7.24</td>
</tr>
</tbody>
</table>

Note: There is an additional charge of 30 ÖS/tonne (2.17 ECU/tonne) if the landfill does not have an adequate liner or vertical enclosure.
Rates for disposal of waste on landfill which fulfil the requirements of available techniques are:

<table>
<thead>
<tr>
<th>Date</th>
<th>C&amp;D Waste Landfills</th>
<th>Residue Landfills</th>
<th>Mass Waste Landfills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OS/tonne</td>
<td>ECU/t</td>
<td>OS/tonne</td>
</tr>
<tr>
<td>1 January 1997</td>
<td>60</td>
<td>4.34</td>
<td></td>
</tr>
<tr>
<td>1 January 1998</td>
<td>150</td>
<td>10.85</td>
<td>200</td>
</tr>
<tr>
<td>1 January 2001</td>
<td>80</td>
<td>5.79</td>
<td></td>
</tr>
<tr>
<td>1 January 2004</td>
<td>100</td>
<td>7.24</td>
<td>200</td>
</tr>
</tbody>
</table>

8.5 Subsidies

There are no direct subsidies.

8.6 Positive waste planning measures

There is a national waste management plan (‘Bundes-Abfallwirtschaftsplan’) which is currently in draft.

All landfills have to meet particular requirements regarding location (geological and hydrogeological conditions etc.), general design, protection of soil and water (lining, water control and leachate management), gas control, stability, landfill cover, documentation and quality control. Threshold values for waste, waste analysis and control procedures are defined for waste to be accepted in the different classes of landfill.

From 1 July 1999 landfills have to comply with requirements set out in an amendment (dated 19 June 1997) to the 1959 water law. This sets out specific regulations for landfills to be enforced in stages. By 1 January 1998 the operator had to inform the relevant authorities about the future use of the landfill (landfill type, closure); from 1 July 1998 there have been tighter controls on the acceptance of waste; from 1 January 1999 there will be additional requirements regarding the acceptance of waste for excavated soil and C&DW landfills. Full enforcement of all provisions will be in place by 1 January 2004.

8.7 Research and development support

There are some research projects into recycling possibilities for construction wastes.

8.8 Pilot and demonstration schemes

We have not identified any pilot or demonstration schemes in Austria.

8.9 Voluntary agreements

A VA was signed in 1990 by the Ministry for Economics and the Construction Industry Federation. The objective of the agreement is to increase recovery rates for C&DW in order to reduce the amount of waste being landfilled and to conserve natural resources. A number of issues mentioned in the VA have now been implemented, such as quality standards for recycled materials (though see section 8.13 below), a waste exchange scheme, and legal requirements.

8.10 Education and training

It is understood that education and training in general waste management is available, but this is not specific to C&DW.

8.11 Advisory services

There is no C&DW-specific organised advisory service. Information and advice is given through the construction recycling federation, and there are other educational and training schemes.
8.12 Waste exchanges

There is an Internet-based waste exchange for excavated soil, mineral construction waste and recycled materials.

8.13 Standards and norms for recycled materials

There are standards for C&DW-derived aggregates for concrete, road construction and noise protection walls, and for the treatment of contaminated soil. Standards for recycled materials are generally performance-based, with different quality classes. The international recycling federation is working on the harmonisation of quality standards for recycled materials.

8.14 C&DW processing facilities

There are approximately 150 treatment sites and 400 landfills for C&DW in Austria. The treatment sites are mainly for the treatment of asphalt, concrete and mineral demolition waste, with an annual capacity of more than 5 million tonnes. Roughly two thirds of all C&DW crushers are reckoned to be located at recycling centres with the remaining one third being on-site mobile machines.

These treatment sites are presently not working to full capacity, so an increase in recycling activity does not necessarily require additional treatment capacity, according to the national waste management plan.

8.15 Other measures

Some regions of Austria require demolition permits to be approved by the authorities, others simply require notification to the relevant authorities.

There is a national standard on demolition works (ÖNORM B2251 Abbrucharbeiten) which is used on all public sector projects.

