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Contents

1 Introduction 1

2 Overview on packaging waste management systems 3

2.1 Legal basis 3

2.2 National targets 5

2.3 Other provisions affecting packaging waste 9

2.4 Systems of compliance 10

2.5 Share of Responsibility 12

2.6 Collection systems 13

2.7 Financing of packaging waste management 15

2.8 Monitoring 17

3 Consumption, Collection and Recovery of Packaging Material 19

3.1 Availability and quality of data 19

3.2 Total packaging 19

3.3 Paper and cardboard packaging 23

3.4 Glass packaging 26

3.5 Plastic packaging 29

3.6 Metal packaging 35

3.7 Discussion and summary 38

4 Scenarios 42

4.1 Methodological approach for the development of scenarios 42

4.2 Scenarios on packaging development in Member States 45

4.3 Future development of packaging consumption within the European Union 74

5 Conclusion 76

6 References 80

ANNEXES

Annex I Description of packaging waste management systems in Member States

Annex II Database for Scenarios

Annex III Population data in EU Member States

List of tables

Table 1: Legal basis 4
Table 2: Targets 8
Table 3: Specific provisions affecting packaging waste imposed by waste management regulations 10
Table 4: Areas of activities of main compliance schemes 11
Table 5: Share of Responsibility according to activity 13
Table 6: Collection modalities (from households) 14
Table 7: Structure of compliance scheme fees 15
Table 8: Comparison of Green Dot tariffs for various packaging types 16
Table 9: Total packaging consumption and achieved recycling and recovery rates according to Member States in 1997 (including exports for recycling/recovery) 21
Table 10: Consumption of paper/cardboard packaging and achieved recycling and recovery rates according to Member States in 1997 24
Table 11: Consumption of glass packaging and achieved recycling and recovery rates according to Member States in 1997 27
Table 12: Post-user plastic packaging waste by end-use sector, Western Europe 1997 30
Table 13: Post-user plastic packaging waste by resin, Western Europe 1997 30
Table 14: Consumption of plastic packaging and achieved recycling and recovery rates according to Member States in 1997 32
Table 15: Consumption of metal packaging and achieved recycling and recovery rates according to Member States in 1997 36
Table 16: Assumed annual growth rates for scenarios from 1997 to 2011 according to materials 44
Table 17: Packaging consumption in Germany from 1991 to 1998 55
Table 18: Packaging consumption trends in Italy, 1996 - 2002 60
Table 19: Development of packaging waste arising in the Netherlands 69

List of figures

Figure 1: Breakdown of packaging put on the market in the EU (EU-15) in 1997 according to material 20

Figure 2: Total packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling) 22

Figure 3: Overall recovery and recycling rates by Member States (in %) 22

Figure 4: Paper and cardboard packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling) 25

Figure 5: Recovery and recycling rates of paper and cardboard packaging by Member States 25

Figure 6: Glass packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling) 28

Figure 7: Recycling rate of glass packaging by Member States (in %) 29

Figure 8: Plastic packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling) 33

Figure 9: Recovery and recycling rates for plastic packaging by Member States (in %) 34

Figure 10: Metal packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling) 37

Figure 11: Recovery and recycling rates of metal packaging by Member States (in %) 37

Figure 12: Estimated development of packaging consumption in Austria from 1997 to 2011 (1,000 t) 45

Figure 13: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria (1,000 t) 45

Figure 14: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria (1,000 tonnes) 46

Figure 15: Estimated development of packaging consumption in Belgium from 1997 to 2011 (1,000 t) 47

Figure 16: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium (1,000 t) 47

Figure 17: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium (1,000 t) 48

Figure 18: Estimated development of packaging consumption in Denmark from 1997 to 2011 (1,000 t) 49

Figure 19: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark (1,000 t) 49

Figure 20: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark (1,000 t) 50

Figure 21: Estimated development of packaging consumption in Finland from 1997 to 2011 (1,000 t) 51

Figure 22: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland (1,000 t) 51

Figure 23: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland (1,000 t) 52

Figure 24: Estimated development of packaging consumption in France from 1997 to 2011 (1,000 t) ... 53

Figure 25: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France (1,000 t) ... 53

Figure 26 : Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France (1,000 t) ... 54

Figure 27: Estimated development of packaging consumption in Germany from 1997 to 2011 (1,000 t) ... 56

Figure 28: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany (1,000 t) ... 56

Figure 29: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany (1,000 t) ... 57

Figure 30: Estimated development of packaging consumption in Ireland from 1998 to 2011 (1,000 t) ... 58

Figure 31: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland [1,000 tonnes] ... 58

Figure 32: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland [1,000 tonnes] ... 59

Figure 33: Estimated development of packaging consumption in Italy from 1997 to 2011 (1,000 t) ... 60

Figure 34: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy (1,000 t) ... 61

Figure 35: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy (1,000 t) ... 61

Figure 36: Estimated development of packaging consumption in Portugal from 1997 to 2011 (1,000 t) ... 62

Figure 37: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal [1,000 tonnes] ... 63

Figure 38: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal [1,000 tonnes] ... 63

Figure 39: Estimated development of packaging consumption in Spain from 1997 to 2011 (1,000 t) ... 64

Figure 40: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain (1,000 t) ... 65

Figure 41: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain (1,000 t) ... 65

Figure 42: Estimated development of packaging consumption in Sweden from 1997 to 2011 (1,000 t) ... 67

Figure 43: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden (1,000 t) ... 67

Figure 44: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden (1,000 t) ... 68

Figure 45: Estimated development of packaging consumption in The Netherlands from 1997 to 2011 (1,000 t) ... 69

Figure 46: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands (1,000 t) 70

Figure 47: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands (1,000 t) 70

Figure 48: Estimated development of packaging consumption in UK from 1999 to 2011 (1,000 t)..... 71

Figure 49: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK (1,000 t)..... 72

Figure 50: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK (1,000 t)..... 72

Figure 51: Estimated development of total packaging consumption in EU from 1997 to 2011 (1,000 t)..... 74

Figure 52: Estimated development of packaging consumption in 2006 and 2011 in EU according to material (million tonnes)..... 74

Figure 53: Estimated recycling capacity requirement in 2006 and 2011 in EU according to material (million tonnes)..... 75

1 Introduction

This report is the Final Report of the study "European Packaging Waste Management Systems" undertaken between September 1999 and August 2000 by ARGUS (Germany) in association with ACR (Belgium) and Carl Bro (Denmark).

An Interim Report was submitted to the Commission in February 2000, and progress meetings with the Commission were held on 14 March 2000 and on 17 November 2000. The findings of the study were presented to the Members of the Committee 21 on 16 January 2001.

Background

The Directive 94/62/EC on Packaging and Packaging Waste, to be transposed into national law by the Member States by 30 June 1996, contains provisions on the prevention of packaging waste, on the re-use of packaging, and on the recycling and recovery of packaging waste. Quantified targets are to be achieved by the end of the first five-year phase, 30 June 2001, for packaging waste recycling and recovery operations.

The evolution of the Directive has been characterised by political conflict between those Member States where separate collection and recycling systems had already been developed and other Member States. The Directive aims at harmonising national packaging legislation with the twin objectives of preventing or reducing the environmental impact caused by packaging and packaging waste, and ensuring the functioning of the internal market so as to avoid obstacles to trade, as well as the distortion of or restrictions to competition

The compromise reached by the European Parliament and the Council, consisted of an initial range of quantified targets for recovery and recycling to be achieved by mid-2001, as well as a commitment by the Community legislator to increase these targets significantly in a second phase to be achieved by mid-2006. This compromise was explicitly stated in Article 6 of the Directive 94/62/EC[1] on packaging and packaging waste, which was adopted by the European Parliament and the Council on 20 December 1994.

Objective of the study

The objectives of this study are: to provide an overview of the different management systems in operation in each Member State, covering the managerial, technical and economic aspects involved in packaging waste management systems, and to draw up potential scenarios for each Member State for the years 2006 and 2011.

Information on packaging waste management systems in Member States presented in this report was sought on the basis of the questionnaire proposed by the Project Group, details of which were submitted to the Commission on the 15th of October 1999. Generally, it was found that information was not always available in the detail envisaged for all Member States.

In the first stage of the study, the Project Group focused its activities on the compilation and study of general and legal information on the waste packaging management systems in Member States. When available, this information included general information; national regulations; accreditation conditions of the “Green Dot” organisations; and terms of contracts or agreements with companies and local authorities. The other component of the work involved the research of information about the recycling activities in Members States, and the research of information on recycling outlets, as well as of observable constraints and problems. This was performed by research via the Internet and appropriate administrations and through available reports.

[1] OJ No L 365, 31.12.1994, p.10 - 23

As agreed at the initial meeting with the Commission, the Project Group did not focus on the compilation of data on packaging waste arisings and recovery and recycling. Generally, this information was provided by the Commission for the year 1997. Nevertheless, wherever information on more recent years was available, this has been included in this report.

Structure of the report

In chapter 2 we provide a summary of the national requirements to be met and on the organisational structure of packaging waste management systems established in Member States. The detailed description of these systems by Member State is presented in Annex I.

Chapter 3 describes the current stage of development of management of packaging waste in Member States, focusing on the technical aspects of recovery and recycling.

In chapter 4 we outline our approach for the scenarios on future development, detailing the assumptions made for packaging consumption and for possible requirements on packaging recycling. In addition, we present our findings on the development of packaging and the packaging waste management sector, offering scenarios for the year 2006 and 2011 for each Member State and for the European Union.

Chapter 5 contains our conclusion about the way of implementation of the Packaging Directive in Member States with regard to the current national requirements and performance of national systems, and taking account of the results of the scenarios.

2 Overview on packaging waste management systems

Introductory remark

The Directive on packaging and packaging waste contains obligations and provisions for transposition that allow Member States a certain latitude with regard to adopting appropriate measures. Member States have established distinct systems to comply with the requirements set out in Directive 94/62/EC, both in terms of legislative provisions and implementation strategies, taking existing national waste policies into account.

This chapter focuses on the legal requirements and the organisational, managerial and economic aspects of the national packaging waste management systems. In order to increase the intelligibility of the report we are providing an overview of the established national systems. In this overview the emphasis is placed on the management of municipal packaging waste, i.e. packaging waste from households, and from small enterprises, offices etc. which is collected together with household packaging waste. The particular aim is to point out the differences between the various national approaches. It is structured according to the issues listed below.

- Legal basis
- National targets
- Specific provisions
- Systems of compliance
- Share of responsibility
- Collection systems
- Financing
- Monitoring

Annex I contains an extensive description of packaging waste management systems including lists of references by Member State. Wherever detailed information on certain issues regarding these systems are required, the reader is asked to refer to the annex I.

2.1 Legal basis

Member States have started to introduce legal measures to regulate packaging waste already at the end of the eighties and the beginning of the nineties. The majority of Member States have implemented Packaging Regulations in 1997. Only Greece has not yet transposed the EU Packaging Directive into national law. Depending on national waste management traditions, the regulation of packaging waste recovery is accompanied by voluntary agreements (Denmark, Netherlands). A number of Member States (Belgium, Denmark, France, Portugal, United Kingdom) have transposed the EU Packaging Directive in regulating the recovery requirements and the environmental requirements in the design and manufacture of packaging ("essential requirements") in separate legal acts. The following table lists the legal basis for the transposition of the Packaging Directive.

Table 1: Legal basis

Country	Legal basis
Austria	Packaging Ordinance of 1992, amended 29th November 1996 Target Ordinance (Federal Law Gazette No. 646/1992, as amended by 649/1996)
Belgium	The Ecotax-Act (ordinary Law of 16th July 1993 aiming at completing the federal structure of the State) Interregional Co-operation agreement Packaging Decree of 30th of May 1996 (came into effect on 5th March 1997) Law of 21st December 1998 (essential requirements) The Royal Decree of the 25th of March 1999 defining standards for packaging.
Denmark	Statutory Order no. 298 of 30 April 1997 on certain requirements for packaging Statutory Order no. 299 of 30 April 1997 on waste Statutory Order no. 124 of February 27, 1989 on packaging for beer and soft drinks as amended by statutory order no. 540 of 1991 and no. 583 of 1996 and no. 300 of 30 April 1997
Finland	Decision of Council of State on Packaging and Packaging Waste 1997 Law on Alcohol Excise, No. 1471 of 29th December 1994 Law on Soft Drinks Excise, No. 1474 of 29th December 1994
France	Lalonde Decree N° 92-377 of April 1 1992, in force since January 1993, setting out conditions for the collection and the recovery of packaging waste produced in households. Decree N° 94-609 of 13 July 1994 on packaging waste for which the holders are not households. Decree N° 96-1008 on the disposal of household waste which contains the quotas set by the European Packaging Directive Decree N° 98-638 of 20 July 1998 related to the environmental requirements in the design and manufacture of packaging
Germany	Packaging Ordinance of 1991, amended 21st of August 1998
Greece	Draft Law "Measures and conditions for the alternative management of packaging and other waste products. Foundation of the National Organisation for the Alternative Management of Packaging and Other Waste (NOAMPOW)"
Ireland	Waste Management (Packaging) Regulations 1997 Waste Management (Farm Plastics) Regulations 1997 Waste Management (Packaging Amendment) Regulations 1998
Italy	"Ronchi Decree", Law effective from 5th Feb. 1997 implementing EC Directives (Directive on waste, hazardous waste and packaging waste) amended 28th Nov. 1997
Luxembourg	Grand Ducal Regulation of 31st October 1998
Portugal	Decree-Law No. 366-A/97 of 20th December 1997 (modified by Decree-Law N° 162/2000 of 27th July 2000) Ordinance N° 29-B/98 of January 1998 The Decree-Law N° 407/98 of 21 December 1998 for essential requirements and maximal concentration of heavy metal
Spain	Packaging Law 11/1997 of 24th April 1997 Royal Decree 782/98 of 30th April 1998 Law 10/1998 of April 21st 1998 Order 50/1998 of December 30th 1998 Order 50/1998 of 30th December 1998
Sweden	Decree (1997 - 185) on producer responsibility for packaging.
The Netherlands	Packaging and Packaging Waste Decree of July 4th 1997 Packaging Covenant II of 26 December 1997
UK	Producer Responsibility Obligations (Packaging Waste) Regulations 1997 Packaging Regulation (1998) Packaging (Essential Requirements) Regulations 1998 Producer Responsibility Obligations (Packaging Waste) Regulations (Northern Ireland) 1999

2.2 National targets

Prevention at source

The first priority of packaging waste management options is the prevention and reuse of packaging. The Packaging Directive does not include targets for this aspect but introduces explicit prevention obligations at three levels: essential requirements and standardisation (article 9); other measures that Member States are required to adopt (article 4) and the concentrations of heavy metals in packaging (article 11)[2].

Some Member States have introduced targets for the prevention of packaging. In effect, different approaches were followed with regard to prevention targets, aiming at quantitative prevention through either the reduction of packaging consumption growth or the packaging waste arising. In the **Netherlands** the quantity of packaging to be newly introduced on the market in the year 2001 is to be at least 10% lower than the quantity of packaging introduced in the year 1986. Finland and Spain have also set out prevention targets. In **Finland,** at least 6 per cent less packaging waste than in 1995 is generated per year relative to the volume of packed products consumed and in **Spain** a reduction in weight of packaging of at least 10 % by 30th June 2001 compared with 1997 has to be achieved. The 10% reduction objective is calculated by applying the ratio of the weight of packaging waste to the weight of the packed product. In **Belgium** a standstill provision for the weight of disposable packaging on the market is in effect. This means that any person putting packed products on the Belgian market wrapped in non-reusable packaging, must pay attention that, for the same material, the ratio between the weight of the packaging and the weight of the product put on the market in this packaging does not increase compared to the same existing report to the date of entrance of the law.

Prevention plans are required for certain businesses in the Netherlands, in Belgium and in Spain. In **Belgium**, companies which bring more than 10 tonnes onto the market each year, must submit a general prevention plan to the Interregional Packaging Commission every three years. This plan must describe the measures foreseen and the objectives related to:

- the increase of recyclable packaging waste,
- the increase of re-usable packaging in comparison to non-recyclable packaging and one-way packaging respectively,
- the composition of packaging in order to make it re-usable or recyclable and to minimise the environmental impacts of packaging waste management, and
- the reduction of one-way packaging quantities.

In **Spain**, packers which place a quantity of packaged products and, if applicable, industrial or commercial packaging, on the market during one calendar year, which may generate packaging waste exceeding certain amounts, have to prepare a business prevention plan. This business plan must include

- quantified goals for prevention,
- the measures foreseen to achieve them and
- the control mechanisms set up to verify their compliance.

The business plans for prevention may be prepared by Integrated Waste Management Systems, however in this case the plans must refer to a sector of production of packaging, and identify the packagers concerned, which shall be individually bound to perform the measures contained in the said plan. These business plans, which have a periodicity of three years, must be approved by the

[2] Demey, Th.; Hannequart, J.-P.; Lambert, K.: Packaging Europe - A directive standing up to transposition into 15 national laws, 1996

competent environmental agency of the Regional Government in whose territory the measures must be carried out. The Regional Governments must report to the Ministry of Environment.

The way in which the prevention goal can be met in the **Netherlands** is set down in a prevention protocol. This defines a systematic approach to prevention measures that producers/importers must apply in their company. This can be done by following the “Prevention Guideline” or by applying the ISO 14001 or EMAS system or similar working method. During the term of the Covenant, companies are expected to assess a number of packaging items every year, and investigate or introduce possible improvement. During the term of the Packaging Covenant, it is expected that industries will assess the large majority of their packaging in accordance with this system. Companies having more than 4 employees and which place more than 50 tonnes of packaging material on the Dutch market, must submit an annual report, via a cluster or otherwise, on the progress of their prevention strategies. This report should, if possible, provide quantitative information, explanations and examples.

Reuse

No quantitative objective for reuse has been set in the Packaging Directive. According to article 5 "Member States may encourage reuse systems of packaging, which can be used in an environmentally sound manner, in conformity with the Treaty". Targets for reuse of packaging implemented by Member States refer mainly to beverage packaging, generally aiming to support and/or protect already existing reuse systems.

Quotas for reusable packaging contained in the 1991 German Packaging Ordinance are presently the subject of an infringement action by the European Commission. **Germany** has set out a target for reusable packaging of 72 % for the categories of beer, mineral water, carbonated soft drinks, fruit juices and wine.

In **Denmark,** the Danish industry has entered into 2 voluntary agreements with the Danish Environmental Protection Agency (DEPA) regarding packaging waste. The agreements include the increasing of reuse or recycling of PET bottles as well as transport packaging made of cardboard, paper and plastic. The agreement on PET bottles enables the producers to use the bottles in the Danish bottle reuse system. The Danish Statutory Order no. 124 of February 27, 1989 on packaging for beer and soft drinks, last amended by statutory order no. 300 of 30 April 1997, states that beers and soft drinks may only be marketed in Denmark in refillable packaging.

Except for imported drinks, this packaging must be approved by the Danish Environment Protection Agency. Imported drinks may be sold provided their packaging is not made of metal, and that a system of return and deposit has been set up.

The agreement on the recovery of transport packaging covers both reuse and recycling of material for packaging. This agreement sets the objective of reaching a level of 80% collection and recovery of transport packaging by direct reuse or material recycling.

Reuse targets also exist in **Portugal** for the packaging of beverages, 30% for soft drinks, 10% for waters, 80% for beers and 65% for ordinary table wine to be achieved in 1999.

There is still a reuse target for wine and spirit bottles filled in **Sweden,** but the deposit refund system was closed down in 1998 due to a sharp decrease in bulk import. No such collection has taken place since then and the reuse target will in fact be deleted in 2001. This change in the Ordinance already came into force in 1997. The other reuse targets are for returnable glass and PET bottles for beer and soft drinks filled in Sweden, both will cease in 2001. The PET target will continue as a recycling one only.

In some countries a combined reuse/recycling target is in effect. The Packaging Target Ordinance in **Austria** specifies "reuse quotas" in the domain of beverages. In the case of packaging beverages, the "reuse and / or recycling quotas" must be attained by refilling packages, recycling and thermal recovery of old packaging materials. A similar regulation is applied in **Finland**, where at least a total of

82% by weight of all used packaging is reused per year, and all packaging waste is recycled or otherwise recovered.

Recovery and recycling

With regard to recovery and recycling most Member States have introduced quantitative targets as set out in the Packaging Directive. Three countries, Austria, Belgium and the Netherlands, officially exceed the maximum targets and have made use of article 6 (6) of the Directive. Nevertheless, recovery and recycling objectives stipulated by national regulations vary widely due to particular provisions such as sector-based objectives and municipal packaging waste objectives:

- **Austria** has in effect three sets of targets: material-specific targets for businesses individually complying with the recovery objectives, expressed as percentages of packaging taken back and own packaging waste arisings; targets for reuse and recovery (material and energy) for beverage containers; and targets for economic operators (manufacturers, importers, fillers and distributors) which take part in a collection and recycling scheme.
- In **Belgium,** the recovery and recycling objectives have already to be achieved by 1999. These objectives apply separately for both municipal (packaging sourced from households) and for industrial packaging waste.
- In **Denmark,** specific targets are set out by voluntary agreements for transport packaging (cardboard/paper and plastic), for non-refillable glass, and for PVC packaging.
- Material specific recovery targets are set out in **Finland, Sweden** and the **Netherlands** without further prescription as to whether these targets have to be achieved by municipal or industrial packaging waste. In **Germany,** material specific recovery targets apply to sales packaging only.
- In **France,** packaging materials licensed by the green dot systems, the final users of which are mainly households, have to be recovered by 75% by the end of 2002.
- The recovery and recycling objectives in **Ireland** have to be achieved both at commercial premises and in the domestic waste section on a 80% : 20% basis.

An overview of national recovery and recycling targets as well as on prevention/reuse objectives is provided overleaf in Table 2.

In summary, the national quantitative recovery and recycling objectives impose different requirements on economic operators responsible for packaging. High recovery targets for non-industrial packaging waste have a fundamental effect with regard to compliance costs in particular. It is usually considered that the collection and processing of municipal packaging waste is more cost-intensive than from industrial sources and, for some materials, results in lower quality of secondary material.

In countries where no provisions exist regarding the recovery of packaging waste from domestic sources, the compliance with recovery obligations is met primarily by the recovery of industrial packaging waste, which is usually cheaper.

Table 2: Targets

	Global targets			Recycling targets for packaging materials						
Country	Recovery	Recycling	Recycling of each material	Glass	Paper / cardboard	Plastics	Steel	Aluminium	Beverage/ composites	Reuse/prevention target
Austria [1]	50	25	15	93	90	40	95		40	
Belgium	80 [2]	50	15							x
Denmark [3]				65	55	15	15			
Finland	61	42	15	48	53	45 [4]	25	25		x
France	50-65 75 [5]	25-45	15							
Germany	65	45	15	75 [6]	70 [6]	60 [6]	70 [6]	60 [6]	60 [5]	x
Greece										
Ireland	50-65	25-45	15	45	31	10	5	25		
Italy	50-65	25-45	15							
Luxembourg	55	45	15							
Portugal	25 [7] 50 [8]	25 [8]	15 [8]							x
Spain	50-65	25-45	15							x
Sweden				70	40/65 [9]	30 [9]	70	70 [9]		
The Netherlands	65	45 [10] 65 [11]	15	90[11]	85[11]	35[11]	80[11]			x
UK	58		18							

Note: targets are to be achieved by 2001 if not stated otherwise

[1] Austria: material-specific targets for individual company compliance, expressed as percentages of packaging taken back and own packaging waste arising which must be recycled

[2] Belgium: targets have to be achieved by 1999

[3] Denmark: targets of waste management plan, other targets are included in voluntary agreements (see country report)

[4] Finland: target for plastics applies to recovery

[5] France: target for household packaging waste to be achieved by the end of 2002

[6] Germany: material specific recycling targets apply to sales packaging

[7] Portugal: target to be reached by 2002

[8] target to be reached by 2006

[9] Sweden: recycling target for: corrugated cardboard 65%; paper/cardboard 40 %; aluminium drinks containers 90%; PET drink bottles 90%

[10] Netherlands: mandatory target to be achieved in 1998 defined in the Packaging and Packaging waste decree

[11] voluntary target defined in the Covenant II to be achieved by 2001

x particular reuse and/or prevention targets are described above

2.3 Other provisions affecting packaging waste

In a number of Member States additional regulations exist with direct or indirect effects on packaging and packaging waste. Table 3 provides an overview of these provisions. The use of economic instruments such as taxes to support the reuse (in some countries) and recycling of packaging waste is one of these measures. **Belgium** introduced eco-taxes on certain products put on the market. These include packaging for beverages and for some industrial professional products. The intention was to support reuse and recycling. This has lead to the introduction of producers responsibility schemes for various types of household packaging waste such as packaging for beverage and for non household packaging such as packaging of agricultural pesticides, professional inks, solvents and glues.

A tax system to encourage the reuse of disposable drink containers has been in effective use since the 1970's in **Finland**. According to the present provisions, a supplementary tax must be paid for beverages, beer and other alcoholic drinks, depending on the type of packaging used, when the packaging waste is not recovered, and a reduced tax is to be paid in case of recovery. Packaging materials which form part of a reuse system are exempt from the tax.