Closing Comment on the Relative Effectiveness of the Different Measures

Austria has used a combination of measures to encourage C&DW recycling, with the main emphasis on conventional regulation.
9. PORTUGAL

9.1 Restrictions or bans on disposal

No such measures exist in Portugal, where regulation of landfills in general has been much more of a focus than regulation of specific waste streams. The government is seeking to close down large numbers of unregulated (but acknowledged) local landfills in favour of larger, formally managed facilities.

9.2 Mono landfill

There are no formal requirements that particular C&DW streams must be sent to mono landfills in Portugal. In any case, there are very few mono landfills in Portugal, and none dedicated to C&DW-type materials.

9.3 Other environmental or planning controls

Controls on demolition and recycling activities may be exercised by Regional and Municipal authorities, depending on the activity concerned. There are no specific measures which require developers to deal with particular C&DW streams in a specified manner, and in practice very few controls on the disposal of C&DW.

9.4 Taxes (landfill and others)

There are no taxes on waste or aggregates in Portugal, nor are any planned at present.

9.5 Subsidies

We are unaware of any subsidies being granted to C&DW recycling activities.

9.6 Positive waste planning measures

There is a national waste strategy for Portugal, which raises the basic issues related to C&DW recycling. So far this has not filtered through into local waste plans. The key municipalities (Lisboa, Porto and Faro) are all understood to be considering how best to translate national objectives into local practice (see 9.7 below).

9.7 Research and development support

There is a project to characterise the nature C&DW arisings and measures currently taking place in Lisboa. This is designed to result in an action plan for C&DW management. The project arises from a protocol signed by the National Waste Institute (Instituto Nacional dos Resíduos), Lisboa City Council (Câmara Municipal de Lisboa) and the Institute for Applied Science and Technology (Instituto de Ciência Aplicada e Tecnologia).

As a first stage, the processes involved in rehabilitation and demolition of selected buildings are being studied. The sites which have been chosen are intended to be representative of the different types of buildings to be found in the city. The aim is to characterise and quantify the waste arisings.

There will be a second stage (starting in 1999) which will deal with construction sites. Later this work will be complemented through further studies in other regions of the country with different characteristics, in order to generate a representative picture of the issues.

The Portuguese government’s civil engineering laboratory (LNEC) has a roads research programme which includes issues related to the use of waste materials in road construction. So far this does not extend to C&DW-derived aggregates.
9.8 Pilot and demonstration schemes

A demonstration project on the site of Expo’98 was proposed. The original intention was to take demolition waste from structures which previously occupied the site, and to use it as an aggregate in concrete for the Expo development. Concerns about contamination caused the proposal to be dropped. Parts of the site had previously been occupied by a slaughterhouse and a fuel tank farm.

9.9 Voluntary agreements

There are no national or local VAs in Portugal related to C&DW.

9.10 Education and training

No formal educational or training programmes specifically geared to C&DW management are offered in Portugal.

9.11 Advisory services

There is no advisory service available to potential C&DW recyclers in Portugal.

9.12 Waste exchanges

There is a conventional market for high value materials (metals, architectural salvage etc), but no formal waste exchange.

9.13 Standards and norms for recycled materials

There is no formal standard for recycled materials in Portugal. The highway authorities responsible for motorways and major roads in Portugal (BRISA and JAE respectively) will not accept C&DW-derived aggregates on their schemes.

9.14 C&DW processing facilities

Although some C&DW is separately collected in special containers located on construction and demolition sites, most nevertheless ends up being landfilled.

It has recently been reported that a C&DW recycling centre has been established near Lisboa, but no details of the capacity or throughput of this centre are known to us. The aim of this centre is stated to be to facilitate greater re-use and recycling through sorting and crushing.

The inert fraction will be marketed under a proprietary brand name for road construction, as well as being used in the landscaping of worked-out sand pits and stone quarries, and in drainage works. The separated plastics, paper and cardboard, wood and metals (ferrous and non-ferrous) are sent to appropriate specialist recycling facilities.

There is no central register of mobile crushing and sorting machines.

9.15 Other measures

We are unaware of any other measures in Portugal.

Closing Comment on the Relative Effectiveness of the Different Measures

C&DW recycling is at a very early stage in Portugal, and none of the measures listed above have yet had a clear impact on practice.
10. DENMARK

10.1 Restrictions or bans on disposal

According to national waste management policy and related targets, landfilling and incineration of C&DW should be minimised. Only waste which cannot be recovered in an environmentally safe way is supposed to be landfilled, and in 1996 only 10% of C&DW was landfilled.

Since January 1997 municipalities have been obliged by law to assign to incineration all waste which cannot be recycled and which is suitable for incineration. There is, however, no explicit ban on landfilling and incineration without energy recovery.

10.2 Mono landfill

In general, there are no active mono landfills in Denmark, though some landfills have cells for specific waste streams (such as PVC waste, asbestos etc).

10.3 Other environmental or planning controls

The Danish Environmental Protection Act requires waste treatment plants and landfills for C&DW to hold licences from the county authorities, based on a process of environmental assessment. The county authorities are then responsible for supervising the treatment plants, and have the authority to take action if they fail to comply with the applicable licensing conditions.

The temporary installation of a crusher on a demolition site does not require a permit, but its use is covered by environmental regulations designed to protect neighbouring properties from unreasonable nuisance. The same machine located on any site other than the demolition site does require a permit. Temporary storage of demolished materials on the site of origin does not require a permit, provided that no additional materials are brought onto the site from other locations.

Although there is no requirement that selective demolition techniques should be used, C&DW has to be separated.

10.4 Taxes (landfill and others)

There has been a national tax on landfilling and incineration since 1987. Since 1 January 1997 the rates have been:

<table>
<thead>
<tr>
<th>Disposal mechanism</th>
<th>Rate of Tax/t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfilling</td>
<td>335 DKK</td>
</tr>
<tr>
<td>Incineration with &lt;10% power production</td>
<td>260 DKK</td>
</tr>
<tr>
<td>Incineration with power production</td>
<td>210 DKK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rate of Tax/t</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 ECU/tonne</td>
</tr>
<tr>
<td>35 ECU/tonne</td>
</tr>
<tr>
<td>28 ECU/tonne</td>
</tr>
</tbody>
</table>

Taxation, in combination with other legislation and planning measures, has been successful in reducing to a minimum the landfilling of C&DW.

There is also a natural resources tax which applies to the quarrying of gravel of 6 DKK/m³ (0.8 ECU/m³ or approximately 1.35 ECU/tonne).

10.5 Subsidies

No direct payments are made to subsidise C&DW use or recycling.

10.6 Positive waste planning measures

The recycling target for all waste in Denmark is 50% by the year 2000. The recycling target for C&DW was set at 60% in 1993, and increased to 85% in 1996. This target was achieved that same year. Municipalities also set local targets in their own waste management plans. These local targets generally follow the national targets.
As well as being required to assign all kinds of waste to specific treatment or recycling facilities (see 1 above), municipalities are also responsible for securing sufficient local treatment capacity for C&DW. Where necessary this can involve the municipalities setting up and operating facilities themselves.

10.7 Research and development support

The Ministry of the Environment provides financial support (partial or total) to R&D projects. Since the mid-1980s over 100 projects relevant to C&DW have been completed.

10.8 Pilot and demonstration schemes

Since the mid 1980s approximately 60 pilot and demonstration projects on C&DW recycling have been carried out in Denmark. The following are among the most significant:

- pilot demolition of industry and local recycling of crushed concrete and masonry (1986-88);
- test using crushed masonry in car parks (1988-92);
- demonstration project on selective demolition (1989-91);
- construction of ‘recycled houses’ in Odense, Horsens and Copenhagen (1990-94).

10.9 Voluntary agreements

There is a national VA on the topic of selective demolition between the Minister of the Environment and Energy and the Association of Demolition Contractors. This was signed in 1996.