In **Germany** taxes imposed or proposed by a number of cities on non-reusable food service packaging were considered discriminatory and did not enter into law. Taxes on primary packaging and secondary packaging with a volume of less than 20 litres and on bags of plastics or paper with a volume of more than 5 litres exist in **Denmark**. Packaging of carton and cardboard is also taxed if there is no documentation that the content of recycled material is greater than 50%. In addition, a new law regarding taxes on PVC and phthalates has been proposed.

Another common measure is the restriction of landfilling for certain types of waste. Generally, this limit is not specifically introduced to restrict the disposal of packaging waste in landfills, but to reduce the organic components of waste being landfilled. Packaging waste is only directly affected in **Austria, Italy** and the **Netherlands**, by a limit on landfilling and incineration without energy recovery (Austria and the Netherlands) and a ban on landfilling of collected packaging waste (Italy).

At the Community level, the Directive on the Landfilling of Waste, which was adopted in April 1999 will have an impact on the amount of organic packaging waste. The directive stipulates that wastes shall be pre-treated prior to their landfilling and includes reduction targets for the landfill of biodegradable wastes. However, many EU countries have already fixed **national regulations** which are more stringent in this respect. A national restriction on landfilling of combustible/organic waste is or will come into effect in **Austria**, **Denmark**, **France**, **Germany** and **Sweden**.

Table 3: Specific provisions affecting packaging waste imposed by waste management regulations

Country	Provisions
Austria	• full enforcement of provisions on landfills and acceptance criteria for waste being landfilled by 1 January 2004 • limit for landfilling and incineration without energy recovery of packaging waste
Belgium	• eco-tax
Denmark	• landfilling of combustible waste prohibited • tax on primary and secondary packaging for certain products
Finland	• tax on beverage packaging, exemption from tax if the packaging is reused
France	• prohibition of waste dumping, except for final waste from 1 July 2002
Germany	• full enforcement of provisions on landfills and acceptance criteria for waste being landfilled by 2005
Italy	• ban on landfilling collected packaging waste
The Netherlands	• limitation of the amount of packaging waste to be landfilled by 2001
Sweden	• packaging must be labelled with information on the type of material • landfilling of sorted combustible waste is prohibited by 2002 and landfilling of organic waste by 2005

2.4 Systems of compliance

In all Member States economic operators within the packaging chain (manufacturer, packer/filler, distributor, importer) are responsible for packaging waste management, and for providing data on the amount of packaging put on the market. Except for Denmark, the industry has build up organisations in all Member States to comply with the obligations imposed by national packaging regulations on behalf of the individual businesses affected. However, economic operators generally have the option of transferring their obligations to an external organisation (hereafter called compliance scheme) or fulfilling their obligations by themselves.

Most of the compliance systems need to be approved and are monitored by the Ministry for Environment or an independent body (e.g. packaging committee). The schemes co-ordinate the activities necessary for the recovery of packaging waste and have an essential interface role to play between the different actors within the packaging life cycle (industries, public legal entities, consumers, recycling and recovery operators). In **Austria** and the **UK,** a competition scrutiny system is explicitly applicable to these organisations in order to avoid monopolisation.

In eight Member States a "green dot" system has been established. By contracting with the green dot system, the companies responsible for producing packaging entrust their take-back obligation to the scheme in return for an annual fee based on the types of packaging materials used, and on the amount of packaging put on the market. The printing of the “green dot” as an indication that the “packaging producer responsible” financially supports the integrated system of selective collection and recycling of its packaging waste is mandatory in most countries. The „Green Dot“ logo was not approved by the Interregional Packaging Commission in Belgium which considered that the signification of this logo was too restricted and even „confusing“ because it could not be used by the citizens to help them to sort their packaging waste.

The green dot systems are predominantly in charge of the management of household/municipal packaging waste. But, as is demonstrated by Austria and Ireland, this is not always the case. The table below lists the main national packaging waste management organisations and summarises the responsibility of these systems according to municipal/industrial packaging waste.

Table 4: Areas of activities of main compliance schemes

Country	Organisation	Responsible for		Green Dot
		municipal packaging	industrial packaging	
Austria	branch organisations	x	x	x
Belgium	Fost+	x	no	x
	Val-I-Pack	no	x	
Denmark	Municipalities	x	(x)[1]	no
Finland	PYR	x	x	no
France	ECO-Emballages	x	no	x
	Adelphe	x	no	
Germany	DSD	x	no	x
	different organisations	x[2]	x	
Ireland	Repak	x	x	x
Italy	CONAI	x	x	no
Luxembourg	Valorlux	x	no	x
The Netherlands	SVM-Pact	x	x	no
Portugal	SPV	x	x	x
Spain	Ecoembalajes	x	no	x
	Ecovidrio	x	no	
Sweden	REPA	x	no	no
UK	different organisations, e.g. Valpak	no particular responsibility according to this classification		no

1) Municipalities are obliged to assign industrial packaging waste to recycling, which means that they have to prepare regulations that oblige enterprises to recycle their packaging waste.
2) Since the amendment of the Packaging Ordinance in 1998, systems for self-compliers are in operation in competition with the DSD.

The UK has adopted a unique approach to fulfilment of the European Union's packaging waste recovery and recycling targets. The UK has a system whereby all those involved in the packaging chain take on a share of the responsibility for ensuring fulfilment of the UK's target for the recovery of packaging waste. This concept of "shared producer responsibility" for packaging waste is based on a much more specific and narrower definition than in other countries where this concept involves at least a partnership between the consumer, local authorities and industry. Shared producer responsibility for packaging waste in the UK refers only to the industries which produce or use packaging. Responsibility for recovery and recycling of packaging waste is divided among the commercial enterprises which form part of the "packaging chain", raw material producers, packaging manufacturers, packer/fillers and sellers. The recovery and recycling targets are to be met according to a certain percentage obligation associated with the economic activity. If and when local authorities and consumers are drawn in it will be to help the packaging producers to fulfil their obligations.

Except for **Denmark** and the **United Kingdom,** industry-based organisations are established in all Member States to take over the responsibility for and to manage the recovery of municipal packaging waste. It is only in **Belgium** that the responsibility is clear cut for municipal waste and industrial packaging waste with two different organisations dealing with the two waste streams. In **Austria**, **Finland**, **Ireland, the Netherlands** and **Italy,** the systems in place are responsible for both municipal and industrial packaging waste. In **Germany** the activity of the nation-wide DSD system was restricted to sales packaging by the Federal Cartel Office; systems for self-compliers have started operating in competition to the DSD since the amendment of the Packaging Ordinance in 1998.

With regard to industrial packaging waste, self-compliance is possible and common in most Member States. However, there are also several, mainly sector- or material-based organisations in place to take over the obligations of packaging waste management for the industry. In the **UK** for example, 16 compliance schemes exist; in **Austria,** the concept of "large waste holders" was introduced to facilitate the management of and self-compliance with large quantities of packaging waste from businesses. In **Germany** there are a number of different organisations guaranteeing the recovery of industrial packaging waste. In **Portugal** sector-based systems are established (e.g. for hotels and restaurants); in **Finland,** so-called producer organisations are in charge with the recovery of different packaging materials.

2.5 Share of Responsibility

In principle, the private sector is responsible for the packaging they put on the market. With regard to definite packaging waste management activities, the responsibility is shared in the majority of Member States between municipalities and industry. While collection and sorting of municipal packaging waste is predominately undertaken by the public sector, the collection of industrial packaging waste and the recovery and recycling of both municipal and industrial packaging waste is a privately organised domain. Table 5 below provides an overview of the share of responsibility.

In **Austria** and in **Germany,** obligated economic operators are explicitly required to organise the collection and sorting of domestic packaging waste and to comply with recycling targets for this waste stream. The packaging regulations in these countries set out criteria for the collection system, inter alia capacities and distances between collection points, extensions of the collection system. The compliance schemes in Austria and Germany conclude contracts with municipalities (and private operators) for the services necessary in the context of separate collection and sorting of municipal packaging waste.

In other countries the collection (and sometimes also sorting) of municipal packaging waste is either not explicitly regulated or the targets to comply with are less high. In practice, separate collection is exclusively carried out by municipalities, and the compliance schemes negotiate the conditions and extent of separate collection, and the reimbursement per material and per region with the municipalities. The collected materials are either sold at market prices (e.g. **UK**), at fixed prices, or are handed over free of charge to recovery/reprocessing operators (or guarantors). In practice, depending on the material concerned, both is possible, selling at market prices and transfer free of charge (e.g. **Germany**).

Table 5: Share of Responsibility according to activity

Country	Collection and sorting (municipal packaging)	Recovery
Austria	ARGEV + other private organisation	Branch organisation responsible for recycling (Guarantors)
Belgium	Municipalities	Fost Plus
Denmark	Municipalities	Industry
Finland	Municipalities	PYR
France	Municipalities	Eco-Emballages, Adelphe
Germany	DSD+ other private organisation	Industry (Guarantors)
Ireland	Municipalities	Repak
Italy	Municipalities	CONAI
Luxembourg	Municipalities	Valorlux
Portugal	Municipalities	Ponto Verde + entities of packaging and raw packaging material manufacturers
Spain	Municipalities	Eco-embalajes
Sweden	Material-companies	Material-companies
The Netherlands	Municipalities	Industry
UK	Municipalities	Industry / compliance schemes

2.6 Collection systems

Separate collection of municipal and industrial packing waste is carried out in all Member States, but to a very different extent. With regard to municipal packaging waste, the systems established vary widely, the main differences being the extension of the system and the materials focussed upon. However, it has to be stressed that the preconditions for implementing the Packaging Directive in Member States were hardly comparable. Some Member States have already had long-term experience of separate collection and/or reuse systems for certain municipal waste materials. In **Austria**, **Denmark**, **Finland**, **Germany**, the **Netherlands** and **Sweden** for example, a well functioning reuse system, e.g. for glass, already existed, and glass and paper were collected separately for recycling. The least advantageous conditions prevailed in countries where landfilling was the predominant waste management option. Table 6 below provides an overview of the collection systems.

The most comprehensive collection is done in **Austria** and **Germany**, in other countries separate collection focuses upon "easy to recycle" materials, particularly with respect to plastics packaging. Recent developments in Austria tend to separate collection of specific recyclable plastic fractions, leaving small plastic items in household waste and using their calorific value for energy recovery; this is also being discussed in Germany.

In order to improve the quality of separate collection the collected and/or sorted packaging materials have to comply with technical specifications in most countries, mainly regarding the contents of impurities, and non-compliance results in lower reimbursements. Another regulative encouraging high quality of collected materials is the market price for these materials. While the collected materials are sold to reprocessors according to market price in the **UK** generally, different mechanisms are applied in other countries. These are subsidies or reimbursements for sorting and contracts with guarantors, to take over predefined amounts of packaging.

Table 6: Collection modalities (from households)

Country	extension of separate collection	Predominant collection system	Comments
Austria	nation-wide	Mainly kerbside bring-system for glass, paper and metals	Plastics: trend to collection of only recyclable plastic materials, other plastics are incinerated with energy recovery
Belgium	nearly nation-wide	kerbside sys. except for glass	Glass: 2 colours are separately collected PMC: empty plastics bottles and jars, metal cans and beverage cartons
Denmark		depending on local condition	Glass: colour separation only in few municipalities Paper: together with newspaper etc. Plastics: collection only in very few municipalities
Finland	mainly in urban regions	bring-system	Beverage carton is collected separately in yellow bins Kerbside system for glass
France	not yet fully established	depending on local condition	Glass: predominately colour separate collection Plastics: empty plastic bottles and flasks Metal cans
Germany	nation-wide	Mainly kerbside bring-system for glass and paper	Glass: separately collected, three colours Paper: together with magazines, newspaper; estimated packaging share 25% Plastics, metals, composites: collected together (yellow bin)
Ireland	not yet fully established	bring-system	Glass and aluminium cans are separately collected, extension of collection scheme planed
Italy	mainly in northern region	depending on local condition	Glass, paper, plastics and aluminium is separately collected
Luxembourg		bring system except for plastics bottles and flasks, metal cans and beverage cartons	Paper etc.: collected together with newspapers etc. empty plastics bottles and jars, metal cans and beverage cartons are collected in blue bags or via containers
Portugal	not yet fully established	mainly bring-system, in some areas kerbside system	Glass: collected mainly through green containers Paper: together with beverage cartons in blue containers, Plastic, metals: together in yellow containers
Spain	not yet fully established	mainly bring system, in some areas kerbside system	Glass: green containers Paper: blue containers Plastics, cans, beverage cartons in yellow containers
Sweden	nation-wide	bring-system	
The Netherlands	nation-wide (for glass and paper, cardboard)	Mainly bring system	Glass: colour separate collection via bottle banks Paper and cardboard mainly via bring systems Plastics, metals, beverage cartons: collected separately on a small scale
UK	some separate collection schemes	mainly bring system, some areas kerbside system	Glass: colour separate collection Bring-system for aluminium

2.7 Financing of packaging waste management

The work of the compliance schemes is financed by fees collected from companies wishing to transfer the obligations imposed on them to the scheme. In general, three different types of fee structures can be distinguished:

- fees based on weight or volume and type of packaging material,
- membership/registration fees based on turnover and
- fee per unit of packaging

In **Spain** a membership fee and a material-specific fee is collected, in **France**, **Germany** and **Luxembourg** a material-specific fee and a fee per unit of packaging is to be paid. Fees in **Austria** and **Germany** are explicitly calculated to cover the total costs of waste management of the different packaging materials, excluding cross-subsidies between the different packaging materials.

In **UK**, Packaging waste Recovery Note (PRN) concept was developed as a means of providing evidence of compliance and as an economic instruments to stabilise the recycling market. The reprocessors sell the PRNs to compliance schemes and individually obligated producers. In principle, the Packaging Recovery Notes, to be purchased by obligated businesses, should cover all costs incurred for the collection, recovery and reprocessing of the various packaging materials. The annual registration fees paid by producers registered with the Agency or a Compliance Scheme are used to fund the Agency's monitoring activities.

Table 7: Structure of compliance scheme fees

	material specific	Fees based on number of units	membership/ turnover
Austria	x		
Belgium	x		
Finland	x		x
France	x	x	
Germany	x	x	
Ireland	(x) from 2000		x
Italy	x		x
Luxembourg	x	x	
Portugal	x		
Spain	x		x
Sweden	x		x
The Netherlands			x
UK	Purchase of evidence of compliance (e.g. PRN)	fixed fee if registration is done with the Environment Agencies compliance schemes have different joining fee arrangements	

The financing need for packaging waste management is depending on the national quantitative recovery and recycling objectives and on the different requirements with regard to municipal and non-municipal packaging waste. High recovery targets for municipal packaging waste (sales packaging in case of Germany) have a fundamental effect on the expenditures on compliance. In countries where

no provisions exist regarding the recovery of packaging waste from domestic sources, the compliance with recovery obligations is met primarily by the recovery of industrial packaging waste, which is usually cheaper.

An indication for the differences in financing needs is provided by the following comparison of Green Dot tariffs in Member states. The fees for various types of packaging are particularly high in Austria and Germany compared to those in other Member States.

Table 8: Comparison of Green Dot tariffs for various packaging types

		Fee for various types of packaging in € x 10^{-3}						
	kg	Austria	Germany	Belgium	Luxem-bourg	Portugal	Spain	France
Glass bottle (1 l)	0.35	**30.52**	28.46	6.77	5.99	**0.52**	2.40	0.75
Tetrabrick (1 l)	0.027	5.47	**25.28**	6.14	5.69	**0.27***	2.25	2.99*
PET bottle (1 l)	0.03	32.90	**45.12**	10.44	8.59	**1.20**	3.53	3.47
Aluminium can (33 cl)	0.015	6.92	**13.65**	2.40	2.00	0.52	0.76	**0.45**
Steel can (33 cl)	0.03	**11.97**	11.61	1.74	1.24	0.52	0.93	**0.42**
Cardboard box	1	**202.76**	190.64	37.68	31.23	**9.98**	15.47	74.09**

* : paper-cardboard tariff is applied (main material)

** : a 10% rebate is awarded to cardboard packaging containing more than 50% recycled material

Note:

These fees are valid for the year 2000. They are exclusive VAT.

Figures in bold indicate the maximum and the minimum fee

These different fees are hardly explainable by national differences in costs for recovery and recycling activities only. A detailed consideration of financing and costs caused by the implementation of the Packaging Directive is beyond the scope of this study, nonetheless, there are a number of factors which influence the economical impact of compliance with the Packaging Directive and by the same time impede the direct comparison of costs. Taking into account also the findings of the study on costs-efficiency of packaging recovery systems from SOFRES[3] the following aspects are to mention:

- general approach of packaging waste regulation - industrial value-based approach (e.g. the Netherlands) market-based approach (e.g. the UK), administrative approach (e.g. Germany)
- scope of national targets - material specific recycling targets
- scope of regulation of different packaging waste flows - recovery targets applicable to household packaging, sales packaging, drink packaging, all packaging

[3] SOFRES, Costs-Efficiency of Packaging Recovery Systems - The case of France, Germany, the Netherlands and the United Kingdom, 2000

Generally, three different types of systems can be broadly distinguished regarding the financing of non-industrial packaging waste management activities:

• Industry is fully responsible for covering all costs; municipalities can be involved in separate collection on behalf of the industry	Austria, Germany, Sweden
• Industry and municipalities share responsibility, the industry covers costs of sorting and recycling; municipalities are in charge of separate collection and their costs are (completely or partially) reimbursed.	Belgium, Denmark, Finland, France, Ireland, Italy, Luxembourg, Portugal, Spain
• Industry and municipalities share responsibility, the industry covers the costs of recycling; municipalities are in charge of separate collection and receive revenues through selling the collected materials.	United Kingdom, the Netherlands

Comparison of costs is very difficult due to lack of transparency of costs particularly with regard to collection. In countries where packaging waste management costs are currently rather high (Austria and Germany) a trend to reducing costs is observable. The reasons for this development are manifold and include e.g. an increase of the number of licensees, but also the optimisation of collection and sorting, cost reduction of recovery operations and cost savings through technical innovation. It is very likely that in contrast to cost reduction tendencies in these two countries the costs for compliance with the Directive will increase in other Member States, at least when recycling targets are increased.

2.8 Monitoring

The activities of the compliance schemes are monitored by the ministries of environment or other entities, e.g. the Interregional Packaging Commission in **Belgium**, the Agencies in the **UK**. The compliance schemes control their members (e.g. through external auditors). In addition, the monitoring of businesses obligated is carried out by the Agencies in the **UK**, by local authorities in **Ireland**, by the Interregional Packaging Commission in **Belgium** and by the wholesale and retail trade industry in **Finland**.

Monitoring and control is carried out at different stages:

- compliance with targets
- activities of compliance schemes and obligated businesses (free-rider)

Compliance with **targets** is predominately monitored through data reports of businesses obligated, either submitted directly or via the compliance schemes to the competent authority. In **Germany**, data on packaging consumption and recovery results achieved are compiled by an independent institute on behalf of the Federal Environment Agency. The regulation in **Luxembourg** includes the provision that the monitoring of the achievement of mandatory recovery and recycling rates must be undertaken by an approved auditor. In the **Netherlands**, the monitoring is realised by the Packaging Committee by comparing results of the monitoring carried out by both the Monitoring Institute (the monitoring agency appointed by the Industry - SVM-Pact) and the National Institute of Public Health and Environmental Hygiene (Rijksinstituut voor Volksgezondheid en Milieuhygiëne - RIVM, the monitoring agency appointed by the Minister). The Packaging Committee evaluates and compares the individual reports

of the Minister and SVM·PACT together with the joint monitoring report (of the Monitoring Institute and RIVM) and then uses these to write its own annual report.

In the **UK**, in addition to the compilation of data reported by businesses collected by the Agencies which cover ca. 86% of the amount of packaging consumption, the Department of Environment, Transport and Regions (DETR) estimates the amount of packaging placed on the market based on agencies' reports and information provided by material organisations. In **Denmark**, waste treatment facilities are to keep a register of the type, origin, and quantity of waste, including recyclable materials, which are recycled, incinerated for energy recovery, or disposed of. The data must be registered in ISAG (Information System for Waste and Recycling) in a standard computer table. The data from the register must be sent annually to DEPA. All producers, exporters, or importers of empty packaging or packaging containing products (filled packaging) shall, at the request of DEPA, submit information on the number of product units, the materials and substances used in each component of the packaging and the weight of each material used in the packaging per product unit.

3 Consumption, Collection and Recovery of Packaging Material

3.1 Availability and quality of data

The data on consumption and recycling of packaging material as shown in the following sections are based on the reports of Member States submitted to the Commission according to Commission Decision 97/138/EC for the year 1997. As Greece, Ireland and Portugal have not yet delivered their reports, and the report for Luxembourg was not available to the project group, the data for these countries are derived from information provided by European material associations (APME, CEPI, FEVE), from relevant surveys, or are extrapolated from data of comparable countries. In the following the term EU-11 refers to Member States except Greece, Ireland, Luxembourg and Portugal.

The lack of accuracy and comparability of data from Member States has already been analysed and discussed in other studies (e.g. PricewaterhouseCoopers, 1998, BIPE & ADEME, 1998) and shall not be discussed in depth in this study. However, it seems necessary to mention the most important facts that have to be considered in the discussion and interpretation of the reported data:

- data on wood packaging, which constitute a relevant portion of transport packaging, are only reported by 7 of the 11 countries which have submitted reports
- data on "other packaging" are provided by 5 of these Member States
- data on imports and exports of packaging waste as well are incomplete

Further uncertainties arise from the different methods of data collection and compilation in Member States, which are described insufficiently in several of the country reports to the EC. Another area of uncertainty is the definition of energy recovery and feedstock processes. The results achieved in packaging waste recovery cannot be compared notably due to the lack of common understanding of the concept of energy recovery. Indeed, commonly defined criteria for the minimum thermal efficiency treatment plants must achieve to be distinguished from common incineration plants are lacking. With regard to feedstock processes clarification seems to be necessary which of these processes are considered as recycling activities.

However, an in-depth analysis and correction of the reported data is beyond the scope of this study. Some additional information on data compilation as well as inconsistencies of data can be ascertained from the description of the packaging waste management systems in Annex I.

3.2 Total packaging

The total quantity of packaging put on the market in the EU in 1997 amounted to about 58 million tonnes. The breakdown of packaging according to material is shown in Figure 1. Composite packaging is generally included in the predominant material. As described above, data on wood packaging and "other packaging" is partially not available. Thus, it can be assumed that total packaging consumption as well as the share of wood packaging are underestimated in these figures.

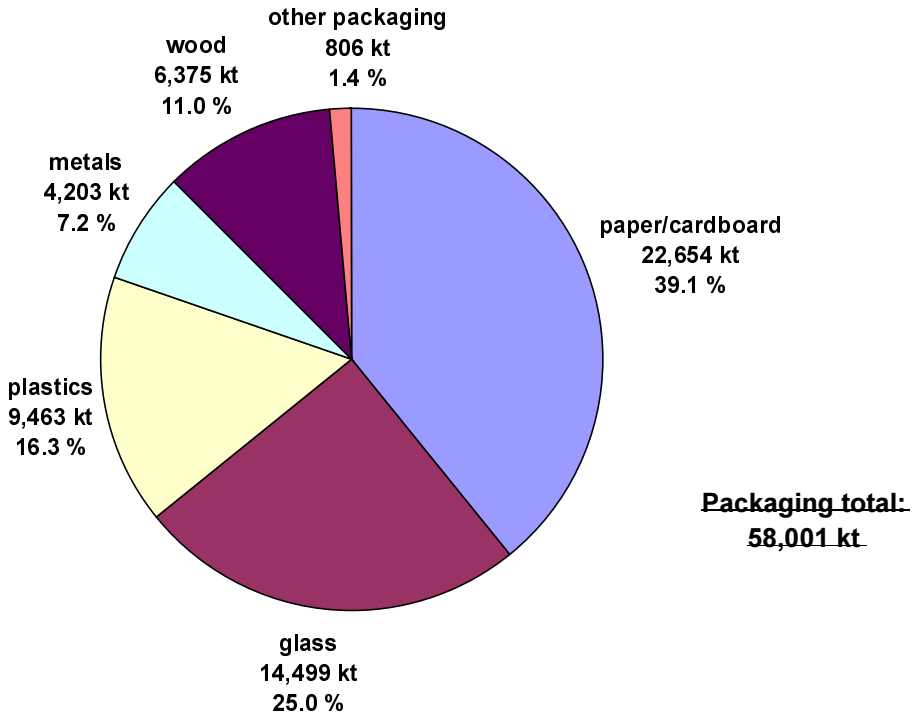

Figure 1: Breakdown of packaging put on the market in the EU (EU-15) in 1997 according to material

Consumption according to Member States, as shown in Table 9 ranges between 74.4 kg/cap,a in Greece and 189.2 kg/cap,a in France, the EU-15 average amounting to 155.2 kg/cap.a. The low consumption in Finland (81.2 kg/cap,a) is to a large extent a result of their wide-ranging reuse systems (see also figure 2).