10.10 Education and training

In Denmark both theoretical education and practical training courses on C&DW management issues are available. The Technical Universities and Civil Engineering Colleges provide courses on solid waste management, including the management and treatment of C&DW and the relevant legislation. For semi-skilled workers a one-week course in C&DW management has been set up by Danish ‘AMU-centres’. The purpose of these courses is to improve the workers’ knowledge of the waste fractions within C&DW, to educate them about selective demolition techniques and the influence which the quality of the sorting process can have on the subsequent re-use of the various wastes, and to inform them about the different treatment, recycling and disposal options. The course also deals with occupational health aspects.

10.11 Advisory services

Two private sector institutions - RENDAN (Danish Centre for Knowledge on Waste Minimisation and Recycling) and DTI (Danish Technological Institute) - are provided with financial support to enable them to act as know-how centres for C&DW disposal and recycling. An annual status report on C&DW recycling is prepared and published by RENDAN.

10.12 Waste exchanges

There is an active market for C&DW in Denmark. For many years demolition contractors have marketed re-usable demolition materials from their own stock yards, and there are many examples of C&DW which has been treated at crushing plants owned by the private sector or by groups of municipalities being sold to interested customers.

10.13 Standards and norms for recycled materials

The Danish Society of Civil Engineers has issued a standard for the use of crushed concrete and masonry as an aggregate material in new concrete. There is also a specification governing the use of crushed concrete, asphalt and masonry as a substitute for gravel in road construction.
10.14 C&DW processing facilities

There are approximately 30 mobile and stationary crushing facilities in Denmark. Some are privately owned, others belong to groups of municipalities.

10.15 Other measures

Under the Danish Building Regulations (of the National Building and Housing Agency) a permit is required from the local municipality before any building may be demolished.

Closing Comment on the Relative Effectiveness of the Different Measures

The combination of legislation, taxation, national and local planning measures have between them been successful in reducing to a minimum the volume of C&DW going to landfill.
11. GREECE

11.1 Restrictions or bans on disposal
We are unaware of any bans on disposal in Greece.

11.2 Mono landfill
We are unaware of any formal requirements that particular C&DW streams be sent to mono landfills in Greece. Most C&DW that is not re-used or recycled goes to XITAs (sanitary burial or refuse sites) or dumps for burial.

11.3 Other environmental or planning controls
We are unaware of any other specific controls aimed at C&DW management.

11.4 Taxes (landfill and others)
There are understood to be no taxes on either waste or aggregates in Greece at present, and we are unaware of any plans to introduce such measures.

11.5 Subsidies
We are unaware of any subsidies being granted to C&DW recycling activities.

11.6 Positive waste planning measures
The ‘National plan for the integrated and alternative management of waste and refuse’ emphasises the importance of closing down unsupervised dumps and creating modern landfills. It also encourages the sorting of all wastes at source.

11.7 Research and development support
We were unable to obtain any information on research and development projects involving C&DW in Greece.

11.8 Pilot and demonstration schemes
We were unable to obtain any information on pilot and demonstration schemes involving C&DW in Greece.

11.9 Voluntary agreements
We are aware that VAs have hardly been used in Greece, and we believe that none have been developed for C&DW.

11.10 Education and training
We were unable to obtain any information on formal educational or training programmes specifically geared to C&DW in Greece.

11.11 Advisory services
We understand that no advisory services related to C&DW management exist in Greece.

11.12 Waste exchanges
Some materials (such as cables, frames, glass and rubble) are re-used or recycled, but we understand that there is no formal waste exchange for C&DW.
11.13 Standards and norms for recycled materials

There are not believed to be any standards and norms directly applicable to C&DW-derived materials in Greece.

11.14 C&DW processing facilities

Such C&DW processing as does occur is organised on-site by the demolition/building contractor. No register of such facilities is believed to exist.

11.15 Other measures

We are unaware of any other measures in Greece.

Closing Comment on the Relative Effectiveness of the Different Measures

C&DW recycling is at a very early stage in Greece, and none of the measures listed above have yet had a clear impact on practice.
12. SWEDEN

12.1 Restrictions or bans on disposal


12.2 Mono landfill

Mono landfills are used to facilitate potential future efforts to separate, recycle and/or treat different kind of wastes.