According to the reported data, the minimum recycling target of the Directive of 25 % was already exceeded in 1997 by 11 of the 12 Member States who have to fulfil this target by 20014. This is mainly due to the recycling rates for paper/cardboard and glass packaging. However, some of these Member States (Italy, Spain and UK) have to increase their recovery rates to achieve the overall recovery target of 50 % in 2001 (see Figure 3).

Consumption and recovery results structured by materials are discussed in the following sections.

[4] Data on Luxembourg are not available

Table 9: Total packaging consumption and achieved recycling and recovery rates according to Member States in 1997 (including exports for recycling/recovery)

Member State	Packaging put on the market		Recycling	Energy recovery	Total recovery
	(1,000 tonnes)	(kg/cap,a)	(%)	(%)	(%)
Austria	1.113	138,0	64,8%	4,8%	69,6%
Belgium	1,356	133.3	62.3%	n.a.	62.3%
Denmark [1)]	971	184.1	48.7%	38.0%	86.7%
Finland [1)]	417	81.2	41.8%	12.2%	54.1%
France	11,069	189.2	41.0%	14.5%	55.5%
Germany [2)]	13,731	167.4	78.3%	2.3%	80.5%
Greece [3)]	780	74.4	n.a.	n.a.	n.a.
Ireland [4)]	683	186.9	n.a.	n.a.	14.8%
Italy [5)]	9,529	165.8	29.6%	2.2%	31.8%
Luxembourg [6)]	39	93.2	n.a.	n.a.	n.a.
Netherlands	2,745	176.3	55.2%	22.4%	77.6%
Portugal [3)]	1,012	101.9	n.a.	n.a.	n.a.
Spain	5,879	149.6	34.4%	1.6%	36.0%
Sweden	923	104.4	57.9%	7.2%	65.1%
UK	7,755	131.7	31.3%	3.2%	34.5%
EU-11 total	**55.487**	**158,9**	**46,3%**	**6,3%**	**52,6%**
EU-15 total	**58.001**	**155,2**			

n.a.: data not available

1) Report contains no figures on energy recovery; the figures given in the table are calculated as difference between total recovery and total recycling
2) Data on energy recovery of paper/cardboard and plastic packaging are not available; data on exports of tinplate and paper/cardboard packaging are not or only partially available
3) Total consumption estimated on the basis of information from CEPI, APME, FEVE and own assumptions
4) National Waste Data Report; data refer to 1998
5) Data on exported wood packaging not available
6) ECO Conseil Agency; data refer to 1996

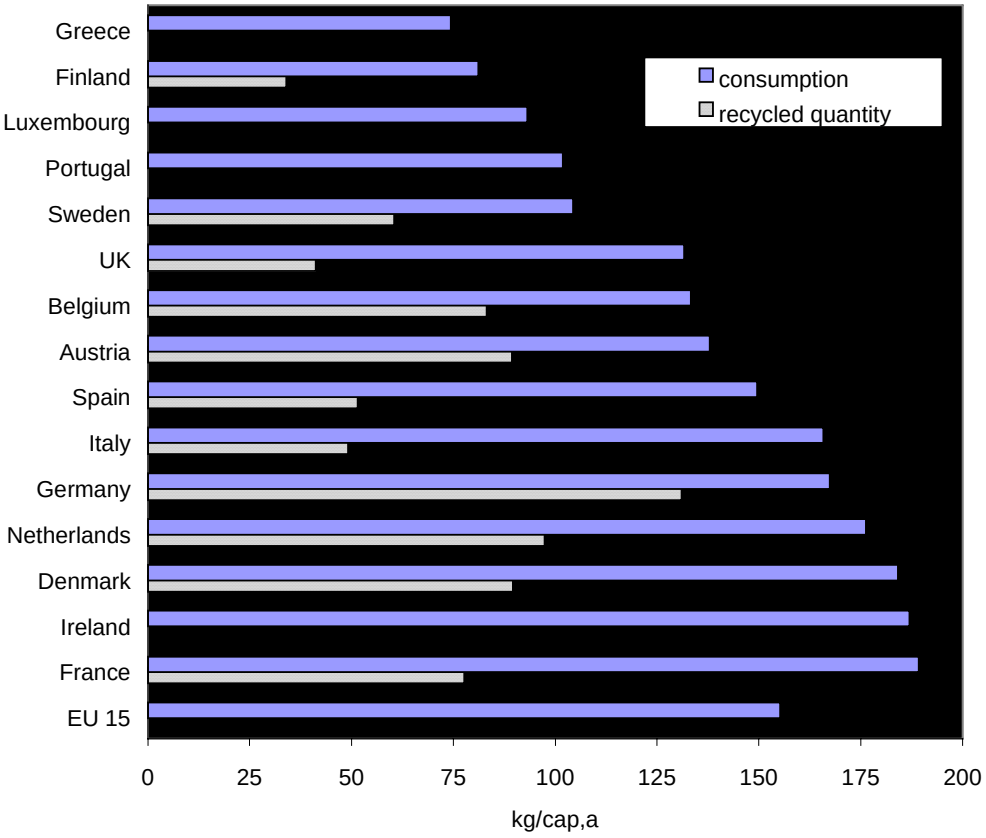

Figure 2: Total packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling)

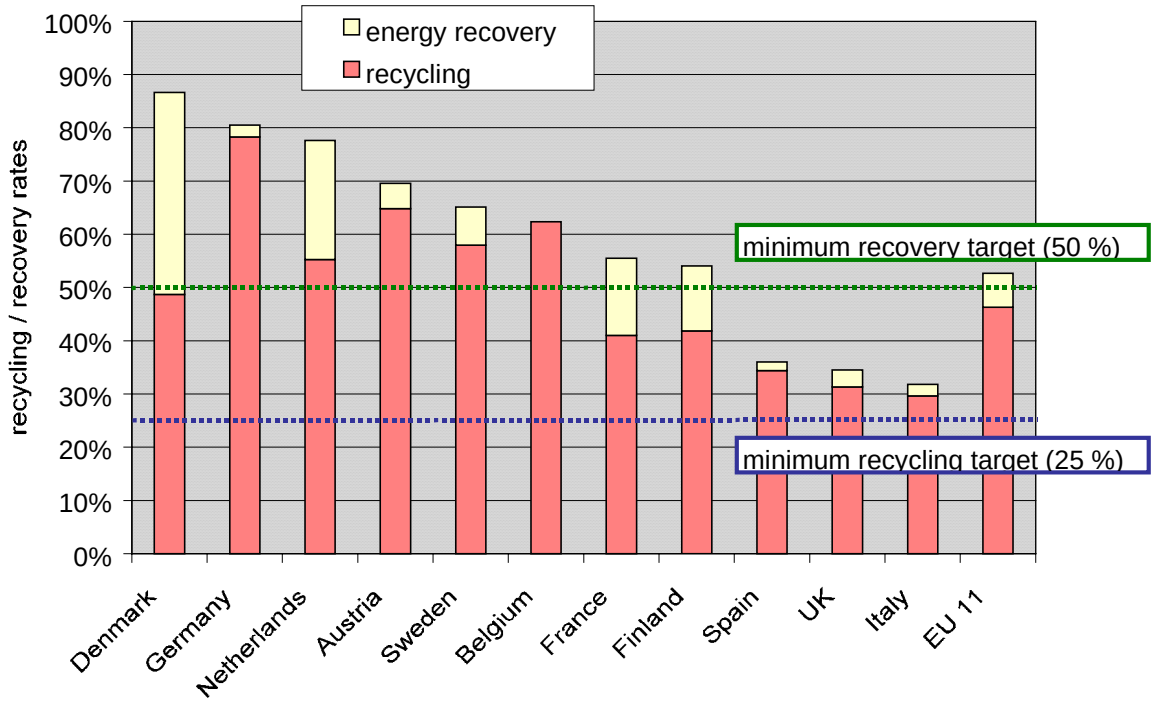

Figure 3: Overall recovery and recycling rates by Member States (in %)

3.3 Paper and cardboard packaging

According to the reports submitted to the European Commission and other available information, consumption of paper and cardboard packaging varied in 1997 between 28.6 kg/cap,a in Luxembourg and 93.1 kg/cap,a in The Netherlands, the EU 15 average being 60.6 kg (see Table 10 and Figure 4). Paper and cardboard packaging is the most important packaging material in terms of quantity in all Member States. The total paper and cardboard packaging consumption of 22.6 million tonnes as reported by Member States is considerably lower than the consumption according to CEPI (28.2 million tonnes) for the year 1997.

Paper and cardboard packaging amounts to about 40 % of total paper and cardboard consumption (CEPI, Annual Statistics 1998). Collection of paper and cardboard from industries and/or from households was established in most of the Member States before the transposition of the Packaging Ordinance, though on different levels. The recycling of paper products is mainly driven by economy and availability: the lack of fibre raw material in Central Europe combined with the cost competitive advantages brought on by recovered paper. It has therefore been in the industry's interest to increase the use of recovered paper. Collection of paper/cardboard products grew continuously in Western Europe in recent years by about 6 % per year. It is assumed that these incentives will remain in place for the foreseeable future. The most common products of paper/cardboard recycling are hygienic papers, newspapers and packaging products. (CEPI, Special Report Recycling, November 1999).

Most of the Member States have established higher targets for paper/cardboard packaging (or for particular types of paper/cardboard packaging) than the 15 % target of the Packaging Directive, either by legislation (Denmark, Finland, Germany, Ireland, Sweden, the Netherlands), by national or regional waste management plans (Belgium, Spain) or in accreditation acts for compliance schemes (France). The highest targets are established in the Netherlands (85 % in 2001).

Paper/cardboard packaging originates mainly from industry and trade, where corrugated cardboard is used as grouped and transport packaging. Some countries such as **Denmark**, **Finland** and **Sweden** therefore concentrate on collection and recycling of these materials, thus compensating lower recycling rates for paper/cardboard packaging from households. In **Denmark** this strategy is enforced by a voluntary agreement with the industry to recycle 80 % of paper/cardboard transport packaging. **Sweden** has set a special recycling target of 65 % for corrugated cardboard.

While the collection systems for paper/cardboard packaging from households in **Austria**, **Belgium** and **Germany** are established nation-wide, other Member States are working on the extension of their systems. To enforce collection from households, **Belgium** and **Germany** have stipulated specific targets (see chapter 2, table 2). In **France**, a recycling rate for paper/cardboard packaging of 35 % is set up in the accreditation act for Eco-Emballages for 2002. The **Danish** waste management plan stipulates that 55 % of paper/cardboard arising in households must be collected by the year 2002.

According to the national reports to the Commission, the achieved recycling rates range between 36.3 % in Italy and 85.5 % in Germany; the EU-11 average amounting to 59.0 %. Thus, the material specific recycling target of the Packaging Directive of min. 15 % recycling has been exceeded by far by all Member States (see Figure 5). However, as paper and cardboard is the most important packaging material in terms of quantity, a further increase might be necessary to achieve the overall recovery rate of 50 %. In **Denmark** and the **Netherlands** energy recovery rates of more than 20 % contribute significantly to the total recovery rates achieved.

Table 10: Consumption of paper/cardboard packaging and achieved recycling and recovery rates according to Member States in 1997 [1)]

Member State	Packaging put on the market		Recycling	Energy recovery	Total recovery
	(1,000 tonnes)	(kg/cap,a)	(%)	(%)	(%)
Austria	531	65,8	83,4%	0,9%	84,4%
Belgium	547	53.8	76.0%	n.a.	76.0%
Denmark [2)]	463	87.8	64.1%	30.9%	95.0%
Finland [2)]	244	47.4	56.5%	16.4%	72.9%
France	3,846	65.8	55.1%	18.5%	73.6%
Germany	5,448	66.4	85.5%	n.a.	85.5%
Greece [3)]	317	30.2	n.a.	n.a.	n.a.
Ireland [4)]	300	82.2	n.a.	n.a.	14.9%
Italy	3,246	56.5	36.3%	3.1%	39.4%
Luxembourg [5)]	12	28.6	n.a.	n.a.	n.a.
Netherlands	1,449	93.1	64.9%	20.1%	85.0%
Portugal [3)]	436	43.9	n.a.	n.a.	n.a.
Spain	2,255	57.4	56.0%	1.1%	57.1%
Sweden	526	59.5	66.2%	8.4%	74.5%
UK	3,035	51.5	53.0%	7.9%	60.9%
EU-11 total	**21.589**	**61,8**	**59,0%**	**7,5%**	**66,5%**
EU-15 total	**22.654**	**60,6**			

n.a.: data not available

1) Recycling and recovery rates include packaging waste quantities exported for recycling/recovery
2) Data on energy recovery of paper/cardboard packaging are not available; the figures given in the table are calculated as the difference between total recovery and total recycling
3) Consumption according to CEPI
4) National Waste Data Report; data refer to 1998
5) ECO Conseil Agency; data refer to 1996

Recovered paper/cardboard is an international commodity, with prices depending on supply and demand such as other industrial raw materials. There is a strong intra-European waste flow for recovered paper, which amounted to about 5.7 millions in 1997 (CEPI, 1999). Paper and cardboard waste therefore is exported as well as imported by most of the Member States. Imports/exports may be due to a surplus/lack of recycling capacities or may be driven by market prices and quality. According to CEPI statistics the main net exporters of waste paper in 1999 were Germany (2,000 kt), Belgium (900 kt), UK (400 kt), The Netherlands (300 kt) and Denmark (200 kt). Net imports are reported for Italy (800 kt), Spain (750 kt), Austria (550 kt), Sweden (400 kt) and France (300 kt). In other Member States imports and exports are almost balanced.

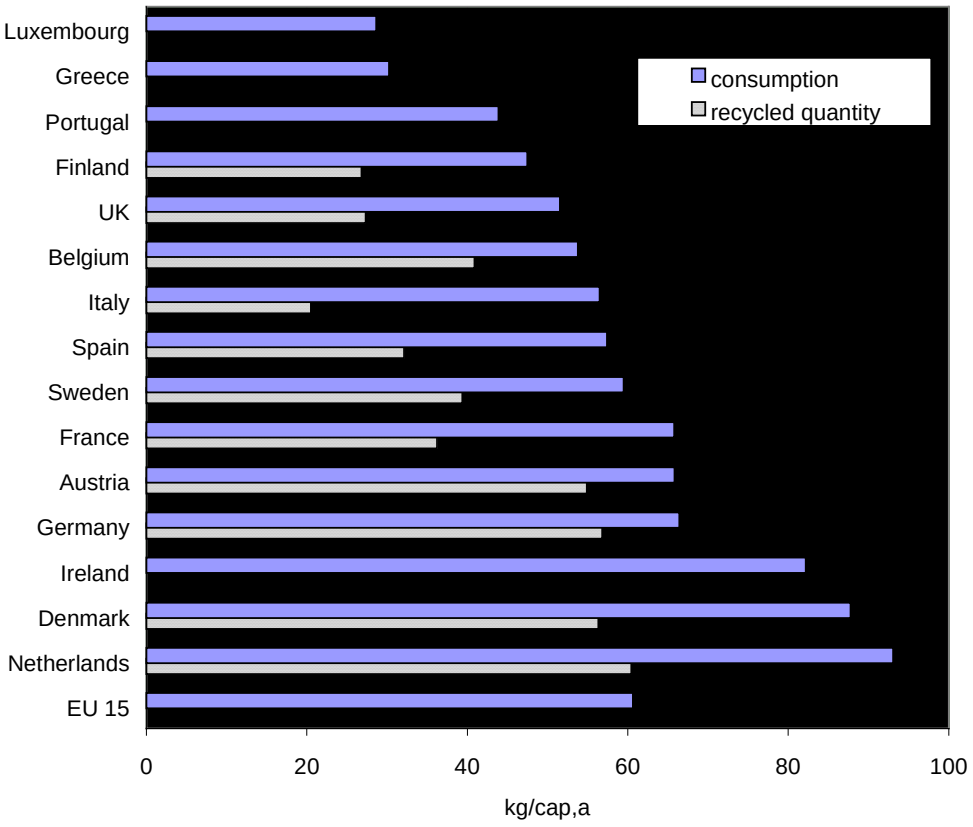

Figure 4: Paper and cardboard packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling)

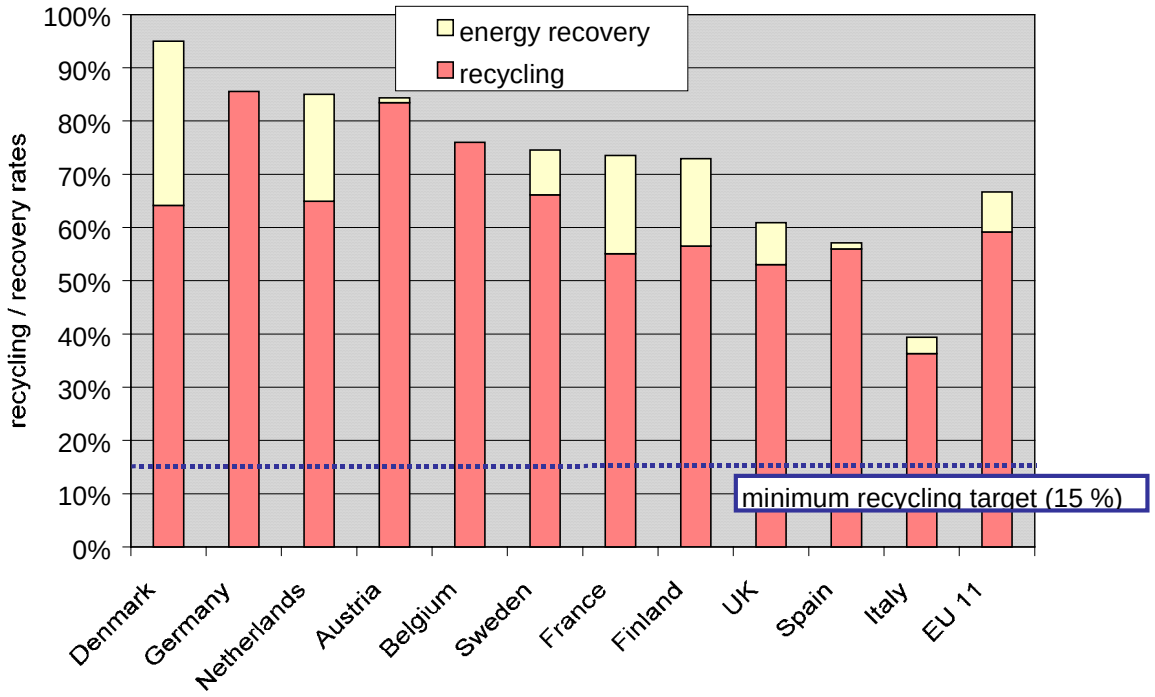

Figure 5: Recovery and recycling rates of paper and cardboard packaging by Member States (in %)

In the reports to the Commission, beverage cartons made of liquid packaging board (LBP) are normally included in the figures for paper/cardboard packaging, which is the predominant material (share of paper fibre about 80 %, the rest being PE and aluminium). According to information from the Alliance for Beverage Cartons & the Environment (ACE) total consumption of beverage cartons in the EU amounted to 874,000 tonnes in 1999 which corresponds to an average consumption of 2.3 kg/cap,a. About 80 % of the beverage containers are used for milk packaging. The share of beverage cartons in total packaging consumption amounts to 1.5 %. (ACE, personal communication, 2000)

Recycling of beverage cartons is reported by all Member States with the exception of **Denmark** and **Italy**, recycled quantities varying in a broad range. The highest recycling rates are achieved in **Germany** (66 %), **Belgium** (54 %), **Luxembourg** (36 %), **Austria** (32 %) and **Sweden** (28 %). In the other Member States recycling rates fell below 15 % in 1999. **Denmark** relies exclusively on energy recovery of beverage cartons mixed with household waste. Beverage cartons are mainly collected together with plastic and metal packaging. In some countries they end up in paper collection (**Portugal**, **UK**), where sometimes they are not sorted out. Accordingly, recycling figures are not or only partially available. (ACE, 2000)

Beverage cartons collected for recycling are usually delivered to paper mills which are equipped to handle this material. After being shredded and pulped the fibre component is recovered and used for the production of tissues, corrugated cardboard etc. The reject is energetically recovered either as fuel for the paper making process or in cement kilns. New technologies allow the separation and recycling of the aluminium and PE-residues:

- In Finland one paper mill will start to reclaim aluminium this year and to return it to the aluminium industry for recycling. PE will be used for energy recovery.
- In a treatment plant in Thüringen, Germany, a new process is under development which allows material separation in a dry process, making all fractions feasible for recycling.

3.4 Glass packaging

The average consumption of glass packaging in the EU differs by more than 500 % from the country with the lowest consumption (**Finland**: 10.1 kg/cap,a) to the country with the highest (**France**: 56.3 kg/cap,a), the EU-15 average being about 39 kg/cap,a (see Table 11 and Figure 6). About 75 % of glass packaging is used for the packaging of beverages, while the rest is used for food (20 %), pharmaceuticals, cosmetics and chemical products (5 %) (FEVE, personal communication, 2000). The consumption depends on national consumption patterns, on the choice of material used for containers (e.g. glass or plastic packaging) and on the extent of reuse systems.

For economic reasons, separate collection and recycling of container glass was established in all Member States before the transposition of the Packaging Directive, though on very different levels. As early as 1988, some countries (**Austria**, **Belgium** and the **Netherlands**) achieved recycling rates of 50 % or more. In recent years collection quantities and recycling rates have increased continuously in most of the Member States. Most of the Member States have established higher targets than the 15 % target laid down in the Packaging Directive, either by legislation (Denmark, Finland, Germany, Ireland, Sweden, the Netherlands), by national or regional waste management plans (Belgium, Spain) or by provision applicable for compliance schemes (France).

*In 1997 the achieved recycling rates ranged between 24.7 % in the **UK** and 83.9 % in **Germany**. Thus, the material specific recycling target of the Directive was exceeded by all Member States (see Figure 7: Recycling rate of glass packaging by Member States (in %)*

). However, as glass is an important packaging material in terms of quantity, an increase in recycling levels might be necessary in some countries to achieve the overall recovery rate of 50 %. According to the country reports, the average recycling rate for EU-11 amounted to 52.2 % in 1997.

In all Member States collection of disposable glass packaging is done mainly through bottle banks. An essential prerequisite for efficient glass recycling is the source-separation according to colour, and a low content of disturbing materials such as ceramics, porcelain, metals and others. Most Member States have therefore established systems where glass is at least sorted according to non-coloured and coloured glass.

Table 11: Consumption of glass packaging and achieved recycling and recovery rates according to Member States in 1997 [1)]

Member State	Packaging put on the market		Recycling	Energy recovery	Total recovery
	(1,000 tonnes)	(kg/cap,a)	(%)	(%)	(%)
Austria	260	32.2	76.5%	0.0%	76.5%
Belgium	310	30.5	70.1%	0.0%	70.1%
Denmark	202	38.4	75.1%	0.0%	75.1%
Finland	52	10.1	47.9%	0.0%	47.9%
France	3,296	56.3	40.9%	0.0%	40.9%
Germany	3,750	45.7	83.9%	0.0%	83.9%
Greece [2)]	154	14.7	n.a.	n.a.	n.a.
Ireland [3)]	111	30.5	n.a.	n.a.	32.3%
Italy	2,248	39.1	33.4%	0.0%	33.4%
Luxembourg [4)]	17	41.4	n.a.	n.a.	n.a.
Netherlands	469	30.1	75.5%	0.0%	75.5%
Portugal [2)]	266	26.8	n.a.	n.a.	n.a.
Spain	1,398	35.6	37.3%	0.0%	37.3%
Sweden	177	20.1	75.6%	0.0%	75.6%
UK	1,787	30.3	24.7%	0.0%	24.7%
EU-11 total	**13.950**	**39,9**	**52,2%**	**0,0%**	**52,2%**
EU-15 total	**14.499**	**38,8**			

n.a.: data not available

1) Recycling and recovery rates include packaging waste quantities exported for recycling/recovery
2) Consumption according to FEVE
3) National Waste Data Report; data refer to 1998
4) ECO Conseil Agency; data refer to 1996

Collection rates are still on a low level in Greece, the UK, Ireland and Italy, in comparison with other Member States. In **Greece,** a separate collection system is primarily run by the municipalities. The Hellenic Recovery and Recycling Association (HERRA), founded by a number of important packaging and food/beverage companies, only collects packaging waste on a small scale in the Greater Athens Area. In the **UK,** the density of bottle banks run by municipalities is still low (1 bottle bank per 2,700 inhabitants in 1997) and has remained more or less static over the last three or four years. Without an increase in glass collection and recycling it seems questionable whether the UK will meet the Directive's overall recovery target of 50 % in 2001. Furthermore, there is a need to improve cullet quality in terms of better colour separation and reduction of contaminants. In **Ireland,** glass is collected

by the municipalities and a private company, both of which are making efforts to increase the number of bottle banks. In **Italy,** colour-separated collection is not yet established. Furthermore, collection has to be improved, especially in the southern part, where glass collection quantities per inhabitant amount to only 15 % of that in Northern Italy.