12.3 Other environmental or planning controls

According to the Planning and Building Law (PBL), a waste plan/demolition plan must be appended to the Notification of Demolition provided to the local authority. This should specify the intended disposal route for the demolition products, focusing on the handling of hazardous substances. Furthermore, a certain level of education and experience of selective demolition and waste treatment is demanded for the responsible person at the demolition site.

12.4 Taxes (landfill and others)

There is currently a proposal for a landfill tax to encourage recycling and ‘waste to energy’ schemes in preference to landfilling. The tax is expected to be set at approximately 30 ECU/tonne, and is expected to come into force on 1 January 1999.

There is a natural resources tax applicable to quarried gravel. It has been set at a level of 5 SEK/m³ (approximately 0.58 ECU/m³, or 1.00 ECU/tonne).

12.5 Subsidies

No direct payments are made to subsidise C&DW use or recycling.

12.6 Positive waste planning measures

A national waste management plan is at present being developed. Waste management planning has previously been devolved to the regional and local level, with counties and municipalities obliged to issue waste plans. The present option for municipalities to take responsibility for commercial waste (including C&DW) will disappear in a couple of years.

Central legislation for the environment will soon be contained in an environmental code. The Collection and Disposal Act (which regulates waste management) and its ordinances will be incorporated in the code.

A new scheme for the authorisation and registration of waste handlers is currently being formulated in accordance with the EC Directive on waste. Another new ordinance on hazardous waste which implements the EC Directives on hazardous waste has recently been adopted. Waste products that contain asbestos, PCB, mercury, cadmium or CFCs cannot be traded in Sweden.

Vägverket (the National Road Authority) has set a target of 90% for recycling of used road building materials by the year 2000.

12.7 Research and development support

Since the early 1990s there has been a large number of R&D projects which have been financed partly or totally by Boverket (the National Board of Housing, Building and Planning), Avfallsforskningsrådet, (the Swedish Waste Research Council), Naturvårdsverket, (the Ministry of Environment), Byggforskningsrådet, (the Building Research Council), municipalities, and/or different actors in the building and construction industry.

12.8 Pilot and demonstration schemes
Since the early 1990s many pilot and demonstration projects have been mounted. Examples include:
- several selective demolition demonstration projects;
- construction of several small recycled houses;
- construction of roads with recycled aggregates;
- preparation of a handbook on selective demolition;
- studies on recycling opportunities for specific materials such as wood, gypsum, concrete, bricks, etc.;
- an analysis of responsibilities for recycled products;
- identification of hazardous waste in building materials and components;
- methods for cleaning contaminated buildings.

12.9 Voluntary agreements

Byggsektorns Kretsloppsråd (the Building Industry Environmental Council) was formed in 1994 to act as a channel to the Swedish government for the views of businesses in the construction sector on environmental issues. In December 1995 Byggsektorns Kretsloppsråd presented its action plan on environmental responsibilities for buildings and building products.

The building industry will work through its companies and organisations:
- to increase knowledge of environmental issues and intensify education;
- to modify standards and contract documents to focus on environmental issues (this has to some extent been accomplished through a revised version of the national building standards AMA 97);
- to separate materials at source in order to facilitate the work of the recycling industry;
- to identify and separate hazardous waste at source and ensure proper handling of these materials;
- to reduce the quantities of waste going to landfill by 50% by the year 2000;
- to work/aim for certification of companies competent to handle C&DW.

12.10 Education and training

Nearly all of the technical universities offer courses in solid waste management, including treatment, handling and the relevant legislation.

Courses in legislation, selective demolition and recycling are also available through a range of 'schools for contractors', such as SIFU (Education Institute) and Maskinentreprenörerna (the Association of Demolition Contractors).

Boverket (the National Board of Housing, Building and Planning) has developed a range of educational materials that are offered at discount prices.

12.11 Advisory services

Byggsektorns Kretsloppsråd (the Building Industry Environmental Council) provides an advisory service to its clients.

12.12 Waste exchanges

Demolition contractors offer products from their own stockyards.

An Internet-based marketing system for C&DW is offered by a group of contractors, and the amount of product sold is increasing.

Local authorities offer information on future demolition projects in their specific area.

12.13 Standards and norms for recycled materials

Existing standards are used for materials. Special standards for concrete/bricks used as road building materials and as aggregates in new concrete are being developed by Boverket. Vägverket and VTI (a research institute) are also working on standards for road building materials using recycled concrete, bricks and asphalt.
Boverket is also planning to develop standards for wood, bricks, and iron components for re-use in new buildings.

12.14 C&DW processing facilities

Approximately 8 mobile and 2 stationary recycling plants for the rubble fraction are active in Sweden. Many producers of building products take back waste from their own products for reprocessing. Examples include producers of mineral wool, gypsum etc.

There are also many sorting plants where mixed waste is separated, primarily into combustible and non combustible fractions.

12.15 Other measures

No other measures were reported.

Closing Comment on the Relative Effectiveness of the Different Measures

The Swedish government has supplemented traditional regulation with a significant number of R&D projects, demonstration projects and cooperation with business. The proposed landfill tax will be set at a relatively high level, suggesting that there is still ample scope for improving the recycling rate. However, it should be noted that levels of C&DW arisings in Sweden are very low compared to most other Member States.
13. FINLAND

13.1 Restrictions or bans on disposal

The Finnish Waste Act (1072/1993) reflects the waste hierarchy established in the Framework Directive, and includes the following priority list of duties for producers and holders of waste:

- to carry out waste prevention measures as effectively as possible;
- to utilise waste as a material;
- to recover energy from waste;
- to dispose of waste to landfill.

Waste tariffs are set locally by municipalities. According to the Waste Act the structure of waste tariffs should encourage waste prevention and utilisation. In the larger cities in particular the tariffs applicable to C&DW suitable for re-use or recycling are considerably lower than landfill tariffs. Some municipalities impose additional high penalty tariffs on incorrectly sorted C&DW.

13.2 Mono landfill

Landfills for waste soil which is unsuitable for construction purposes are common near the larger cities. Where exceptional arisings of such soils are expected, local land use plans may make special provision for this.

13.3 Other environmental or planning controls

Other than specific waste planning measures (see sections 13.1 and 13.6) there are no directly relevant planning measures.

13.4 Taxes (landfill and others)

Since 1 January 1998 the Waste Tax Act (495/1996) has imposed a tax on C&DW which is landfilled with municipal solid waste. The tax is set at 90 FIM/tonne + VAT at 22% (19 ECU/tonne inclusive).

13.5 Subsidies

There are no direct subsidies for the re-use or recycling of C&DW.

13.6 Positive waste planning measures

The national waste plan and the regional waste plans based on it have strongly promoted the trend towards increasing regional co-operation on waste management, including C&DW disposal. The national waste plan includes the following targets to be achieved by the year 2005:

- actions carried out after 1995 should reduce the amount of C&DW by at least 15%;
- the utilisation of C&DW should be at least 70%. As an interim target, the aim is to re-use or recycle half of all C&DW by the end of the year 2000.

According to a decision of the Council of State (295/1997) from the beginning of 1998 C&DW must be sorted on all but the smallest sites into at least the following fractions:

- mineral based wastes;
- unimpregnated timber wastes;
- metallic wastes;
- soil and dredging spoil.

Another decision of the Council of State (861/1997) is aimed at improving environmental protection of landfills, and (indirectly) promoting regional co-operation on improved C&DW management.

In local waste regulations some municipalities provide more specific guidance (and requirements) on the sorting, collection and processing of C&DW. Incorrectly sorted or handled waste can be returned to its last holder.

According to the Waste Act and Decree, organised ('professional and factory-like') waste treatment and disposal facilities (including landfills) shall be licensed and monitored by the relevant regional or
municipal authorities. If the license conditions are violated, the authorities are required to take action to prevent further violations.

Firms which transport C&DW must at least be registered with the regional authorities before they are permitted to move waste.