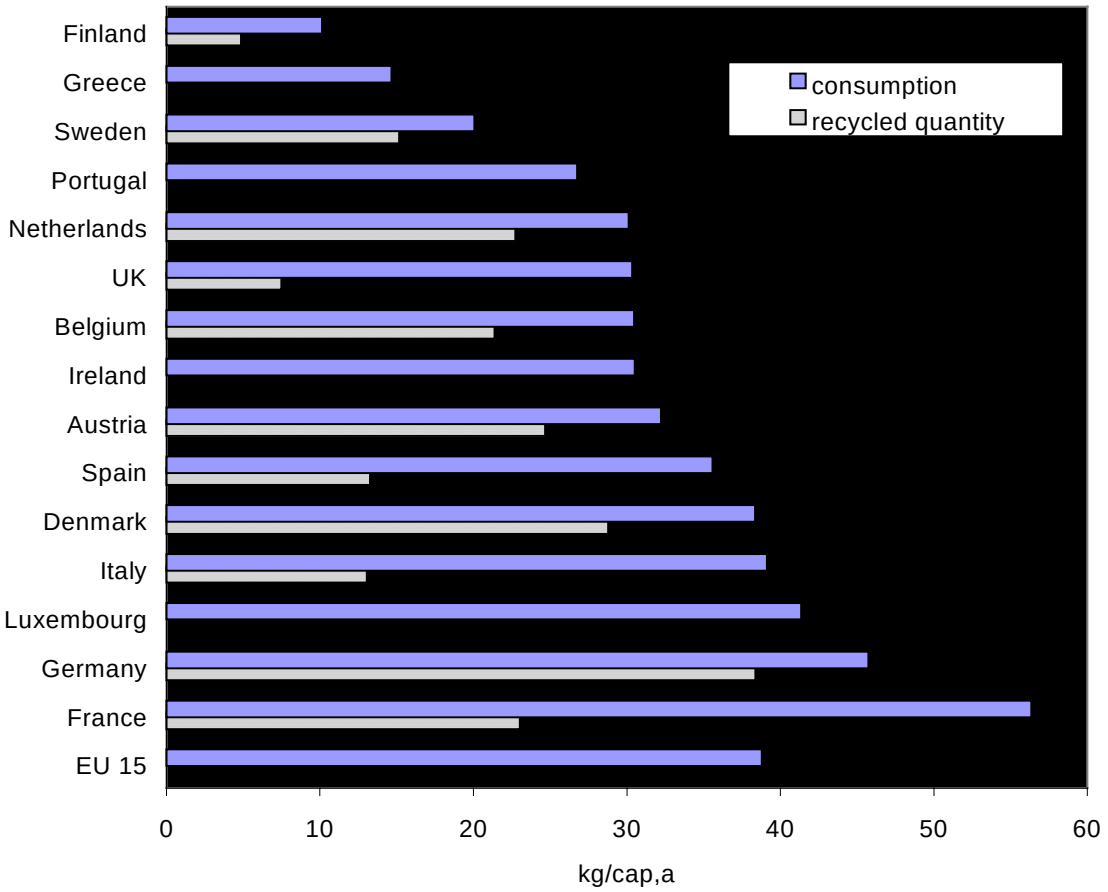

Figure 6: Glass packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling)

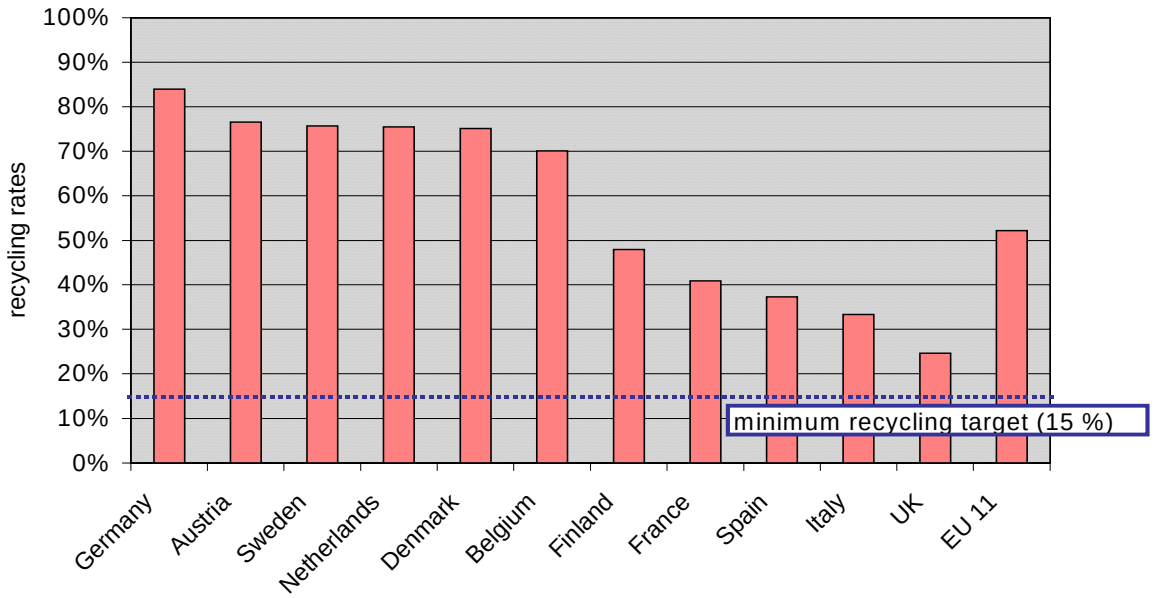

Figure 7: Recycling rate of glass packaging by Member States (in %)

In **Austria**, **Germany** and **France,** the collected glass is mainly used for the production of new container glass. Alternative uses, e.g. for production of insulation products, play only a minor role. Other countries, however, lack sufficient recycling capacities within the country. This is mainly due to imbalances between their own glass production and imports of glass with regard to quantities or colours.

In the **UK,** the glass container manufacturers produce around 1.9 million tonnes of glass per annum. The majority of this is clear glass. Filled glass exported from the UK totals around 440,000 tonnes per annum (mostly clear glass bottles of spirits, particularly whisky). The UK imports around 750,000 tonnes per annum of filled glass, much of which is beer and wine in green bottles. This results in a significant surplus of green glass which can not be recycled to new container glass within UK. Currently, funds to subsidise exports of green glass are not available on account of the low PRN prices (Packaging waste Recovery Note) for glass. Possible solutions include a reduction in imports of green glass and the development of alternative markets for green glass. The main alternative use for cullet is as an aggregate substitute in building and construction applications. However, it appears debatable whether such applications would be economically viable.

The use of significant amounts of cullet for applications other than container glass production are reported in **Sweden** and **Finland**, where cullet are used in glass wool production. Alternative applications might also be necessary in **France** to increase the recycling rates

Glass recycling in **Belgium** is suffering from the collapse of the Verlipack group, which was the only Belgium group to use container glass from households. Glass waste therefore has to be exported for recycling. This has lead to fears of a reduced waste take-back price by the recyclers. According to FOST Plus, this has not occurred due to the sustained demand by the international market.

Exports of cullet are also reported from **Germany**, **Sweden**, **Denmark, Finland** and the **UK**. For some countries there are no data available. It is estimated that the import and export of cullet in Western Europe amounts to about 10 % of the total cullet arising (FEVE, personal communication, 2000). However, reliable figures are not available. It is assumed that on account of mergers and transpositions of production sites, imports and exports of packed products as well as of cullet will increase in the future.

Glass packaging for beverages used in a reuse system has a long tradition in a number of countries. Some countries have made provisions for the support/stabilisation of established reuse systems in their national regulations or voluntary agreements (see reuse section in chapter 2), some of which have given rise to controversial debate. However, recent developments show an increasing substitution of glass packaging by other packaging materials, predominately by PET bottles. A tremendous decrease in market share for refillable bottles compared to disposable bottles is reported from **Austria**.

3.5 Plastic packaging

According to the reports to the Commission, consumption of plastic packaging in the EU amounted to a total of about 9.5 million tonnes in 1997, which corresponds to an average consumption of 25,3 kg/cap,a. It is estimated that in Western Europe in 1997, about 73 % of total plastic packaging was used for packaging ending up in households, while the remaining 27 % was used as distribution packaging (crates, pallets, wrapping) in industry. (APME, 1999).

In 1997, plastic packaging waste was estimated by APME to account for 56 % of all plastic waste. Amounts and shares of post-user plastic packaging waste by end-use sector and by resin are shown in the tables below. The plastic packaging market is dominated by PE packaging, to which 55 % of plastic packaging waste can be attributed. The major part of plastic packaging is used for food packages, 54 % of plastic packaging waste results from this application.

Table 12: Post-user plastic packaging waste by end-use sector, Western Europe 1997

Application	Waste arising (1,000 tonnes)	Share in %
Food	5.338	54,3%
Non-food	600	6,1%
Detergents, pharmaceuticals	1.249	12,7%
Distribution in industry	2.639	26,9%
Total packaging waste	9.826	100,0%

APME: A material of choice for packaging, 1999

Table 13: Post-user plastic packaging waste by resin, Western Europe 1997

Resin	Waste arising (1,000 tonnes)	Share in %
LDPE/LLDPE	3,370	34 %
HDPE	2,044	21 %
PP	1,749	18 %
PET	973	10 %
PS	796	8 %
PVC	717	7 %
EPS	177	2 %
Total	9,826	100 %

APME: A material of choice for packaging, 1999

The demand for plastic packaging has increased in recent years by about 4 % to 5 % annually. It is anticipated by the plastic producers and converters that growth rates will remain at these levels or even increase (van den Doel, 1999; APME, 1998). As far as individual plastic materials are concerned, very high growth rates are expected for PET. The main application for PET is bottles for carbonated soft drinks and mineral water, but PET bottles are also being tested for packaging beer (ÖKK, www.okk.co.at, van den Doel, 1999).

The highest recycling rate of 48.6 % is achieved in **Germany**, where the Packaging Ordinance stipulates a recovery target of 60 % for plastic sales packaging (see Table 14). This target has to be fulfilled by a recycling rate of 36 %, while 24 % of plastic packaging may be used by energy recovery. As energy recovery was not allowed until the German Packaging Ordinance was amended in 1998 the Deutsche Gesellschaft für Kunststoff-Recycling mbH (DKR) - guarantor for the recycling of plastic sales packaging - had to provide for sufficient recycling capacities. Although energy recovery is now permitted, the DSD still carries out recovery exclusively through mechanical recycling and feedstock processes[5].

Plastic packaging in Germany is collected together with metal packaging and beverage containers, and is subsequently sorted according to foils, bottles, jars, EPS and mixed plastics. While high quality sorting fractions such as bottles, foils and jars are predominantly processed to regranulates, which substitute virgin plastics, the mixed plastic fraction, which amounts to 63 % of the sorting output, is mainly recycled by feedstock processes or ends up in products of lower quality to substitute concrete

[5] Feedstock processes convert plastics into monomers or molecules and use either their chemical properties (e.g. reduction in blast furnace) or recycle them back to "new" raw materials (e.g. hydrolysis or glycolysis of PET).

and wood products. In 1998, 56 % of the collected 600,000 tonnes of plastic sales packaging were consigned to feedstock processes, while 44 % were recycled mechanically. In the course of feedstock processes, mixed plastic packaging is used for the production of synthesis gas and methanol (fixed-bed gasification) and as a substitute for heavy oil for the reduction of iron in blast furnaces.

While in the beginning of the DSD the major part of plastic packaging waste was exported for recycling, in 1998 93 % of the plastic sales packaging collected by the DSD was recycled in Germany. 7 % was exported to EU-Member States, to other European States and to Japan. Because of the comparatively low prices for virgin material, the DSD has to subsidise the recycling of sorted plastics, the amount of the subsidies depending on the recovery process (mechanical, feedstock) and on the price of the substituted raw materials (e.g. naphtha) and products (e.g. methanol). At present the DSD pays on average some 354 Euro per tonne for plastic to be recycled (DKR, 1999).

Including industrial plastic packaging, a total of 731.000 tonnes of plastic packaging were recycled in Germany in 1997, which amounts to more than 50 % of the total plastic packaging recycling in the EU (EU-11). At present, Germany is the only Member State who recycles mixed plastic packaging by feedstock processes.

In **Austria,** plastic packaging is either collected separately or, together with beverage cartons, by door-to-door collection or bring systems. In order to optimise the separate collection of plastics and composites, the so-called Viennese model (separate collection of particular recyclable plastic fractions, small plastic items remaining in household waste and using their calorific value for energy recovery) is envisaged to be extended in the vicinity of waste incineration plants with energy recovery.

In 1998 about 32,000 tonnes of plastic packaging were recycled, of which 8,000 tonnes had to be exported. Amongst the exported quantities were about 6,000 tonnes of PET, which could not be recycled in Austria at that time. The Austrian plastic recycling organisation (ÖKK AG) has announced that since September 1999 a PET recycling plant with a capacity of 10,000 tonnes/a has started to process PET on a pilot scale.

In **Belgium,** FOST Plus, which is responsible for organising the collection and recovery of municipal packaging, has restricted the collection of plastic packaging to bottles made of PVC, PET and PEHD. These materials are collected together with metal packaging and beverage cartons. The recycling rates for municipal packaging entrusted to FOST Plus have increased from 16.3% in 1997 to 27.8 % in 1999. In the domain of industrial packaging VAL-I-PAC achieved a recycling rate of 36.8 % in 1999. According to FOST Plus, recycling capacities in Belgium exist only for HDPE and mixed plastics, but not for PET. FOST Plus does not intend to look for outlets for PVC bottles in 2000 as these are gradually disappearing from the Belgian market.

In **Luxembourg**, plastic bottles are collected together with metal cans and beverage cartons, either by door-to-door collection in blue bags or via containers. Valorlux achieved a recycling rate of 23.8 % of adhering packaging in 1999, corresponding to a recycled quantity of 570 tonnes. The sorted plastic is exported for recycling to the Netherlands, France and Belgium.

In **France,** the separate collection of plastic bottles from households is partially established. However, recycling rates achieved by Eco-Emballages are still on a low level (about 4.0 % in 1997). The main part of the recycled material (about 70 %) comes from industrial packaging. With regard to market evolution, France faces a rapid growth in PET production, which is deemed to replace PVC in packaging. According to a French Senate report, recycling capacities in France are exceeding the collected quantities at present.

In the **Netherlands**, plastic packaging tends to be collected with the residual waste even though in some local authorities plastics, metals and beverage cartons are also collected separately on a small scale. Indeed, the separate collection of plastic packaging was not considered practically or economically feasible. As a result, municipalities carry no responsibility in the sub-Covenants for these materials, but industry itself is obliged to support and stimulate the separate collection of plastic packaging waste. In its previous annual report, the Packaging Committee noted that recycling remained much too low in 1998 with reference to the recycling obligation of 35 % for 2001 (Covenant II). The Ministries of Housing, Spatial Planning and the Environment and Economic Affairs, the

Association for Environmental Management of Plastic Packaging (Vereniging Milieubeheer Kunststofverpakkingen – VMK) and the EcoPackaging Foundation (Stichting EcoVerpakkingen) are now supporting collective projects in which separate collection and recycling of plastic packaging is stimulated.

Table 14: Consumption of plastic packaging and achieved recycling and recovery rates according to Member States in 1997 [1)]

Member State	Packaging put on the market		Recycling	Energy recovery	Total recovery
	(1,000 tonnes)	(kg/cap,a)	(%)	(%)	(%)
Austria	180	22.3	20.0%	25.6%	45.6%
Belgium	208	20.5	25.3%	n.a.	25.3%
Denmark [2)]	183	34.8	8.1%	89.8%	97.9%
Finland [2)]	90	17.5	10.2%	12.2%	22.4%
France	1,571	26.9	5.2%	27.1%	32.3%
Germany [3)]	1,502	18.3	48.6%	n.a.	48.6%
Greece [4)]	219	20.9	n.a.	n.a.	n.a.
Ireland [5)]	169	46.2	n.a.	n.a.	2.6%
Italy	1,777	30.9	9.6%	6.1%	15.6%
Luxembourg [6)]	7	16.7	n.a.	n.a.	n.a.
Netherlands	611	39.2	12.4%	52.9%	65.3%
Portugal	225	22.6	n.a.	n.a.	n.a.
Spain	1,215	30.9	6.7%	5.3%	12.0%
Sweden	150	17.0	14.0%	14.7%	28.7%
UK	1,356	23.0	8.8%	0.0%	8.8%
EU-11 total	**8,844**	**25.3**	**15.5%**	**14.2%**	**29.7%**
EU-15 total	**9,463**	**25.3**			

n.a.: data not available

1) Recycling and recovery rates include packaging waste quantities exported for recycling/recovery
2) Data on energy recovery of plastic packaging are not available; the figures given in the table are calculated as the difference between total recovery and total recycling
3) Recycling rate includes feedstock processes
4) Consumption according to APME
5) National Waste Data Report; data refer to 1998
6) ECO Conseil Agency; data refer to 1996

In **Spain**, about 66,700 tonnes of packaging were recycled in 1998 (recycling rate: 6.5%). 66% of the plastic recycled had an industrial origin, 18% came from the agriculture sector, 7% from households, 7% from commerce and trades and 2% from the automotive sector. Plastic recycling concerned mainly PEHD and PELD, followed by PVC. It is expected that extension of separate collection systems throughout Spain in the coming years should increase the recycling rate for plastic waste from commercial and domestic origin.

Portugal has set up a recycling target for plastic packaging of 15 % by 2005. Collection systems for plastic and metal packaging from households are partially established. Ponto Verde, to which about 109,000 tonnes of the plastic packaging put on the market were entrusted in 1999, achieved a

recycling rate of 1 %. According to a survey of the Portuguese Intersectorial Recycling Group, the total capacity for mechanical recycling is estimated at about 45.000 tonnes. PLASTVAL, the organisation responsible for the recovery of plastic waste, has not defined expectations of an increase of the recycling capacities since only 50 % to 60 % of the current capacity is used at most.

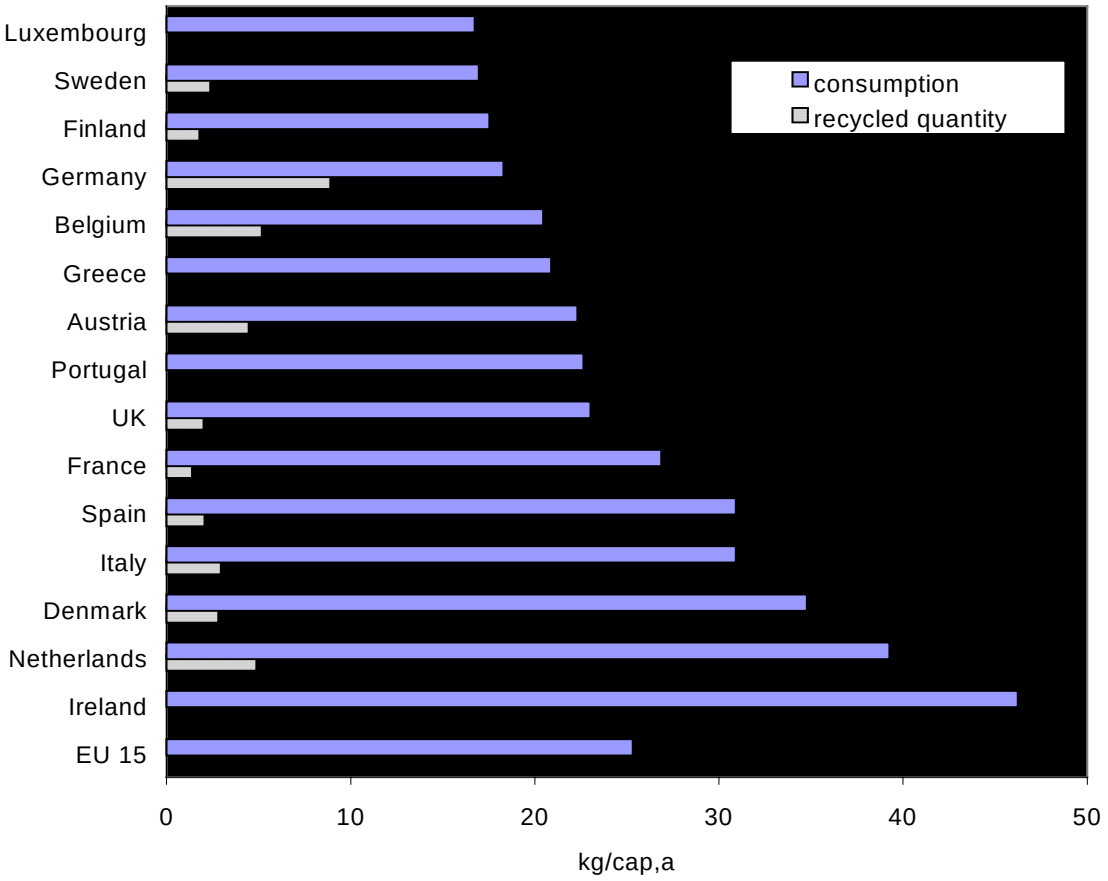

Figure 8: Plastic packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling)

In **Denmark,** all plastic packaging from households is collected together with the residual waste, of which 78 % is incinerated with energy recovery. Separate collection schemes for plastic packaging from households do not exist to date. A voluntary agreement with industry from 1994 stipulates, that 80 % of plastic transport packaging has either to be reused or recycled, assuming this will guarantee a total recycling rate of 15% for all plastic packaging. However, this target could not be met by 1997. In the Statistics on Packaging of Plastic 1998, it was estimated that 15% of plastic transport packaging was recycled in Denmark in 1998. It is outlined in the 1999 Danish waste management plan, that the opportunities for recycling of plastic bottles from households will be investigated. Although Denmark exported about 3,500 tonnes of plastic packaging waste for recycling in 1997, the Danish industry had to import plastic packaging waste due to a surplus of recycling capacity.

Sweden and **Finland** have a comparatively low plastic packaging consumption which may be due to efficient refill-systems enforced by high reuse/recovery targets (see Figure 8). However, both countries have to increase their recycling to meet the target of 15 % of the Directive. In addition to the already existing bring system for recyclables, the Swedish material organisation Plastkretsen established additional reception facilities in May 2000 for sorted plastic from industry. In **Finland,** the packaging waste management system has concentrated to date on trade and industry. Collection of plastic packaging from households is only just beginning following several trials throughout the last 10 years. Collection and recycling of plastic packaging is hindered by the low material flow in combination with the low population density.

In the initial stages of the development of recycling of packaging waste in the **UK,** the focus lies on industrial waste recovery. The amount of post-consumer plastic packaging (plastic bottles) collected from households is estimated at 11,000 tonnes in 1998 compared to a total recycled quantity of 115,000 tonnes. Although collection and recycling should be increased to meet the 15 % recycling target in 2001, there is evidence that collection systems and recycling capacities for plastic packaging are closing down rather than expanding. Some local authorities have withdrawn from or reduced kerbside collection systems. The lack of sustained competitive pricing, compared both with virgin polymer and with recyclate from commercial and industrial sources, but also resistance to the use of recyclate have proven to be the main barriers to an increase in collection and recycling of plastic packaging from households.

In a voluntary agreement with industry, the **Irish** government has set up a target of 10 % recycling of plastic packaging waste in 2001. A separate collection system for plastic packaging from households is not yet established. To recover plastic packaging from the agricultural sector, a special compliance scheme, the Irish Farm Films Producers Group (IFFPG), was founded. According to the National Waste Database Report about 4,400 tonnes of plastic packaging were recycled in 1997, resulting in a recycling rate of 2.6 %. The packaging was mainly recovered from farm plastics and to a limited extent from supermarkets. As there is no indigenous capacity to reprocess post-consumer plastic waste in Ireland, the collected plastic waste is baled and exported to the UK.

In **Italy** there are vastly different collection rates according to geographical region, and in particular a major imbalance between the north and the south. In the Northern part of Italy plastic bottles are collected separately, mainly through street containers. The Central and Southern region contribute only small quantities to the separate collection. Of the total of 278,000 tonnes of recycled plastic packaging, only a minor part results from household packaging.