13.7 Research and development support

The Ministry of the Environment and the state-owned Technology Development Centre (TEKES) have partially or fully funded numerous projects on environmentally sound building, including aspects related to C&DW. The Ministry of the Environment directly supports 2-3 R&D projects related to C&DW each year, with a budget of 0.2-0.4 million FIM (34-68,000 ECU).

However, the research programme was substantially expanded from 1994 onwards, when TEKES’ Environmental Technology in Construction programme started. The total budget for this programme is about 100 million FIM (17 million ECU), about half of which is covered by the participating companies. Nine R&D projects specifically concerned with C&DW were carried out between 1994 and 1997, with funding from TEKES of 4 million FIM (680,000 ECU).

13.8 Pilot and demonstration schemes

As with R&D, demonstration projects related to C&DW have increased since the early 1990s. The most important pilot and demonstration schemes in recent years have been:

- a treatment plant for unsorted C&DW in the Helsinki metropolitan area at the start of the 1990s;
- crushed concrete in street layers (1996-97);
- crushed concrete in improving road structures (1996-97);
- crushed bricks and tiles in light traffic and yard areas (1996-97).

13.9 Voluntary agreements

There are no VAs specifically concerned with C&DW.

The VA between the Ministry of the Environment and the producers and importers of packaging materials and packed goods covers packaging waste arising from construction sites. It supplements the existing mandatory requirements on packaging and packaging waste.

13.10 Education and training

Theoretical education in waste management is available through the technical universities and civil engineering colleges. These courses cover the management and treatment of solid wastes in general, but not C&DW in particular.

Matters related to C&DW are included in training courses provided by the building sector for unemployed technical officers and workers. Training courses run by adult education organisations last up to 3 months, and are funded by the Ministry of Labour and the EU.

AEL, a centre for technical training, organises 3-5 training courses a year (lasting 1-2 days each) on environmentally sound construction for developers, designers and contractors.

The Confederation of the Finnish Construction Industries trains its member contractors through seminars, and has produced and disseminated material on the proper management of C&DW.

13.11 Advisory services

According to the Waste Act, the Finnish Environment Institute is responsible for providing a national advisory and information service as part of its drive to promote sustainable waste management. Waste authorities in regional environment centres and municipalities are responsible for regional and local waste advice and information.

Regional waste disposal firms have waste advisors to promote and improve the quality of their waste operations.
The Confederation of the Finnish Construction Industries has improved its ability to give advice and information to member contractors in problems concerning C&DW.

13.12 Waste exchanges

Conventional markets operate, thus:
- demolition contractors have permanent connections to scrap yards, which handle the utilisation of scrap metal;
- contractors also sell demolished but still usable components and equipment directly from sites or material stores. The amounts of re-useable materials sold from sites and through local recycling centres has increased in recent years;
- significant amounts of wood waste from demolition sites are sold or given direct to private households. Wood waste represents a far higher proportion of C&DW in Finland than in most other Member States.

13.13 Standards and norms for recycled materials

There is no special official norm for recycled materials. The use of recycled material is generally decided on a case-by-case basis. Firms receiving the material generally have standards of their own.

13.14 C&DW processing facilities

In recent years the size of waste treatment plants and landfills has increased, and technical standards have improved. Reflecting this, there has been a rapid change in the processing and utilisation of C&DW.

There are currently about 10 local collection sites for concrete and masonry wastes near the larger cities. Collected material is then crushed using mobile or fixed plant. There are about 20 firms which handle separately collected wood and plastic waste suitable for incineration with energy recovery.

There are about 40 plants which can recycled asphalt. The amount of recycled asphalt is about 25% of the total amount of asphalt consumed annually.

13.15 Other measures

The biggest construction companies have developed (or are developing) quality systems in order to cut arisings and increase the utilisation of C&DW. The Confederation of the Finnish Construction Industries has stimulated and promoted this development.

Since 1997 contractors have had to provide a maintenance plan and instructions as a condition to receiving state subsidies for dwelling production.