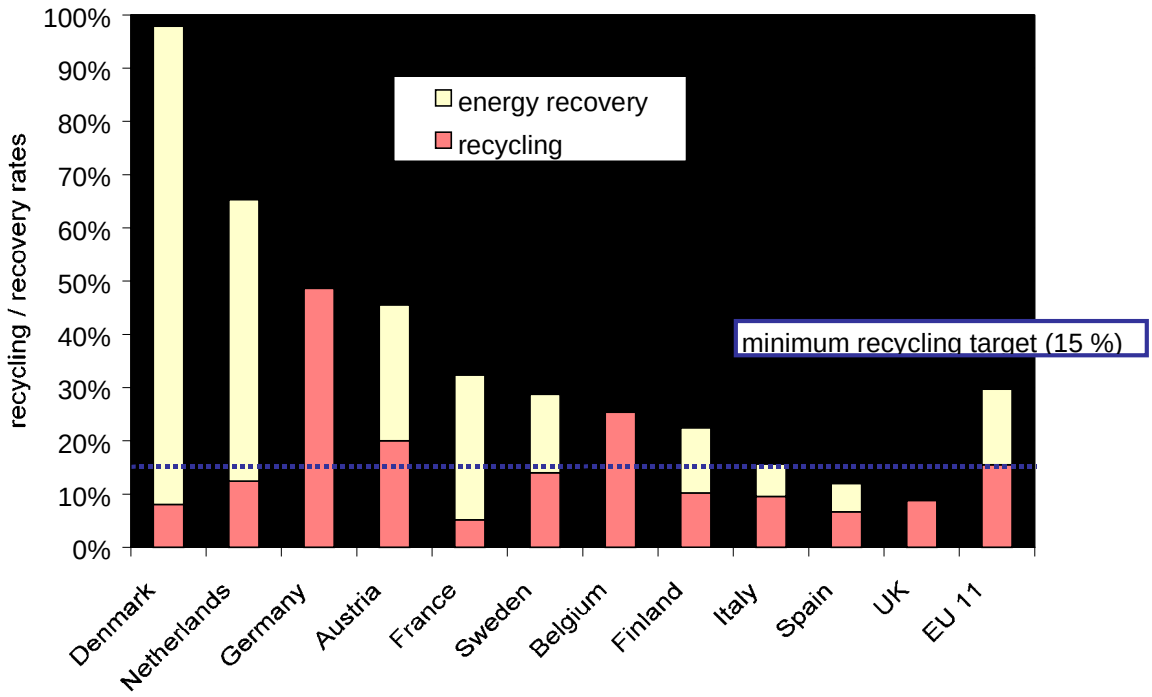

Figure 9: Recovery and recycling rates for plastic packaging by Member States (in %)

Up to now, most Member States have concentrated on the collection and recycling of plastic packaging from trade and industry (distribution films and crates) rather than on household packaging. However, as recycling rates for plastics in 1997 fell below 15 % in most Member States, these

countries have to improve their collection of industrial packaging and/or to extend their collection from households.

3.6 Metal packaging

Reliable figures on the consumption of ferrous and aluminium packaging on a European level are not available. Figures on production, however, can provide an impression of the main applications of metal packaging:

- Out of an average production of almost 5 million tonnes/year of steel for packaging in the EU, the human and pet food segments represent the main application with 50 %, followed by general uses (paint cans, fancy cans, industrial cans etc.) (18 %), beverage cans (17 %) and aerosol cans (7 %) and finally the closures (crown corks, twist caps etc.) (6%) (www.apeal.org, 2000).
- About 1 million tonnes of rolled aluminium are used every year for the production of packaging in Europe. These applications can be divided into rigid packaging (beverage cans, food cans, aerosol cans), semi-rigid packaging (food trays etc.) and flexible packaging (bouches, sachets etc.) About 1/3 of rolled aluminium is used for beverage cans, 1/3 for semi-rigid applications and the rest for flexible products (EEA, 1999 and 2000).

As ferrous packaging and especially aluminium packaging is in demand as a second raw material, and recycling capacities are available in excess, recycling rates are generally restricted by collection. As can be seen from the applications, the major part of metal packaging is used for sales packaging and ends up in households. Industrial metal packaging constitutes only a minor part of metal packaging. To achieve higher recycling rates the collection has therefore to focus on households.

*Consumption of metal packaging in Member States varies on account of consumption patterns, the consumption ranging from 6.0 kg/cap,a in **Finland** to 13.9 kg/cap,a in the **Netherlands**. With an EU-15 average consumption of about 11.2 kg/cap,a the share of metal packaging amounts to 7 **%** of total packaging consumption (see Table 15, Figure 10 and Figure 11: Recovery and recycling rates of metal packaging by Member States (in %)*

).

As described in chapter 2, some Member States such as **Germany**, the **Netherlands** and **Sweden** have set up high targets of between 60 % and 80 % for metal packaging recycling. To fulfil the national targets, or those of the EU Packaging Directive, Member States have chosen different approaches or rather combinations of these approaches:

- mandatory deposits on beverage cans to maximise their return
- source separation with collection systems for households (door-to-door or bring systems), frequently with other materials, and subsequent sorting
- recovery of metals directly from residual waste, from incineration slag and in composting plants by magnets or eddy current technique
- energy recovery through the incineration of thin flexible aluminium foils

As the sorting of ferrous packaging is technically easier than that of aluminium, especially when flexible aluminium is used in composites, higher recycling rates are achieved for ferrous packaging in most of the countries.

Table 15: Consumption of metal packaging and achieved recycling and recovery rates according to Member States in 1997 [1)]

Member State	Packaging put on the market		Recycling	Energy recovery	Total recovery
	(1,000 tonnes)	(kg/cap,a)	(%)	(%)	(%)
Austria	85	10.5	34.1%	0.0%	34.1%
Belgium	121	11.8	70.3%	0.0%	70.3%
Denmark	58	11.0	15.8%	0.0%	15.8%
Finland	31	6.0	8.4%	0.0%	8.4%
France	677	11.6	44.4%	0.5%	45.0%
Germany	1,121	13.7	82.0%	n.a.	82.0%
Greece [2)]	90	8.6	n.a.	n.a.	n.a.
Ireland [3)]	41	11.3	n.a.	n.a.	n.a.
Italy	456	7,9	5,5%	0,0%	5,5%
Luxembourg	3	6.5	n.a.	n.a.	n.a.
Netherlands	216	13.9	67.1%	0.0%	67.1%
Portugal [4)]	85	8.6	n.a.	n.a.	n.a.
Spain	340	8.7	22.6%	1.3%	23.8%
Sweden	70	7.9	45.4%	0.0%	45.4%
UK	809	13.7	26.1%	0.2%	26.2%
EU-11 total	**3.984**	**11,4**	**46,0%**	**0,2%**	**46,3%**
EU-15 total	**4.203**	**11,2**			

n.a.: data not available
1) Recycling and recovery rates include packaging waste quantities exported for recycling/recovery
2) Consumption was assumed to be similar to that of Italy, Portugal and Spain
3) National Waste Data Report; data refer to 1998
4) ECO Conseil Agency; data refer to 1996

In **Denmark,** 78 % of residual waste from households is incinerated with energy recovery. Denmark has therefore, apart from some specific small-scale systems, refrained from establishing collection systems for metal packaging from households, and relies on recovery of steel packaging from incineration slag and separate collection of industrial metal packaging. The recycled quantities reported for 1997 include only metal packaging from industry, thus giving a recycling rate of 15.8 %. For 1998 Denmark reported a recycling rate of 42 % of metal packaging, including separate collection of industrial metal packaging and recovery of steel packaging from incineration slag.

Countries with lower incineration rates have to establish systems for source separation. While some countries restrict the collection to beverage cans, others collect all sorts of metal packaging including semi-rigid and flexible aluminium packaging.

In several Member States, metal packaging is collected together mainly with plastic packaging and beverage cartons (the so-called lightweight fraction) and subsequently sorted (Belgium, Germany, Luxembourg, Spain). **Belgium** and **Germany** have well-established collection systems and achieve recycling rates of 70.3 % and 82.0 % respectively. In **Spain** the achieved recycling rate of 22.6 % in 1997 is expected to increase as a result of the extension of the collection system. About 1.3 % of

aluminium packaging was recovered energetically in 1997. The Spanish National Waste Management Plan stipulates a recycling target of 90 % for both ferrous and aluminium packaging in 2006.

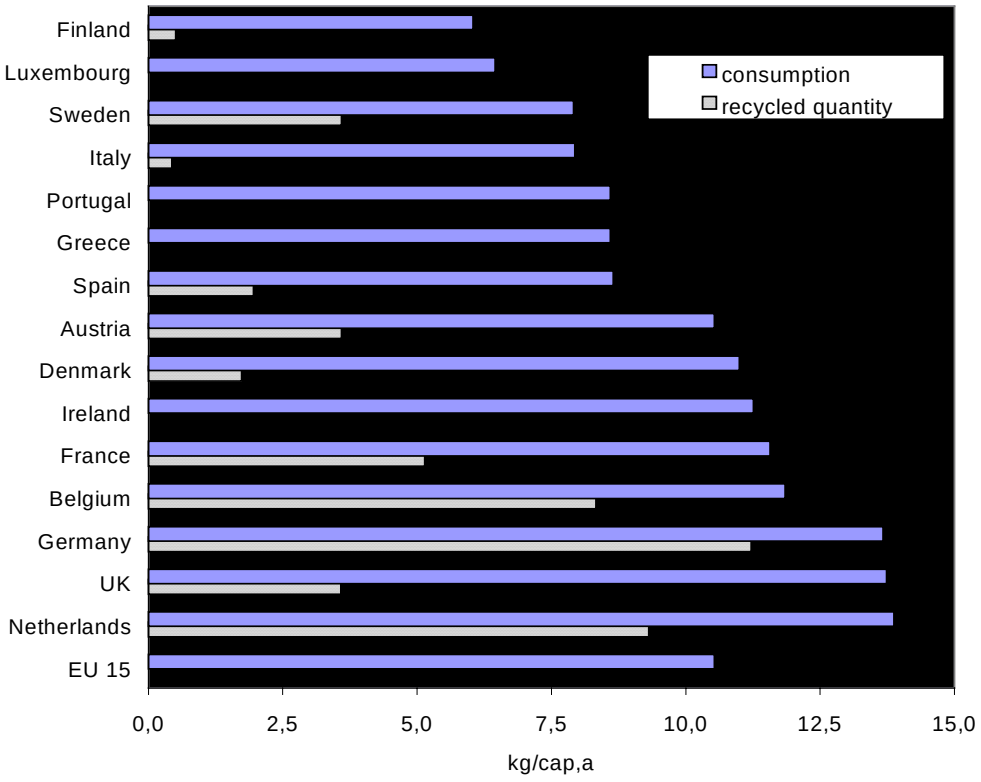

Figure 10: Metal packaging consumption and recycled quantities per capita in 1997 (including packaging waste quantities exported for recycling)

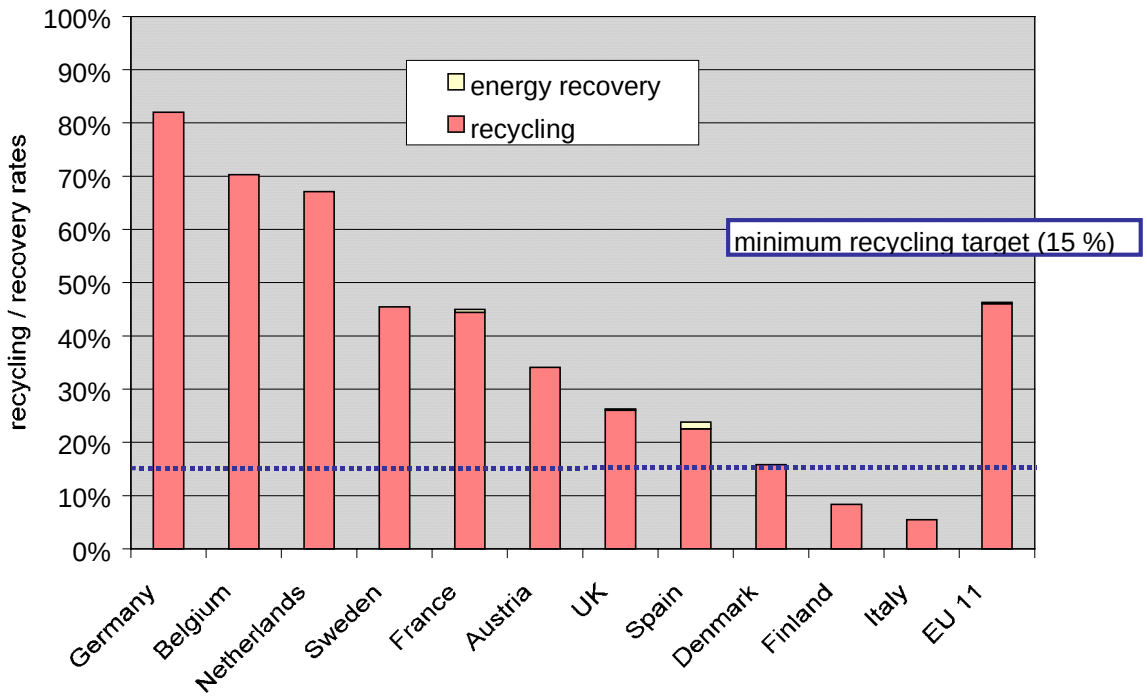

Figure 11: Recovery and recycling rates of metal packaging by Member States (in %)

In **Portugal,** metal packaging is most often collected together with plastic packaging in yellow containers before being sent to a sorting centre. Some municipalities are also developing door-to-door collection schemes for this waste. Recycling results in 1999 amounted to 1.4 % for steel and 0.7 % for aluminium.

In **France,** municipalities have established different collection systems, depending on local conditions. In 1997 a recovery rate of 45.0 % was achieved. For ferrous packaging a recycling rate of 75 % is considered a realistic objective for the year 2002. While rigid and semi-rigid aluminium packaging is recycled, thin flexible packaging is to a small degree recovered energetically in incineration plants. The accreditation act of Eco-Emballages requires recycling of aluminium packaging of 34 % and a total recovery of 59 % in 2002. Eco-Emballages and the concerned guarantors envisage recovering about 10,000 to 12,000 tonnes of aluminium packaging in 2000, of which 2,000 to 3,000 tonnes will be from separate collection.

In **Austria** metal packaging is mostly collected separately in blue containers. In a few selected areas, metals are collected in the yellow containers with plastics and composites.

Ireland is the only Member State that has set up a higher national recycling target for aluminium (25 %) than for ferrous packaging (5 %). The collection concentrates on cans which are taken back via bring system. Recycling rates for both ferrous and aluminium packaging in 1999 were estimated at 4 %.

Sweden has set up recycling targets of 70 % both for ferrous and metal packaging, a specific target of 90 % applying to aluminium cans. A high return rate is ensured by a mandatory deposit on aluminium cans. In addition, a bring system is established. Metalkretsen, the competent material company, plans to start a door-to-door collection in 2001. The recycling rates in 1999 amounted to 63 % for ferrous packaging and 34 % for aluminium.

Finland is only just starting to build up a collection scheme for metals. Mepak Kierrätys Oy, the metal packaging recovery organisation, is carrying out different kinds of studies and research to find the best possible solutions for the recovery of packaging in Finland. A cost-effective collection in Finland is hindered by the low material waste flows on account of the low consumption of metal packaging (especially for aluminium) and the low population density, falling below 5 persons/km^2 in more than 90% of the country.

In the **UK,** collection systems are only established on a low level at present. However, the collection of aluminium packaging for recycling is driven by the intrinsic high value of the metal. For drinks' cans, the industry-led 'cash-for-cans' system enables collectors to be paid cash for every can collected. In 1997 nearly £10 million was paid to consumers in this way. In the case of aluminium foil, community groups, charities and schools benefit directly from the value of the foil collected through more than 100 local authority-assisted projects nation-wide.

3.7 Discussion and summary

In the following, our findings on the performance of the established packaging waste management systems in Member States are summarised. These findings are derived from the recovery results reported to the Commission and from additional information as presented in the reports on Member States in Annex I. Emphasis is placed on potential problems and constraints identified, that may arise from an increase in recycling rates in the course of the revision of the Packaging Directive.

In general, it has to be considered that Member States started from vastly different waste management conditions. While in some Member States national regulations on packaging waste were already in place, separate collection of certain materials had a long tradition, and waste incineration capacities were available, in other countries landfilling was the predominant waste management option. Accordingly, some Member States had “merely” to adopt their existing waste management infrastructure, whereas other countries had to establish a new system.

Plastic packaging

In 1997, the average recycling rate (EU-11) for plastic packaging waste amounted to 15.5 %, which corresponds to 1.4 million tonnes. A closer look at the data shows that Germany contributed significantly to this result with 731,000 tonnes (corresponding to 53% of the total recycled amount of plastics). With the exception of Austria, Belgium and Germany, the recycling rates in 1997 fell below the material specific target of the Directive of 15 %. In Denmark, France, Italy, Spain and UK the recycling rates even fell below 10 % in 1997.

Most countries focus their recycling efforts for plastic packaging on distribution packaging from trade and industry, as these materials can be collected at lower cost and provide higher quality than plastic packaging waste from households. The average share of distribution packaging in total consumption is estimated at 30 % in Western Europe, varying between Member States. High recycling rates of > 50 % in this area should allow Member States to meet the Directive's present recycling target, but will not be sufficient if targets are increased.

The collection of municipal packaging is still in the process of development. With the exception of Austria and Germany, Member States usually restrict the collection to bottles and flasks made of PEHD, PET and PVC. In Austria and Germany, all sorts of plastic packaging are collected, even small items. However, as this approach is very cost-intensive, collection and recovery modalities are currently being discussed.

The main barriers to an increase in recycling plastic packaging are the low collection rates, the lack of competitive pricing compared with virgin materials, and the restricted markets for secondary raw materials. Therefore, subsidies and the development of new products and markets are afforded to guarantee the recycling of plastic packaging. In detail, the situation differs between the Member States and can be characterised as follows:

- Availability of capacities only for certain plastic materials
- Sufficient reprocessing capacities but the plastic materials are not available
- No reprocessing capacities

<u>Mechanical recycling</u>

From an ecological point of view it is widely acknowledged that mechanical recycling has higher benefits than other forms of recovery or disposal, provided that the recycled material substitutes at least a proportion of virgin polymers, and that losses during processing are low (Öko-Institut, 2000). The potential of plastic packaging which is feasible for mechanical recycling is hotly debated. TNO/SOFRES, in a study commissioned by the plastic industry, estimate the potential for plastic packaging waste to be mechanically recycled in 2006 as about 2,355 ktonnes, which would correspond to a recycling rate of 15.5 %.[6] According to TNO/SOFRES, the main barrier for higher recycling rates is attributed to the restricted market opportunities (APME, 1998).

This estimation contrasts with the recycling results achieved in Austria, Belgium and Germany, where rates for mechanical recycling ranged between 20 % and 25 % of total packaging consumption in 1997. Furthermore, the quality of secondary raw material and the market potential are strongly influenced by the available sorting and processing technology, which has continually progressed in recent years. New sorting techniques for the separation of different packaging types are assumed to produce secondary raw material of higher quality than can be achieved by manual sorting. In addition, new recycling processes as the polymer-recycling by dissolution (PRL-process) for recovery of high-quality polyolefins are being developed at present. It is likely that these techniques will increase the share of plastic packaging available for mechanical recycling up to 30 % or more in future.

[6] The rate for mechanical recycling in 1995 is estimated by APME at 10.7 %. It is further assumed that post-user packaging waste will grow by 5.3 % by 2001 and 4.4 % by 2006.

Feedstock processes

Feedstock processes convert plastics into monomers or molecules and use either their chemical properties (e.g. reduction in blast furnace) or recycle them back to "new" raw materials (e.g. hydrolysis or glycolysis of PET). Thus, the problem of finding new outlets can be avoided. There has to be a differentiation between processes using mono-plastic fractions (e.g. PET) and techniques which are discussed in the context of recycling of mixed plastics, not feasible for mechanical recycling.

The first industrial plant for chemical recycling of PET, which reprocesses PET to polyols, was put into operation in France. Chemical recycling of PET is also discussed as a recycling option in Germany on account of the rapidly growing amount of PET-bottles.

Recycling of mixed plastics by feedstock processes is reported only from **Germany**. Driven by the high recycling targets of the Packaging Ordinance, the development of feedstock processes was necessary to find outlets for mixed plastic packaging waste which couldn't be recycled mechanically. The development and use of these processes was only made possible through considerable subsidies by the DSD. In 1998, about 56 % (337,000 tonnes) of plastic sales packaging collected on behalf of the DSD was used as a substitute for heavy oil for the reduction of iron in the blast furnace or for the production of synthesis gas and methanol in the course of fixed-bed gasification.

The possibilities and constraints of feedstock processes for mixed plastic waste was assessed in a study of TNO (TNO, 1999) in the context of PVC recycling. The main conclusion can be summarised as follows:

- Of all plastic waste flows, plastic packaging waste has the highest potential to be used in chemical processes, as the PVC-content, which hinders chemical recycling, is lowest in this waste stream.
- The general problem of chemical recycling is not the technology, but the certainty with regard to markets and funding. As chemical recycling is a comparatively expensive technology, which demands high investments, it will not be economically viable unless a legal incentive is given. As long as recycling requirements can be achieved by mechanical recycling, no incentive is given to built up plants for feedstock processes.

However, at present it is not clear whether feedstock processes and/or which types of these processes are regarded as recycling activities or not. In this context clarification is necessary on European level.

Paper/cardboard packaging

The major part of paper/cardboard packaging in terms of quantity is used for grouped and transport packaging in industry. Most countries concentrate on these materials, as the collection is more cost-effective than collection from households and the quality of the collected material is higher.

The average recycling rate for paper/cardboard packaging in 1997 amounted to 59 % in EU-11. All Member States, with the exception of Italy, achieved recycling rates exceeding 50 %. Selective collection and recycling are well established activities and standards are in place for secondary raw materials. Recycling rates are growing and paper industry may rather easily adapt their infrastructure to the global supply of separated paper waste and to the demand of recycled paper.

Glass packaging

The average recycling rate for glass packaging in EU 11 amounted to 52.2 % in 1997. Estimations by FEVE for the year 1999 give a total recycling rate of 55 % for the whole European Union.

The crucial point in increasing recycling rates is the extension of collection as well as the improvement of the collection quality, with a view to colour-separation and impurities. From a technical point of view,

a further increase in glass recycling is possible provided that collection is carried out with colour-separation and the level of impurities is low.

However, some Member States (e.g. UK, Finland, Ireland) suffer from an import/export imbalance with view to quantities and/or colours (e.g. surplus of imported green glass). Other countries lack national glass production capacities (e.g. Belgium and Luxembourg). These countries have either to export some of their collected glass or to use it for other applications, both of which may lead to lower sales prices or to additional costs.

Metal packaging

With an EU-15 average consumption of about 11.2 kg/cap,a the share of metal packaging amounts to 7 **%** of total packaging consumption. The predominant part of metal packaging is used for sales packaging and ends up in household/municipal packaging waste. As ferrous packaging and especially aluminium packaging is in demand as a second raw material, and recycling capacities are available in excess, recycling rates are generally restricted by collection.

Metal packaging is recovered by separate collection, by deposit-based take-back systems or magnetic separation from incineration feed or slag or from composting plants. Separate collection is constantly increasing especially in Southern Europe and Scandinavia. In 1997 the average recycling rate in EU-11 amounted to 46,0 %. The only countries falling below a recycling rate of 15 % in 1997 were Italy and Finland. As Italy collects increasing amounts of metal packaging and Finland just starts to build up a collection scheme, it is assumed that both countries will meet the Directive's recycling target. Due to the low consumption of metal packaging, Finland faces the problem of low material waste flows combined with a low population density, which hinders cost-effective collection.

4 Scenarios

Based on available information of the present situation, for each Member State two scenarios are developed for 2006 and 2011. The objectives of the scenarios are:

- to analyse, if the established systems will be able to meet higher recovery targets
- to identify the foreseeable problems that could arise in view of collection, sorting, recovery capacities and marketing of the secondary raw materials

4.1 Methodological approach for the development of scenarios

Prerequisites for the assessment of the further evolution are:

- to anticipate the recovery targets which may be fixed by the European Commission in the course of the amendment of the Packaging Directive
- to estimate the development of packaging consumption according to materials for each Member State for the year 2006 and for the year 2011

Anticipation of recovery targets of the Packaging Directive

The development of the packaging waste management systems is and will be strongly influenced by the environmental policy on EU level in general and the revision of the Packaging Directive in particular. Some Member States have already demonstrated that high recovery rates provoke considerable innovations within the treatment sector. The recovery targets fixed in the Packaging Directive seem to be the most important prevailing condition for the achievement of high level recycling activities in Member States. For the development of the scenarios *theoretical future recovery targets* were assumed in close cooperation with the Commission. These targets should not be misunderstood as proposals for the revision of the Packaging Directive, but are used as a tool to identify future constraints. The development of proposals for future recycling targets and the analysis of costs and benefits was not within the scope of this study.

<u>Recovery targets for 2006</u>

In the discussion paper published in December 1999 the European Commission presented two options for the revision of the Packaging Directive in 2001. While option 1 goes back to the targets included in the Proposal for a Council Directive on packaging and packaging waste adopted in 1992, option 2 is based on the already achieved recycling quotas of the five leading Member States and takes into account the difficulties for achieving high recovery targets for specific materials, especially for plastics.

Based on the hierarchy of waste management principles confirmed by the Communication 96/399 of 30.07.1996 and for resource management reasons option 2 focuses on recycling processes. Option 2 was used as basis for the scenarios up to 2006, the suggested targets to be achieved by mid-2006 are listed below. For Greece, Ireland and Portugal we assume for 2006 the achievement of the current recovery targets applicable for the other Member States.

- no targets for recovery
- a minimum of 60 % by weight of total packaging waste to be recycled
- differentiated minimum recycling targets for specific packaging materials contained in packaging waste,
  - 75 % by weight for glass
  - 65 % by weight for paper and cardboard
  - 55 % by weight for metals
  - 20 % by weight for plastics, exclusively by mechanical recycling

Recovery targets for 2011

For glass, metals and paper/cardboard it is generally recognised that recycling is the preferable way of treatment from an ecological point of view. Accordingly, it appears very likely, that the recycling targets for these materials will be raised in the long term to a level which is technically achievable and economically reasonable.

For recovery and recycling of plastics the discussion is more controversial as up to now plastic recycling is expensive, the secondary raw materials can hardly compete with virgin plastics and the ecological benefit of plastic recovery is doubted. On the other side, a recently published review of the most important plastic LCA recycling studies[7] has essentially confirmed the waste management hierarchy for plastics. According to this study high quality mechanical recycling offers the largest environmental benefits, provided that the recycled material substitutes at least a proportion of virgin polymers. It can be expected, that progress in sorting and recycling technology, due to high national standards and recovery rates in some Member States, will steadily increase the potential for high quality recycling and reduce the costs of sorting and reprocessing. Additionally, feedstock processes may contribute to a further increase of plastics recycling in future.

Based on these consideration we anticipate the recycling targets for the year 2011 as follows. For Greece, Ireland and Portugal we assume for 2011 the achievement of the 2006 recovery targets.

- no targets for recovery
- a minimum of 70 % by weight of total packaging waste to be recycled
- differentiated minimum recycling targets for specific packaging materials contained in packaging waste,
  - 75 % by weight for glass
  - 75 % by weight for paper and cardboard
  - 75 % by weight for metals
  - 60 % by weight for plastics, by chemical or mechanical recycling

[7] Öko-Institut: Environmental Assessment of Plastic Recovery Options, 2000

Estimation of packaging consumption

The scenarios are based on packaging consumption and on recycling and recovery results for the year 1997 as given in the reports from Member States to the Commission for 1997. Data for European material associations have been used to fill gaps, where country reports were lacking. As projections of packaging consumption are hardly available we have based our estimations of future packaging consumption on the development in the previous years as reported by the European materials associations and e.g. National Environmental Agencies, and on general trends in packaging consumption. Beverage cartons were not considered separately because in most Member States this material is included in the predominant packaging. Information on wood packaging and other packaging were not available for all Member States, these packaging materials are therefore not included in the scenarios. To define a range of possible future consumption two growth rates are assumed for each material, one assuming a rather slow development or a decrease (lower limit: scenario 1) and one assuming a stronger development (upper limit: scenario 2). These growth rates, shown in Table 16, were estimated for the period 1997 to 2011.

Table 16: Assumed annual growth rates for scenarios from 1997 to 2011 according to materials

Packaging material	Scenario 1 annual growth rate in %	Scenario 2 annual growth rate in %
Glass	-2 %	1 %
Paper cardboard	1 %	3 %
Plastics	2 %	4 %
Metals	-1 %	1 %
Total	~ 0.3 %	~ 2.5 %

As a general approach we assume the same growth rates for all Member States. We have compared these rates with national information on recent or future packaging consumption, as far as such information was available. For some countries growth rates were revised if there was evidence that future consumption will probably be out of the range of our assumptions (see Annex II). Within the scope of this study it was not possible to quantify the effect of prevention targets in Member States (Belgium, Finland, Spain and the Netherlands).

With regard to packaging consumption development it seems arguable whether growth rates as assumed will continue up to 2011. Furthermore, the development of total consumption of packaging as assumed in scenario 2 is for most Member States not very likely, because presumably the development of consumption of different packaging materials will be influenced and compensated by each other. However, as projection of packaging consumption is extremely difficult, we preferred a rather simple approach than to develop a sophisticated but somehow arbitrary model.

In the following sections the development in each Member State (except Luxembourg and Greece) and at the Community level based on the above outlined assumptions is presented and consequences for the packaging waste management systems are discussed in brief.

4.2 Scenarios on packaging development in Member States

4.2.1 Austria

Future Packaging Consumption

In general, the packaging market in Austria is regarded to be rather stable. Mid- or long-term projections for the development of packaging consumption are not available. Considering short term projections and development of packaging consumption in recent years it seems likely that a slight increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. It is assumed that consumption will most likely lie in the lower area of the defined range. The results of the scenarios for Austria are given in the figures below.

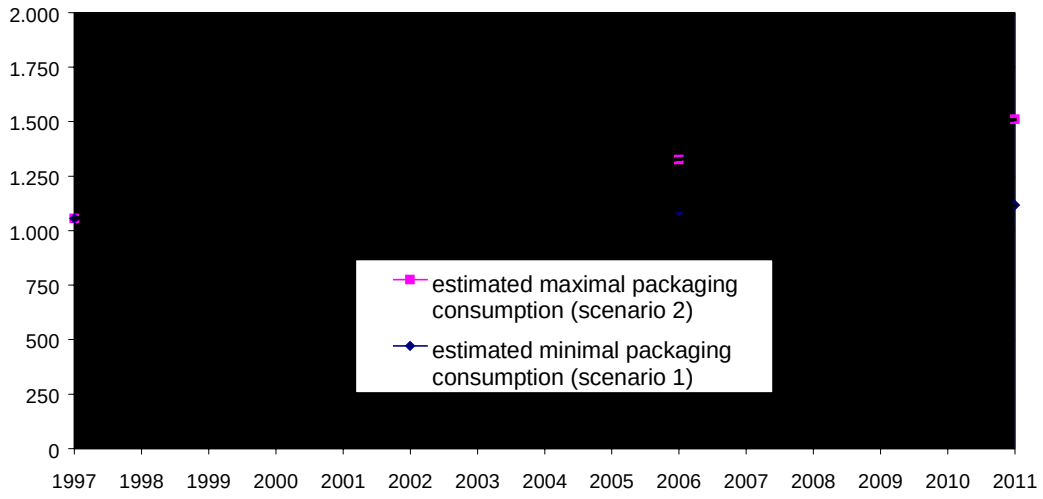

Figure 12: Estimated development of packaging consumption in Austria from 1997 to 2011 (1,000 t)

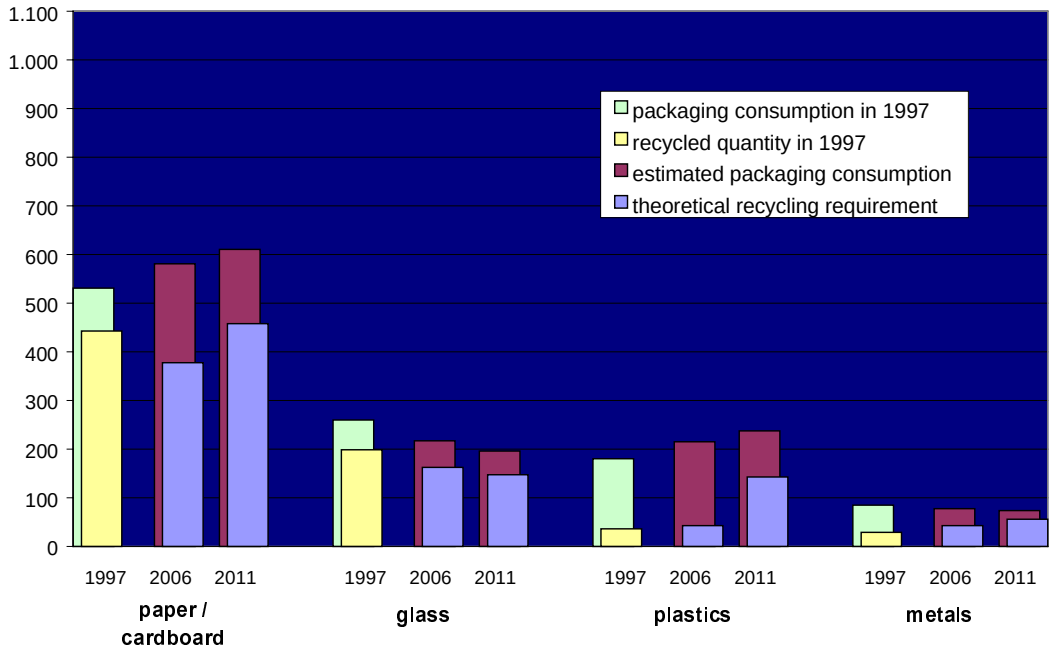

Figure 13: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria (1,000 t)

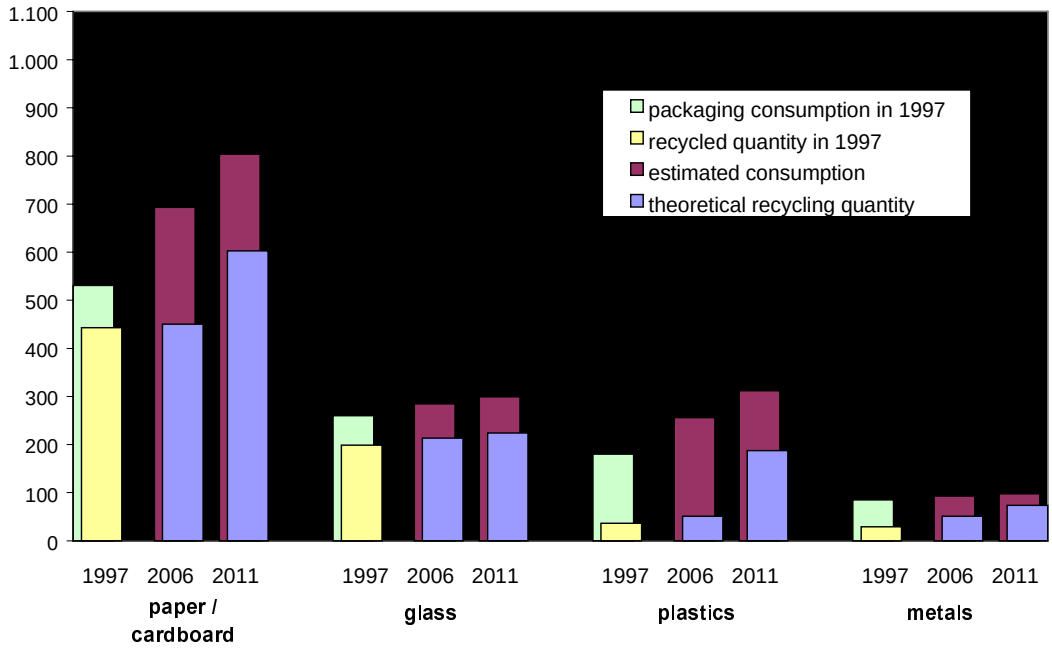

Figure 14: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria (1,000 tonnes)

Conclusion

Austria achieves high recycling rates for all materials already today, ranging between 83.4 % for paper and cardboard packaging, 76.5 % for glass packaging, in 1997 and the fulfilling of requirements for the other materials. The results of the scenarios show that except for plastics the recycling requirements assumed for 2006 were almost achieved already in 1997, only in the case of a strong increase of packaging consumption (scenario 2) an increase of collection and recycling might be necessary for paper/cardboard and plastic packaging. As collection systems are well established no major problems should arise with regard to collection. For 2011 however, additional efforts will be necessary in the field of plastics sorting and recycling to provide for sufficient recycling capacities and marketable products.

4.2.2 Belgium

Future Packaging Consumption

Due to the lack of official survey during the past years, we suggest to keep for Belgium our general growth rate assumptions defined for the European level. Considering short term projections and development of packaging consumption in recent years, it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and also for paper and cardboard packaging. The results of the scenarios for Belgium are given in the figures below.

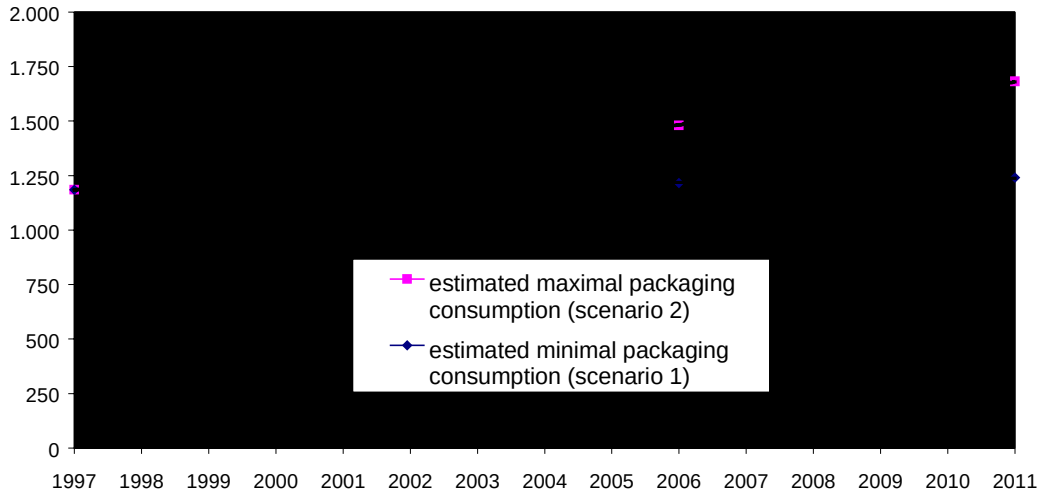

Figure 15: Estimated development of packaging consumption in Belgium from 1997 to 2011 (1,000 t)

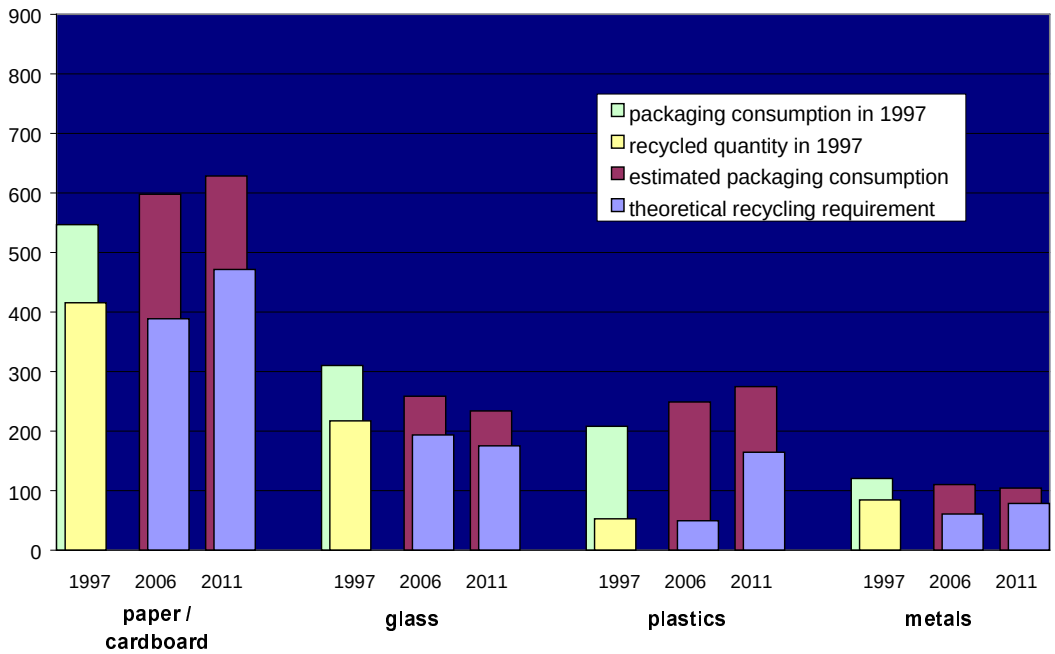

Figure 16: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium (1,000 t)

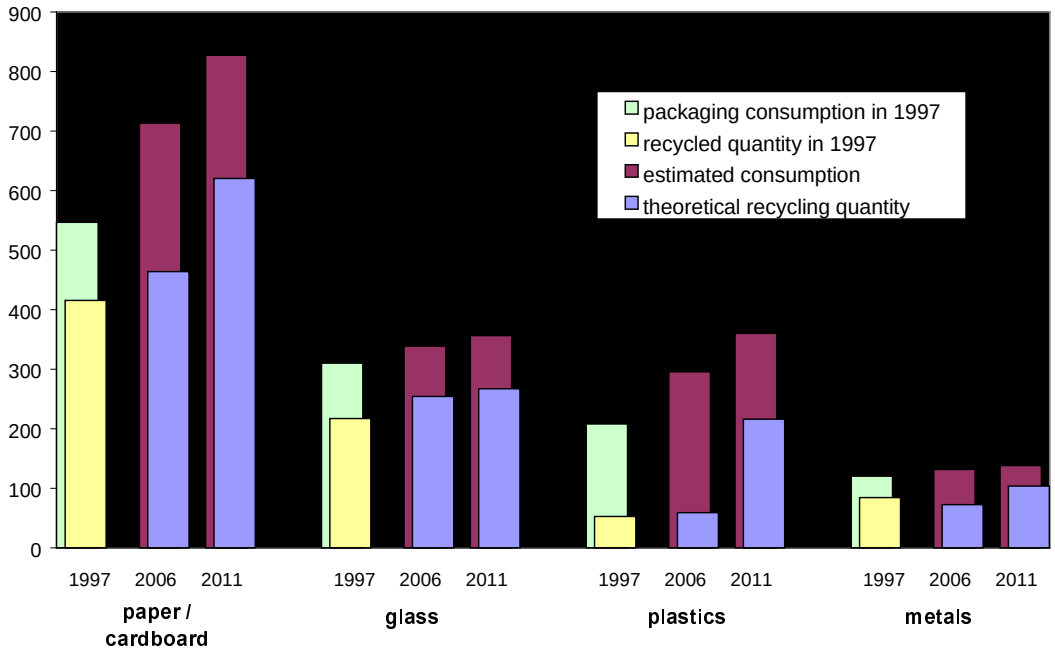

Figure 17: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium (1,000 t)

Conclusion

The results of the scenarios show that the theoretical recycling requirements for 2006 in scenario 1 were achieved for all packaging materials already in 1997 and except for paper and plastics even for 2011. In the case of a strong increase of packaging consumption (scenario 2) additional efforts to increase the collection and recycling would be necessary for 2011. The efforts should concern paper and above all plastics to provide for sufficient recycling capacities and marketable products. For glass packaging there are currently insufficient own recycling capacities but the good quality of collected and sorted glass in Belgium allows finding outlets abroad.

4.2.3 Denmark

Future Packaging Consumption

According to data from the Danish Centre for Waste & Recycling, paper/cardboard packaging has decreased from 1997 to 1998 by 36,000 tonnes (-7.7 %) and as consumption is already high compared to other Member States it seems likely that future consumption will not be much higher than at present. We have revised our assumptions and future consumption is calculated for scenario 1 with annual growth rates of 0 % and 2 % for scenario 2.

While there was a strong increase of plastic packaging consumption from 1994 to 1997, consumption has decreased from 1997 to 1998 by 11,000 tonnes (-6 %). As plastic packaging consumption is already high in Denmark compared to Member States it seems likely that future growth will not be that strong as we assumed. Growth rates are revised for scenario 1 (0 %) and scenario 2 (2 %). The results of the scenarios are shown in the figures below.

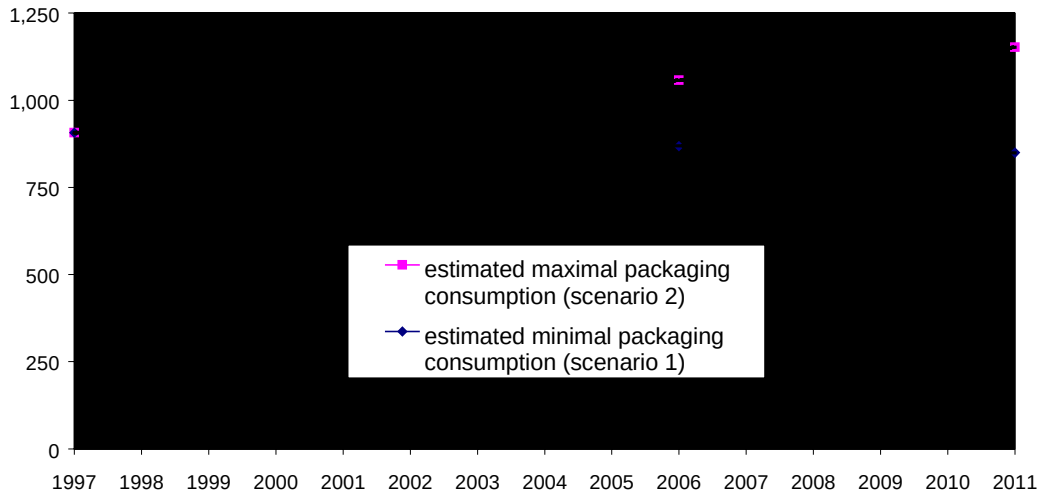

Figure 18: Estimated development of packaging consumption in Denmark from 1997 to 2011 (1,000 t)

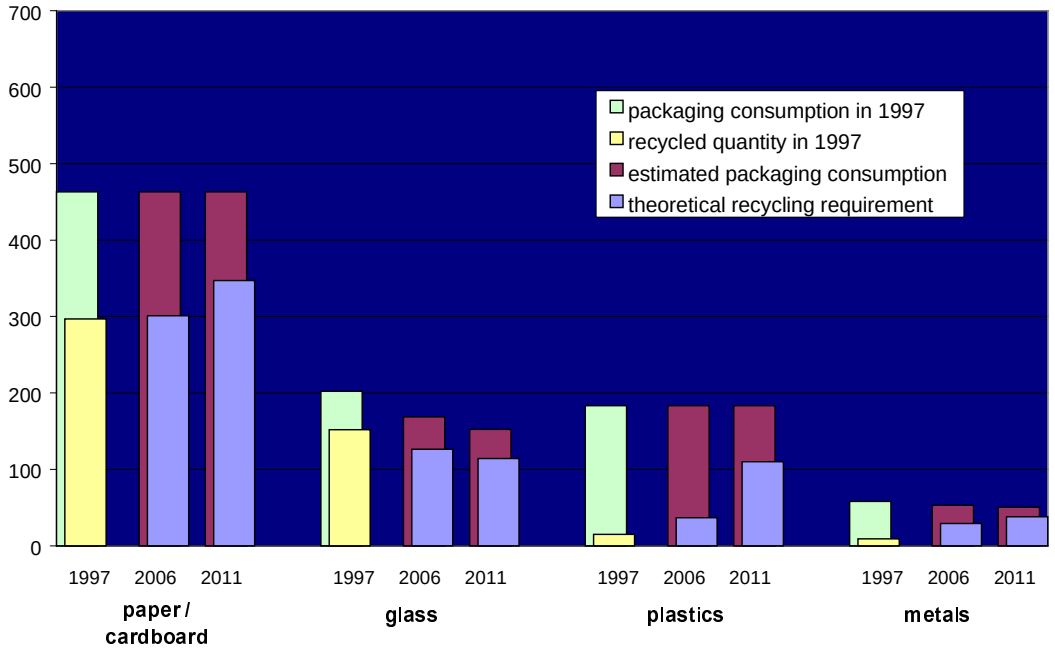

Figure 19: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark (1,000 t)

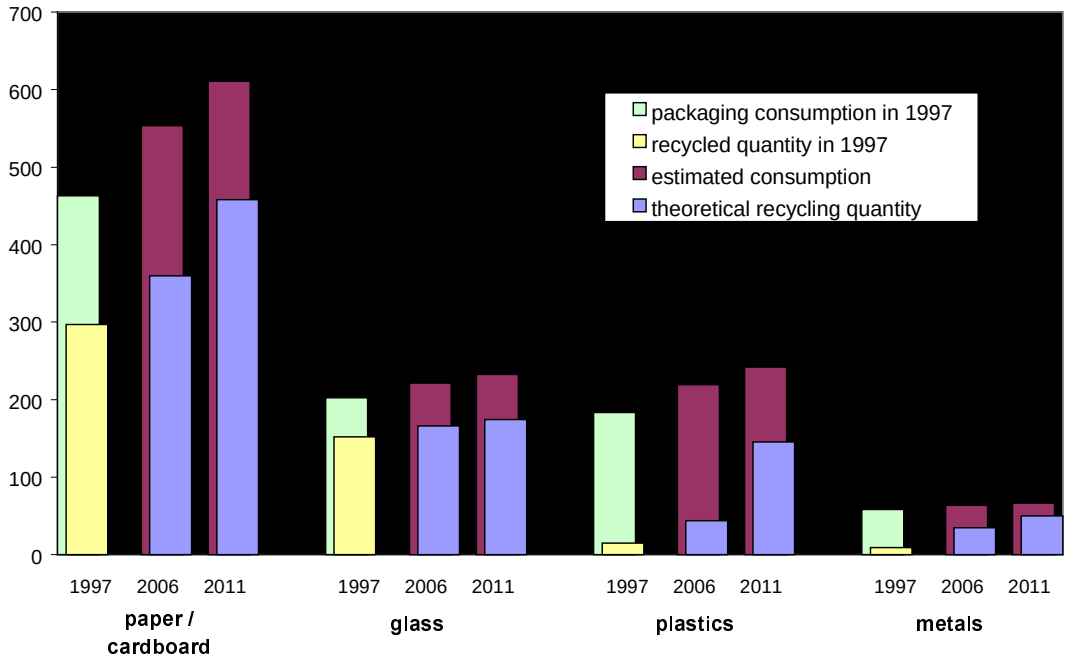

Figure 20: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark (1,000 t)

Conclusion

As Denmark concentrates on energy recovery of plastic packaging from households, recycling rates are still quite low (recycling rate in 1997: 8.1 %). The recycling at present seems to be limited by insufficient separate collection, as it is reported that the available recycling capacity exceeds the supply of material. In the Danish waste management plan it is outlined that the opportunities for recycling of plastic bottles will be investigated. A recycling target of 60 % for 2011 without the option of energy recovery would clearly conflict with the Danish waste management strategy, which has promoted large investments in waste incineration plants with energy recovery. Further plants are planned to be constructed in the next years.