Closing Comment on the Relative Effectiveness of the Different Measures

Rates of arisings of C&DW are very low in Finland compared to most other Member States, reflecting in part the widespread use of wood, and the relative scarcity of high-rise buildings. The government has used a wide range of policy instruments to reach this point, but has recently introduced a landfill tax at a relatively high rate to encourage further progress.
14. IRELAND

14.1 Restrictions or bans on disposal
There are currently no restrictions or bans on the disposal of C&DW.

14.2 Mono landfill
There are no mono landfills in Ireland.

14.3 Other environmental or planning controls
The location of C&DW treatment and disposal facilities is controlled through the planning system by Local Authorities.

14.4 Taxes (landfill and others)
There are no taxes on the disposal or recovery of C&DW.

14.5 Subsidies
ERDF funding (via the Department of the Environment and Local Government) was recently announced for ‘fixed-site’ C&DW recycling facilities at Balleally landfill and Ballyfermot. The amounts were IR£400,000 and IR£254,500 (533,000 and 339,000 ECU) respectively, to Fingal County Council and Thornton Waste Ltd.

Other than this no subsidies have been given to any other C&DW-related scheme to date.

14.6 Positive waste planning measures
Since the introduction of the Waste Management (Licensing) Regulations of 1997 all landfills have to apply for a licence from the Environmental Protection Agency (EPA) by certain specified dates to continue operating. The Licence Application (and subsequent Licence if granted) specifies the quantities and types of wastes to be accepted at the landfill. Thus C&DW must be specified as a waste to be accepted. However there are no particular restrictions relating to the acceptance of such waste unless it is contaminated. The EPA can specify certain limits on the level of contamination acceptable at any landfill.

National recycling targets do not explicitly refer to C&DW, even though it has been confirmed as a priority waste stream, and is being considered as such in Waste Management Strategy Studies and Plans currently being prepared across the country. Specific measures are thus being recommended in local and regional Waste Management Plans to deal with this waste stream.

The Dublin Waste Management Strategy Study Report (December 1997) for the Dublin Region, which is the largest generator of C&DW (1.2 million tonnes per annum), sets a target for recycling of C&DW of 82% by 2004. This target includes soil excavated as part of construction activities.

14.7 Research and development support
No information on R&D support has been found.

14.8 Pilot and demonstration schemes
There are no ‘fixed-site’ C&DW recycling facilities in operation at present in Ireland. Crushing trials at Balleally landfill in 1996 produced a product which conformed to the National Road Specification and formed the basis to proceed with the development of a fixed-site recycling facility at the landfill (see under Subsidies above). Tenders have been invited for the development and operation of the facility and these are currently being assessed by the Local Authority.
14.9 Voluntary agreements

No VAs specific to C&DW exist at present.

14.10 Education and training

No C&DW-specific courses were available until mid-1998. However, a Training Programme and Competency Assessment Scheme on Waste Management in Ireland was launched in Dublin on 18 June 1998. Modules of the course are likely to make reference to C&DW recycling.

14.11 Advisory services

No advisory services related to C&DW are believed to exist at present.

14.12 Waste exchanges

There is no formal waste exchange for C&DW, though there is an active market in recovered materials (such as metals and architectural salvage).

14.13 Standards and norms for recycled materials

The National Roads Authority (NRA) is shortly to produce a new National ‘Specification for Roads’ based on the UK specification. This document will include a detailed list of classes of earthworks materials together with associated typical uses and permitted constituents. A number of classes are likely to allow for the use of crushed concrete as granular material.

14.14 C&DW processing facilities

There are a limited number (estimated at fewer than 6) of mobile crushers in operation in Ireland. Some construction projects, mainly roads, use mobile plant to crush concrete for use in the construction works. At present there are no fixed crushing facilities (though see 14.8 above).

14.15 Other measures

There are no other measures to report.

Closing Comment on the Relative Effectiveness of the Different Measures

C&DW recycling is at a relatively early stage in Ireland, and most of the limited range of measures detailed above will take some time to change this situation.
15. LUXEMBOURG

No information on policy measures used in Luxembourg was received from the authorities there.
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