In recycling of glass and paper/cardboard packaging Denmark belongs to the leading countries, fulfilling the assumed targets for 2006 already today. For metal packaging the currently achieved recycling results are unknown as the data reported to the Commission (recycling rate of 15.8 %) do not include the quantities recovered from incineration slag. A separate collection system for metal packaging from households does not exist in Denmark.

4.2.4 Finland

Future Packaging Consumption

For all materials our assumptions seem reasonable and, as packaging consumption is generally very low in Finland, growth rates as predicted in scenario 2 appear more likely than those of scenario 1.

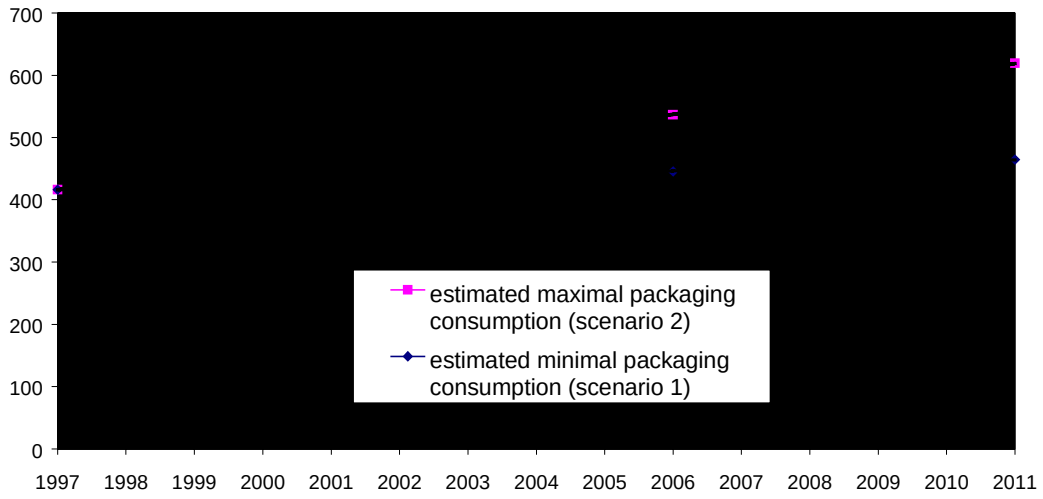

Figure 21: Estimated development of packaging consumption in Finland from 1997 to 2011 (1,000 t)

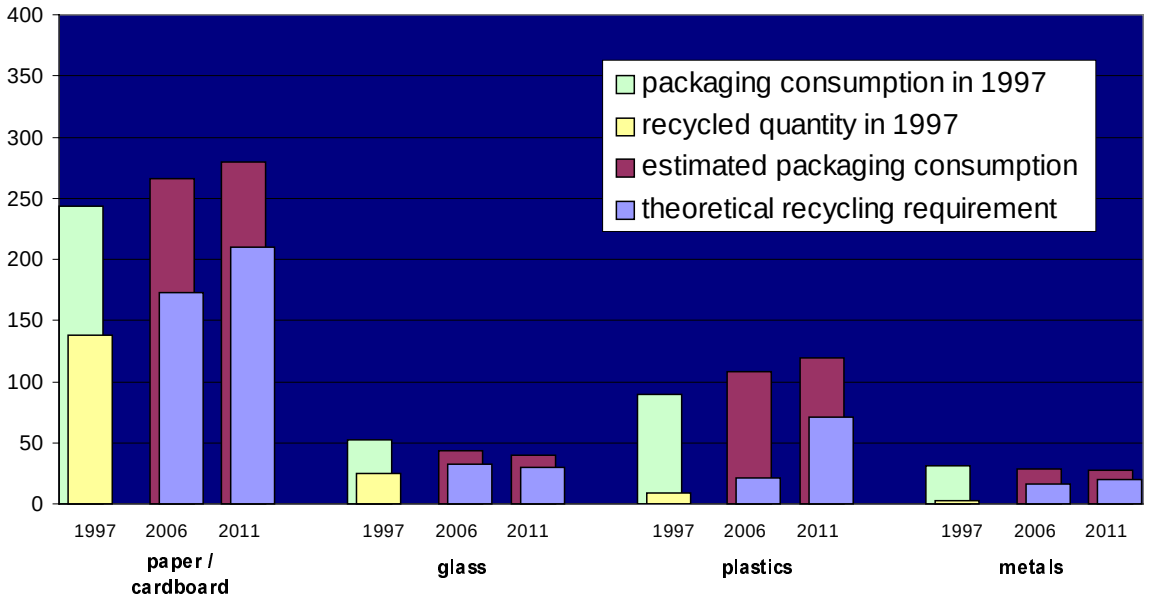

Figure 22: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland (1,000 t)

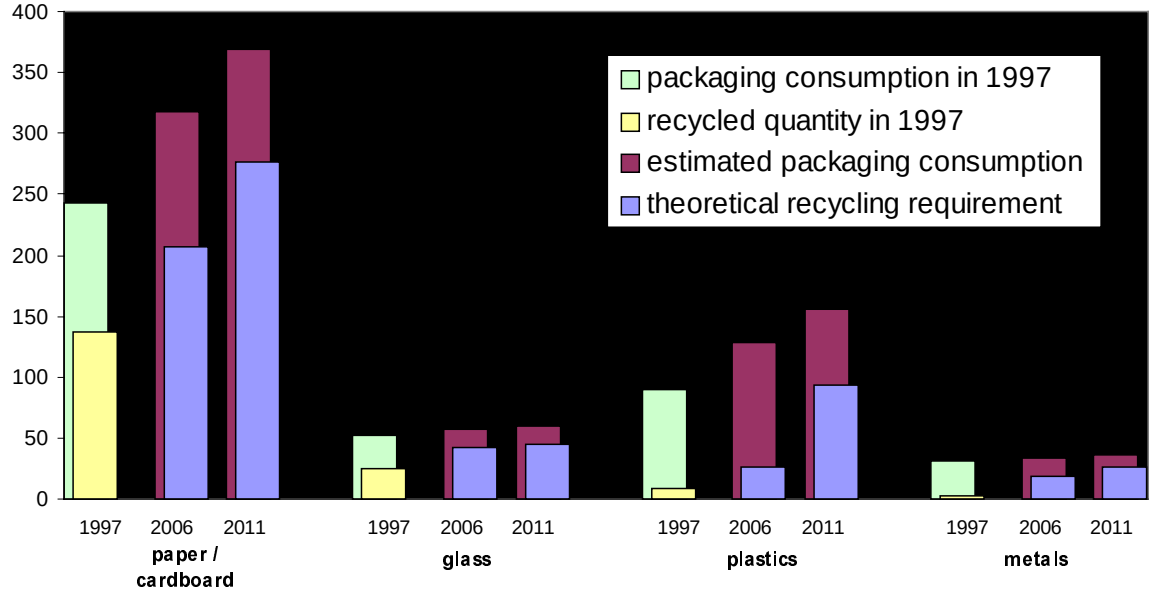

Figure 23: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland (1,000 t)

Conclusion

The treatment capacity for glass is sufficient for the present amount of collected glass, but recycling capacity will be lacking if a substantial increase of glass packaging consumption should take place. Even now, some of the glass cullet is exported to countries outside EU and, in the long run, the markets for the recycled material will be problematic. Problems will also occur with regard to recycling of plastics. It is likely that there will not be enough treatment and conversion capacity for collected plastic packaging waste exceeding 20 % recycling level. Generally, the plastic and aluminium packaging waste flow is much too low in Finland to allow the establishing of recycling capacities on economically feasible scale.

The main limiting factor is the fact that more than 90 % of the country has a population density less than 5 persons/sqkm. Establishing new collection systems will result in a considerable increase of costs due to long distances and rather low amounts of packaging materials. This effects the recycling of plastics and aluminium in particular. The limited flows of plastic and metal packaging waste hinders the establishing of sorting plants and specific recycling plants.

4.2.5 France

Future Packaging Consumption

Considering short term projections and development of packaging consumption in recent years it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. The results of the scenarios for France are given in the figures below.

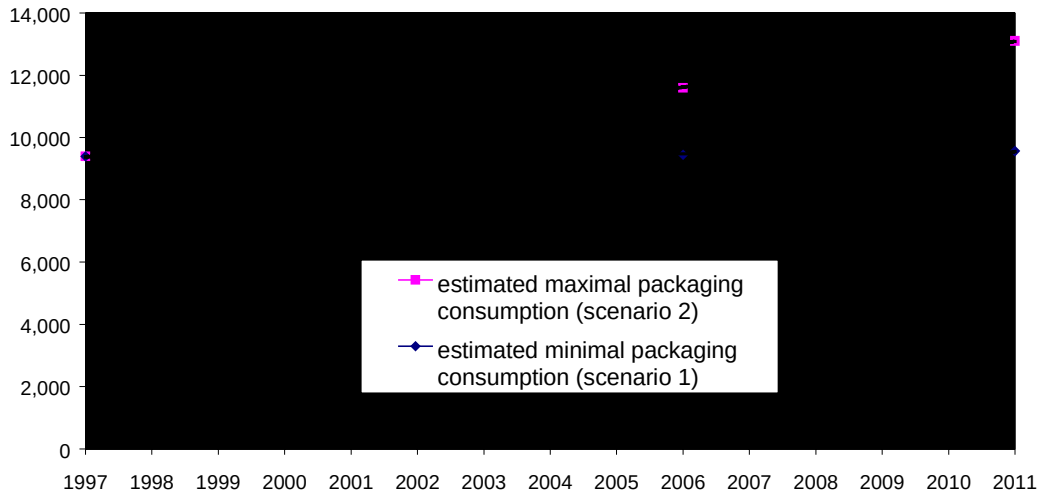

Figure 24: Estimated development of packaging consumption in France from 1997 to 2011 (1,000 t)

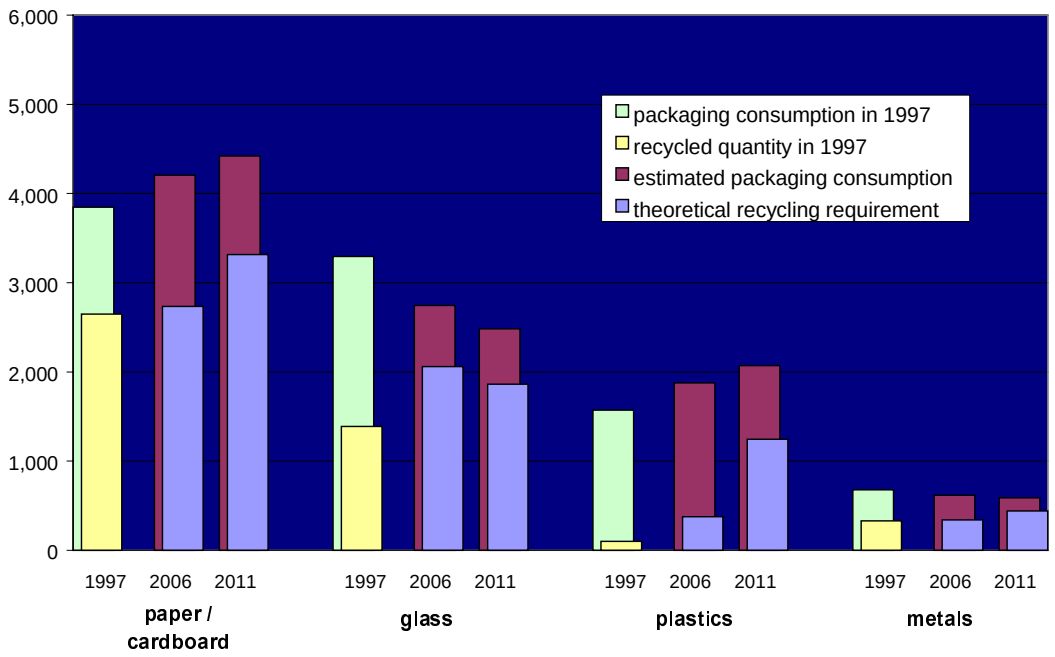

Figure 25: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France (1,000 t)

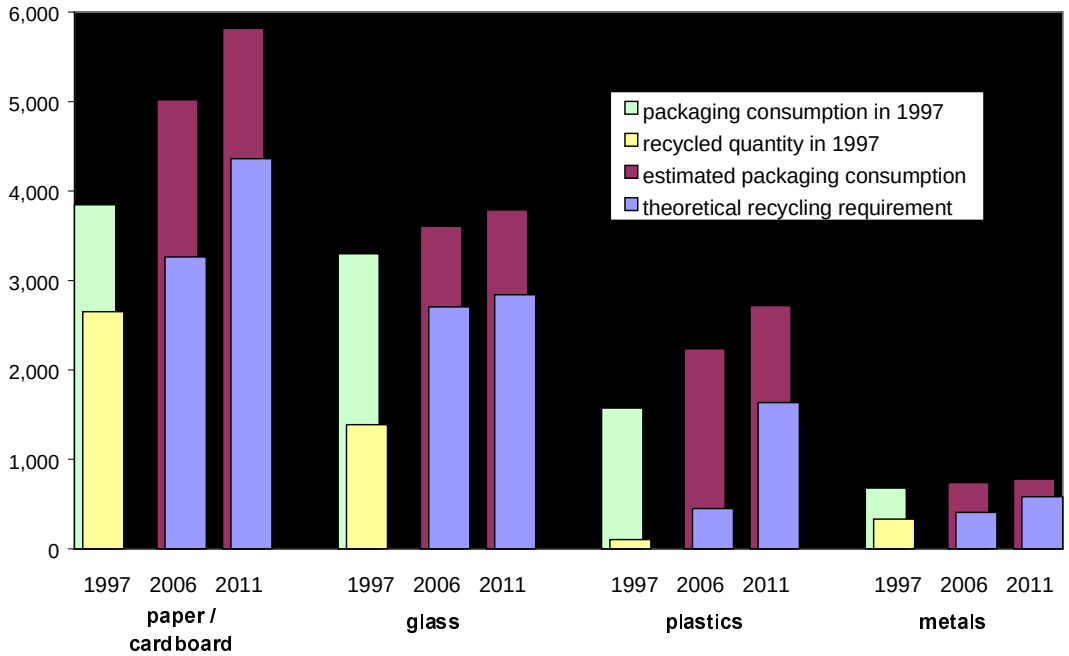

Figure 26 : Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France (1,000 t)

Conclusion

In France high recycling requirements for household packaging materials are included in the accreditation act of Eco-Emballages for 2002. The results of the scenarios show that the recycling requirements assumed for 2006 for paper/cardboard were already nearly achieved in 1997. At present, paper industry is adapting its processes and increases recycling capacities and the utilisation rate of recovered paper rapidly. The sector foresees a recycling capacity of 7 million tonnes by 2005, which should be sufficient to absorb additional quantities of separately collected paper and cardboard.

With regard to glass packaging, recycling capacities will probably not be sufficient to achieve the recycling target of Eco-Emballages/Adelphe of 75 % in 2002. Even in scenario 1, it is expected that capacities for some 200,000 up to 300,000 tonnes will be lacking, which corresponds to 10 % to 15 % of the total glass packaging to be recycled. However, the selective collection of glass is currently realised for a mix of all colours of glass. The settlement of selective collection schemes for different colours of glass should allow the collection of 200,000 to 300,000 tonnes of white glass which could be recycled as such. Besides, according to the French senate report, other recycling outlets (for about 100,000 tonnes) could be further developed in construction, or civil engineering for instance (building material, reflective paints, cobblestone,…). Substantial further efforts should be necessary according to scenario 2.

For plastic and metal packaging efforts will be necessary to extend the separate collection. According to the French Senate report, recycling capacities are exceeding the collected quantities at present. Moreover, emerging technologies especially in the field of mixed plastic recycling could create new outlets for plastic waste. Studies commissioned by the “Plastic Processing Federation” (“Fédération de la Plasturgie”) has identified a potential new national market for 49,000 tonnes plastics waste. However, according to scenario 2, substantial increase of recycling capacities should be necessary in the long term.

4.2.6 Germany

Data base

Packaging consumption in Germany is regularly assessed by the GVM (Gesellschaft für Verpackungsmartkforschung) on behalf of the Federal Environment Agency. The calculation of packaging consumption is mainly based on the evaluation of official statistics (production, foreign trade) and on regular panel-based consumption analysis. The most recent data for 1998 however differ from those of the previous years for some materials due to a change of definitions in the amended Packaging Ordinance. Furthermore, data for 1998 are provisional as they are based on estimates.

Table 17: Packaging consumption in Germany from 1991 to 1998 [1] (1,000 t)

Materials	1991	1992	1993	1994)	1995	1996	1997	1998 [4]
Paper / cardboard pack. [2]	5,791	5,605	5,333	5,425	5,398	5,380	5,472	5,570
Glass packaging	4,637	4,426	4,223	4,127	3,954	3,811	3,715	3,740
Plastic packaging [2]	1,656	1,594	1,507	1,547	1,570	1,499	1,519	1,485
Metal packaging [2,3]	927	876	812	813	829	813	807	832
Total packaging	13,010	12,502	11,875	11,912	11,751	11,504	11,513	11,627

1) Since 1998 definitions of the amended Packaging Ordinance were applied
2) including composites on the basis of the particular material
3) Since 1998 aluminium-containing composites on the basis of plastics are include. Thus, data are not directly comparable to those of the previous years.
4) Estimation of GVM (Gesellschaft für Verpackungsmarktforschung)

Future Packaging Consumption

As shown in Table 17 packaging consumption in Germany has decreased significantly from 1991, when the Packaging Ordinance was adopted, to 1996 by about 1.5 million tonnes (-11.6). All packaging materials were affected by this development, the decrease having been strongest for glass with –18 %. From 1996 to 1998 consumption began to increase again slightly. It seems as though packaging consumption declined as a result of the adoption of the Packaging Ordinance and reached a standstill in 1996. In spite of the slight restarting increase, packaging consumption in 1998 lay for all materials clearly below the level of 1991.

In general, the packaging market in Germany is regarded to be rather stable. Mid- or long-term projections for the development of packaging consumption are not available. Projections therefore can only be derived from short-term prognoses on sales packaging, general developments of consumption patterns and the extrapolation of consumption development in the last years. However, it has to be taken into account that the market of drinks packaging is strongly influenced by the German regulation in favour of refillable bottles (re-use quota). A change of policies in this respect would clearly affect the choice of packaging material for drinks and would very likely result in a further decrease of glass packaging consumption. The results of the scenarios for Germany are given in the figures below.

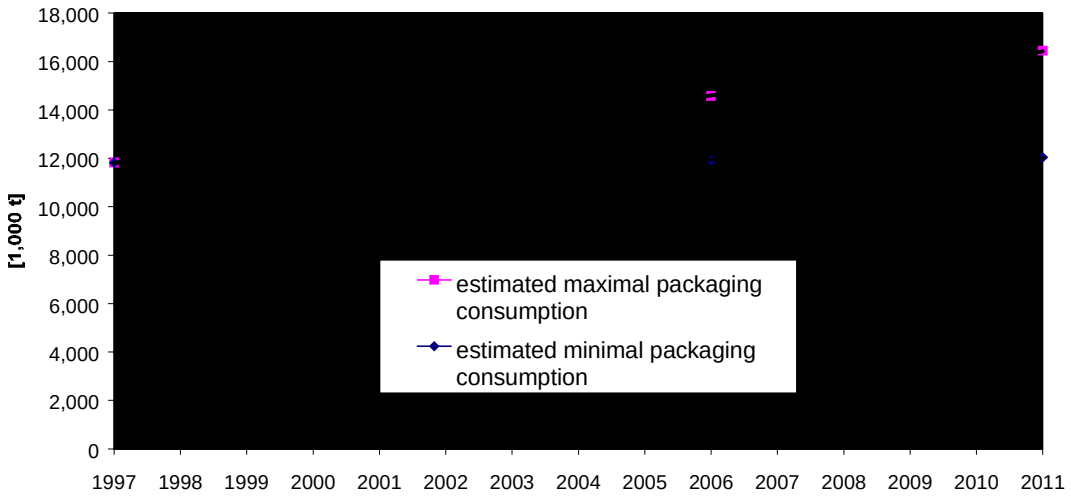

Figure 27: Estimated development of packaging consumption in Germany from 1997 to 2011 (1,000 t)

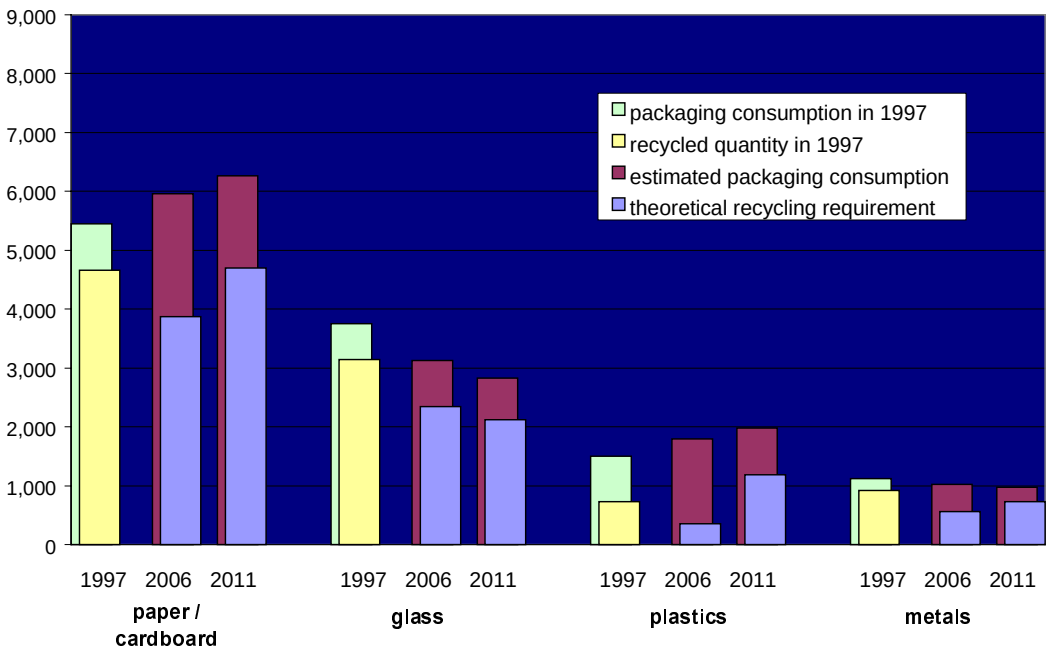

Figure 28: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany (1,000 t)

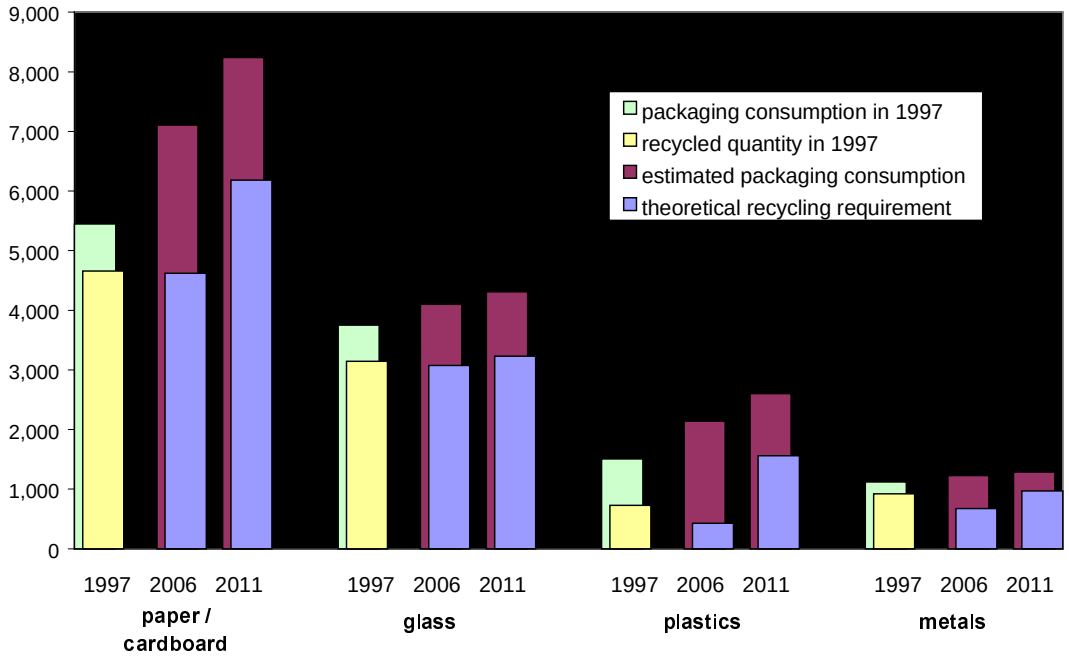

Figure 29: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany (1,000 t)

Conclusion

Because of the high mandatory recycling requirements for sales packaging Germany already today achieves high recycling rates for all materials, ranging between 48.6 % for plastic packaging and 85.5 % for paper and cardboard packaging in 1997. The results of the scenarios show that the recycling requirements assumed for 2006 were achieved already in 1997, even in the case of a strong increase of packaging consumption (scenario 2).

For 2011 an increase of collection and recycling might be necessary for paper/cardboard and plastic packaging. As collection systems are well established no major problems should arise with regard to collection.

However, additional efforts will be necessary in the field of plastics sorting and recycling to provide for sufficient recycling capacities and marketable products, especially for sales packaging. New automatic sorting technologies have been developed which allow type specific sorting of plastic packaging, this being regarded as a prerequisite for marketable products. It is expected that these technologies will achieve higher product quality at lower costs.

Furthermore, the strong increase of PET bottles requires the building up of new recycling routes in Germany. At present, the DKR, guarantor of the DSD for the recycling of plastic packaging, works on several options for PET recycling.

4.2.7 Ireland

Future Packaging Consumption

As Ireland has not yet submitted official data on packaging consumption and recovery to the European Commission, the scenarios are based on data from the Irish Environment Protection Agency (EPA) for the year 1998. The data from EPA are estimates and are based on information obtained from National Waste Database surveys of local authorities, industries, waste contractors and recycling organisations

and the results of waste composition surveys conducted on household and commercial waste streams.

According to the EPA's National Waste Database Report for 1998 the total arising of packaging waste has considerable increased from 1993-1998. In general, the quality of information on packaging arisings is continuously improved. It is likely that the increase in estimated arisings since 1995 is due in part to improved data collection and reporting. Material-specific data on the development of packaging consumption or packaging waste arisings are not available. The results of the scenarios are shown in the figures below.

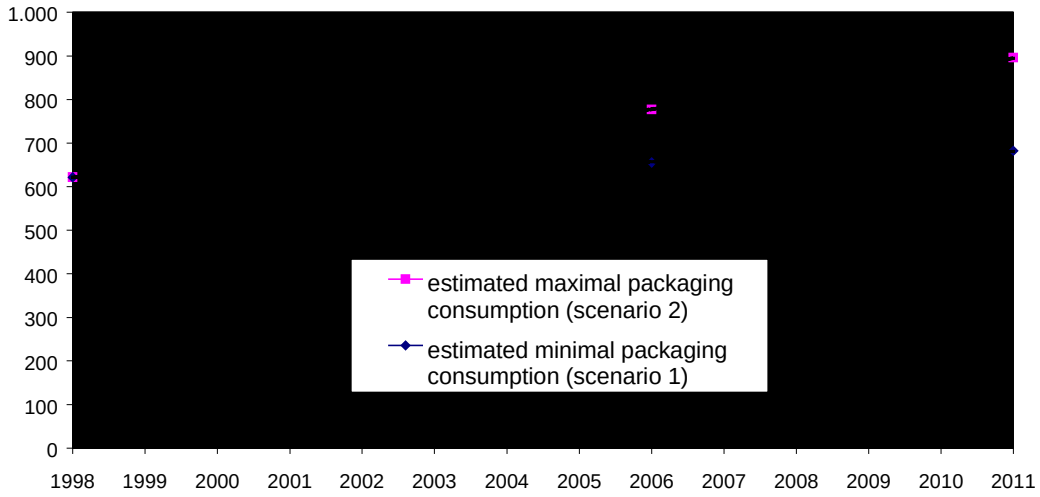

Figure 30: Estimated development of packaging consumption in Ireland from 1998 to 2011 (1,000 t)

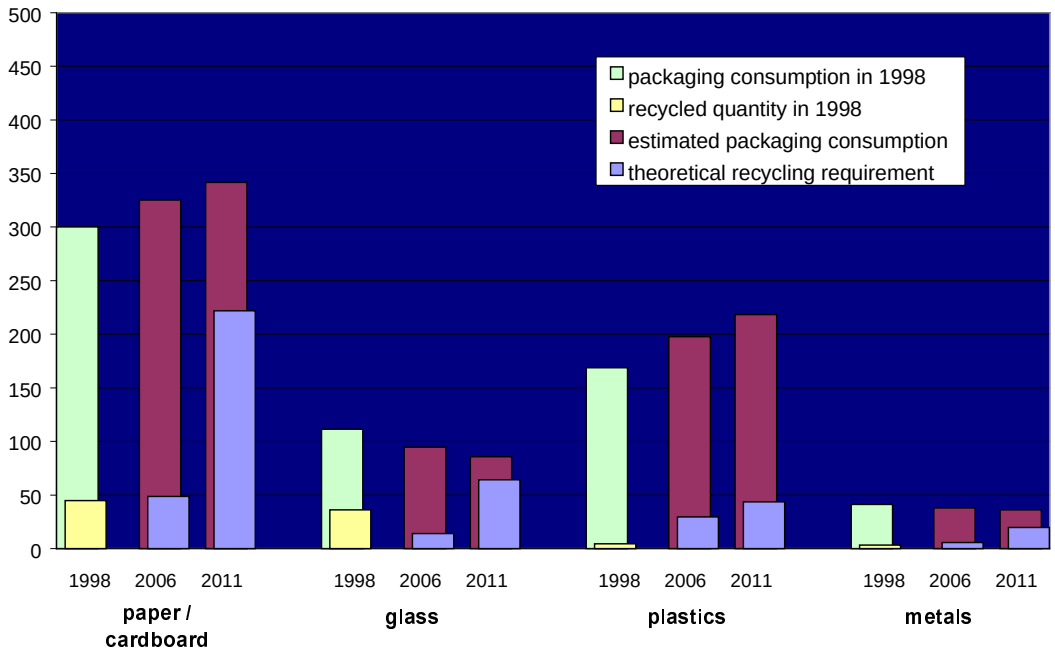

Figure 31: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland [1,000 tonnes]

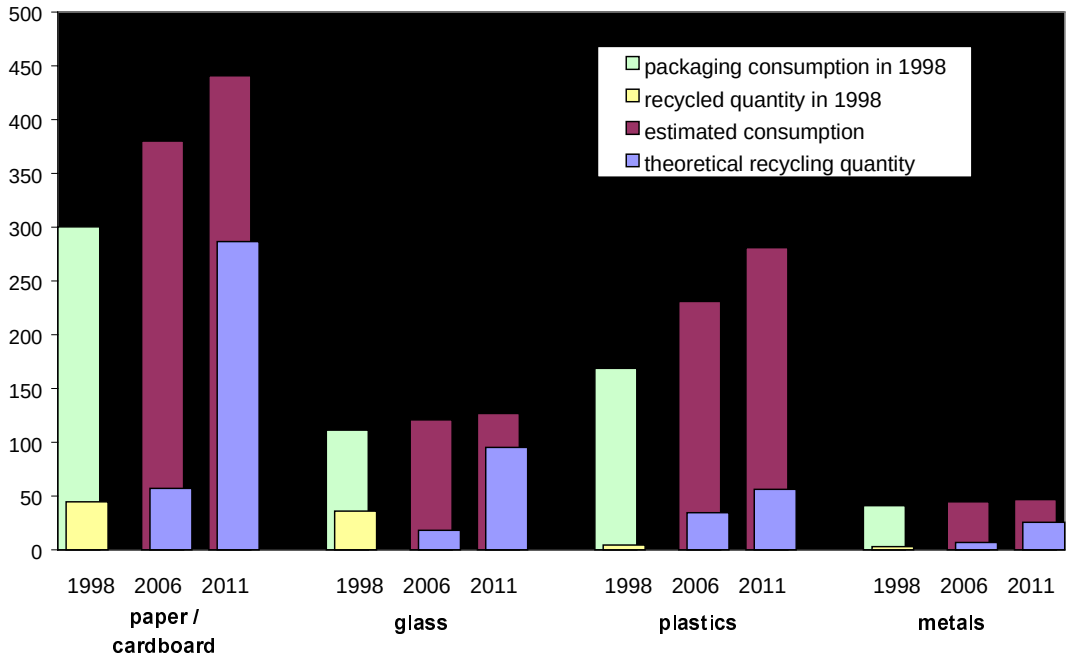

Figure 32: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland [1,000 tonnes]

Conclusion

Under the EU Packaging and Packaging Waste Directive, Ireland is required to recover 25% of its packaging waste by mid 2001. The material specific targets of 15 % have only to be met by the end of 2005. According to estimates of the Irish EPA, Ireland achieved a global recovery rate of 15 % in 1998, recycling rates having been highest for glass (32 %) and paper/cardboard packaging (15 %). Up to now, Ireland has no incineration plants due to considerable public resistance to waste incineration. Thus the overall recovery target has to be met exclusively by recycling.

At present, recycling is restricted by insufficient collection infrastructure, limited recycling capacities and a lack of markets for secondary raw material. Collection has to be increased for all materials, but especially for metal and plastic packaging as recycling rates for these materials fell below 5 % in 1998. The plastic recycled in 1998 came mainly from the agricultural sector, contributions from other sources were very low. Recycling of aluminium has even dropped dramatically. For plastic, aluminium and tinplated steel packaging Ireland lacks recycling capacities within the country. These materials are baled and sent to UK for recycling. Thus, more reprocessing is needed within the country and the marketing of secondary raw materials has to addressed.

The Irish Department of Environment (DoE) is concerned that the recovery targets of Repak, the compliance scheme for household and commercial/industrial packaging waste, do not take account of the increase in packaging waste arisings. The recovery target based on 1994 packaging waste arisings was 100,000 tonnes. However the recovery target based on waste arisings in 1998 is now 170,000 tonnes. As a result of their concerns the DoE recently appointed an Irish consultant to review their position and to suggest a strategy to ensure that Ireland meets their recovery target for 2001 and 2005.

4.2.8 Italy

Future Packaging Consumption

Based on provisional data from packaging companies and associations CONAI (Consorzio Nazionale Imballagi) has estimated the consumption trend of packaging (see Table 18 below). These data show an increase of consumption from 1996 to 2002 of 10 %. The general trend to substitute glass packaging for plastic packaging is observable also in Italy. For glass the growth rate assumed in scenario 2 (stable market) appears to be more likely than the decrease of –2 % as assumed in scenario 1. For all other materials the development estimated in scenario 1 seems to be the more realistic one according to Istituto Italiano Imballaggio (National Institute of Packaging).

Table 18: Packaging consumption trends in Italy, 1996 - 2002

	Growth 96/02	1996	1997	1998	1999	2000	2001	2002
	%	(in 1,000 tonnes)						
Steel	-12.6%	446	400	398	396	394	392	390
Aluminium	9.0%	51	57	57	56	56	56	56
Cardboard	9.6%	3,060	3,243	3,270	3,298	3,353	3,353	3,353
Wood	13.1%	1,777	1,802	2,050	2,040	2,030	2,019	2,009
Plastics	18.7%	1,685	1,777	1,800	1,863	1,907	1,953	2,000
Glass	7.4%	2,049	2,248	2,240	2,230	2,220	2,210	2,200
Total	10.4%	9,068	9,527	9,815	9,883	9,960	9,983	10,008

Source: European Packaging & Waste law: April, 1999; Agra Europe (London) Ltd.

The results of the scenarios for Italy are given in the figures below.

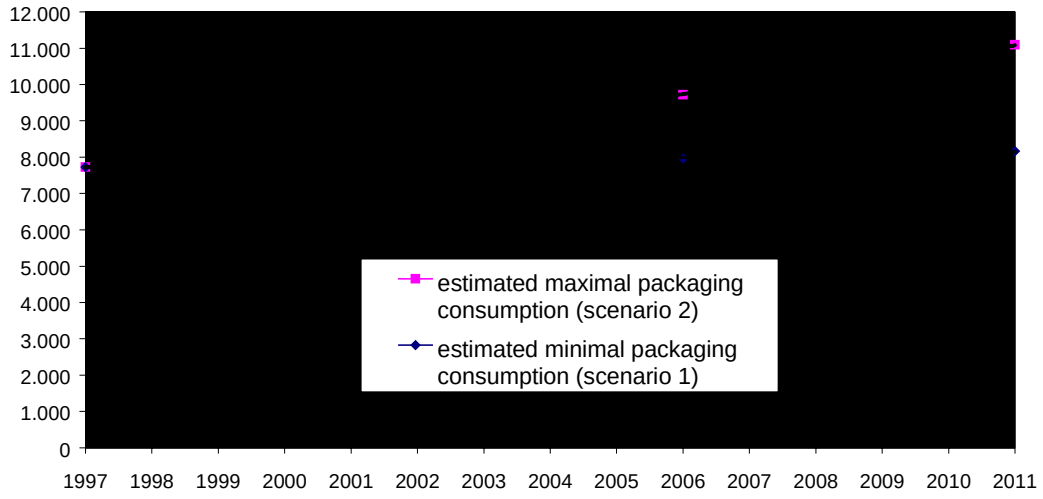

Figure 33: Estimated development of packaging consumption in Italy from 1997 to 2011 (1,000 t)

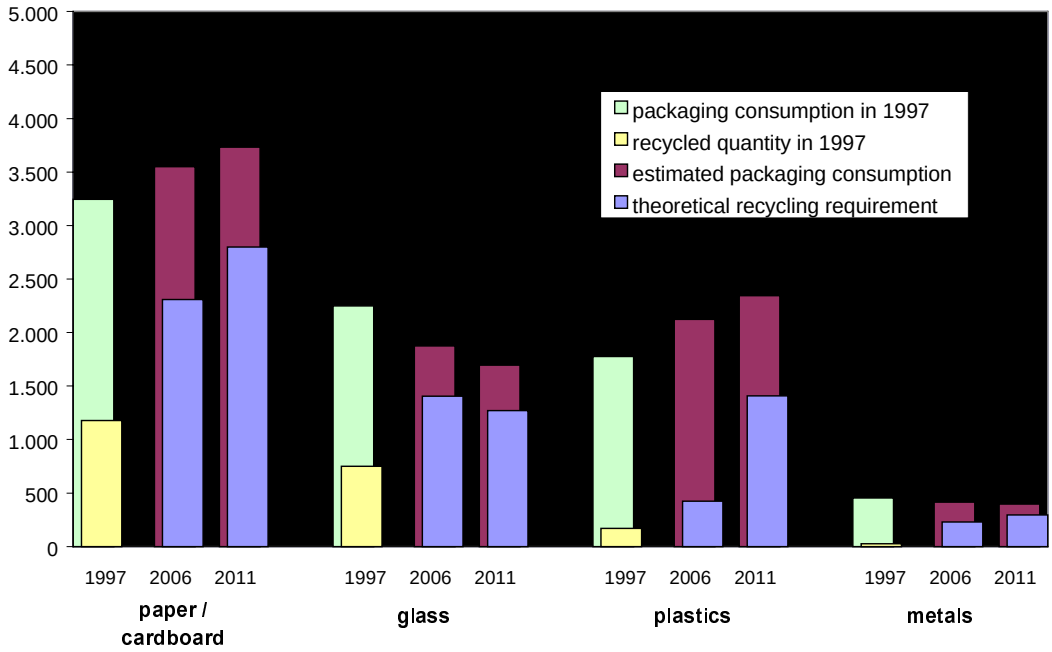

Figure 34: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy (1,000 t)

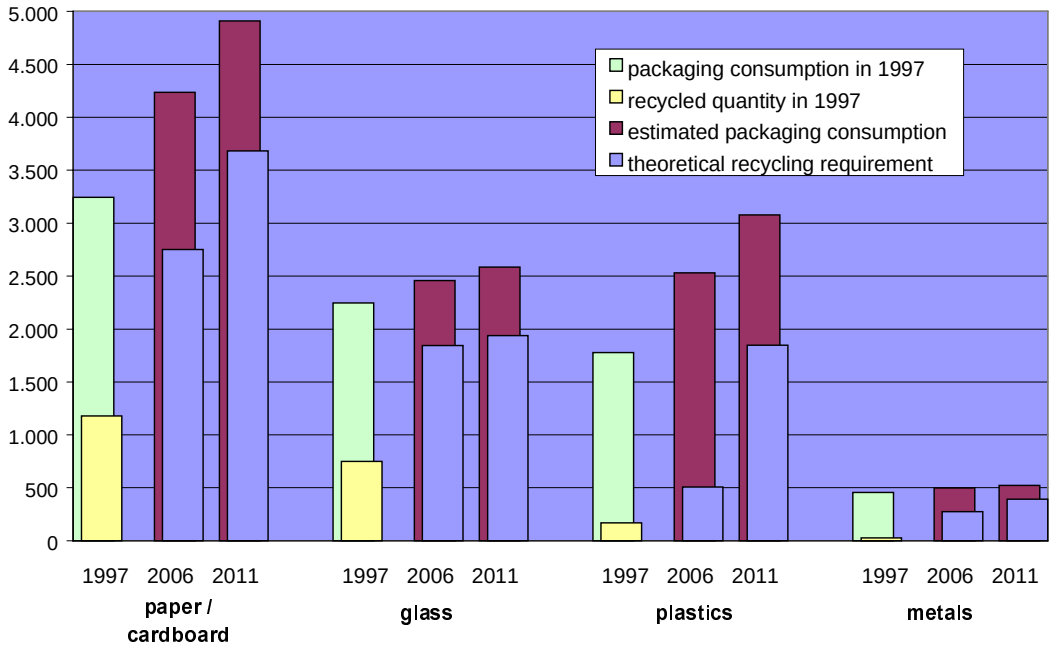

Figure 35: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy (1,000 t)

Conclusion

Based on the recycling results achieved in 1997 it appears questionable whether the total recovery target for 2001 will be reached. The limiting factor for an increase of recovery and recycling rates is the collection of the packaging materials. This applies particularly to the southern region of Italy were the collection rates are still very low. From the technical point of view problems do arise for marketing of mixed paper and mixed glass. The quality of paper collected by street containers is rather low and although green glass is widely produced the amount of glass collected without colour-separation (mixed glass) is now close to fit the demand from the glass industry. However, if recycling targets are increased as assumed in the scenarios efforts will be necessary for all packaging materials in order to improve the quality of separately collected materials.

4.2.9 Portugal

Future Packaging Consumption

According to Ponto Verde, the packaging waste of glass, paper/cardboard and plastics represented in 1980 around 20% of the household waste. At the beginning of 1990, this percentage increased to about 45%. (Ponto Verde, Gestao Integrada de Residuos de Embalagens em Portugal). The packaging market has profoundly been altered since the beginning of the nineties. It evolved from a situation where the country produced and consumed only “functional” packaging used to keep and protect goods to the development of the packaging as a communication tool for the producer. Nonetheless, our assumptions for the development of packaging consumption are applied. The results of the scenarios for Portugal are given in the figures below.

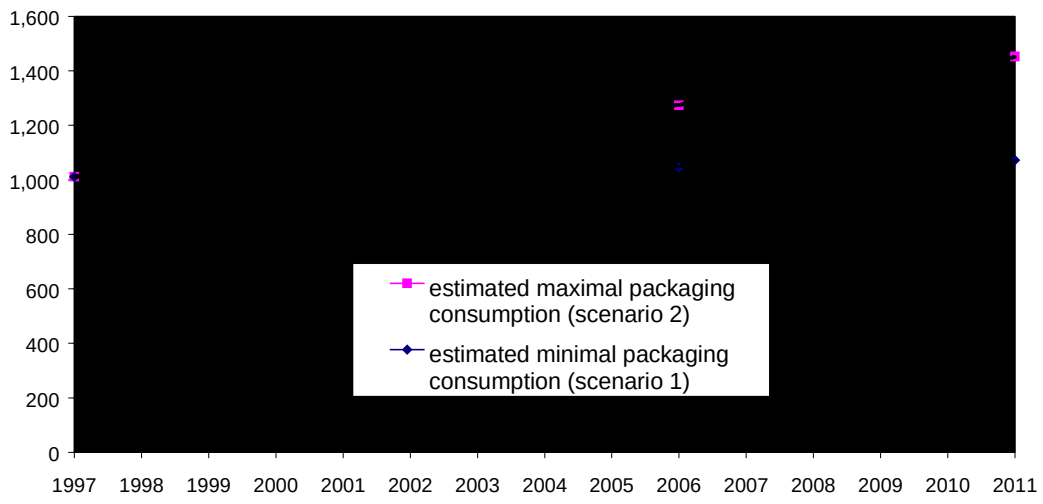

Figure 36: Estimated development of packaging consumption in Portugal from 1997 to 2011 (1,000 t)

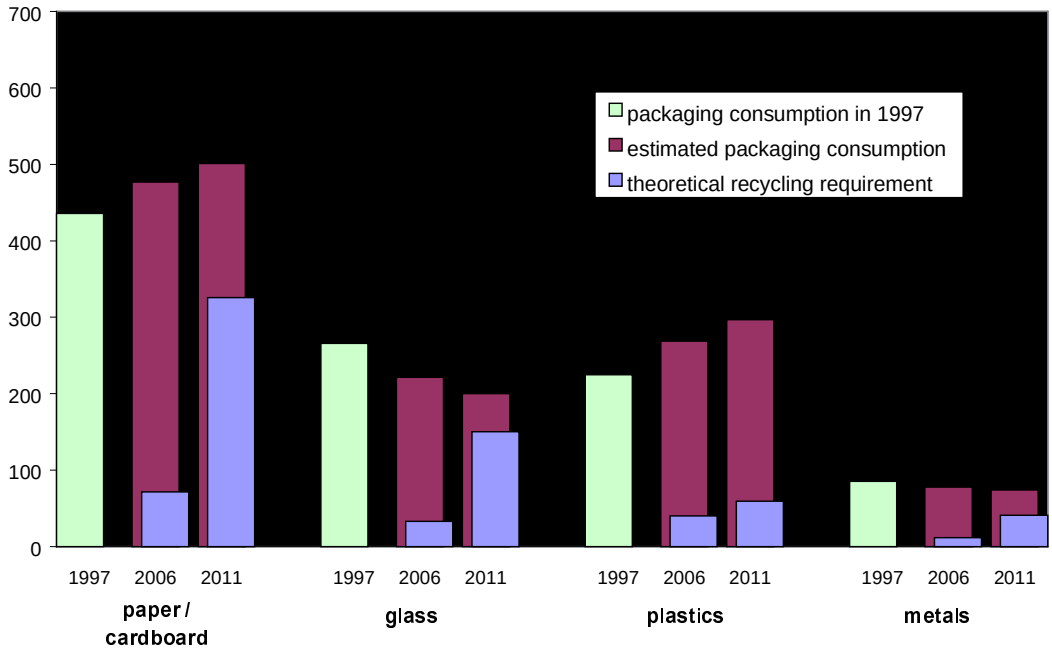

Figure 37: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal [1,000 tonnes]

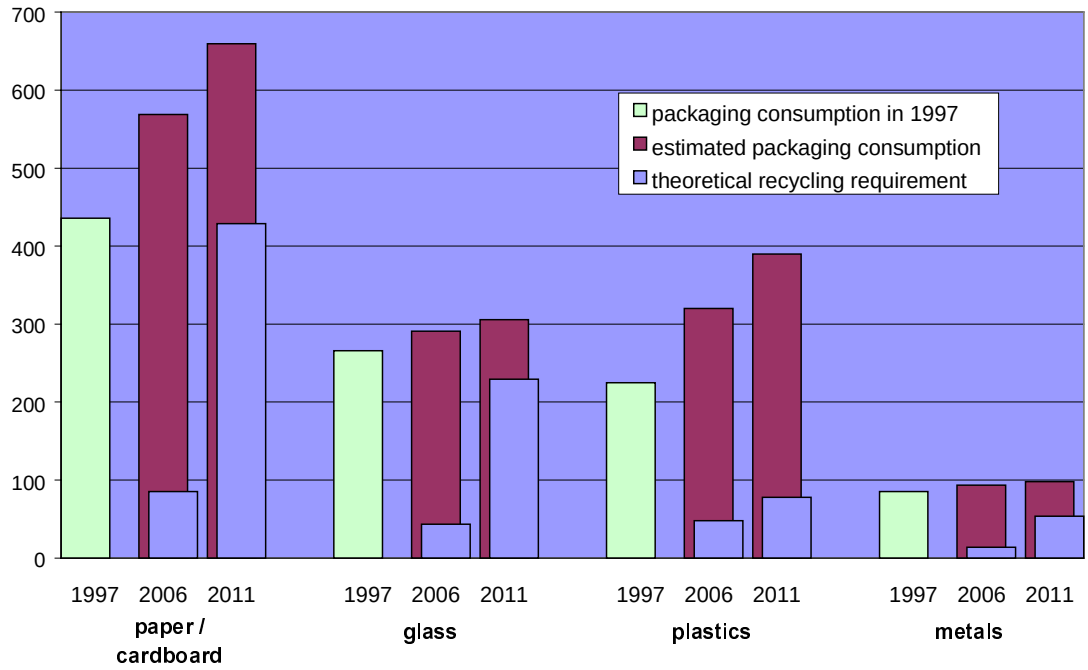

Figure 38: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal [1,000 tonnes]

Conclusion

The major task in Portugal at this stage is to build up and extend separate collection schemes for packaging waste and to raise public awareness on this subject. Data on collection and recycling rates for Portugal are not available. Information on the stage of development is only available from Sociedade Ponto Verde (SPV), the compliance scheme responsible for the so-called urban packaging waste. At the end of 1999, contracts with SPV were signed by 147 municipalities, representing more than 5 million inhabitants (52 % of national population). The recycling rates achieved were still low in 1998, but have increased significantly in 1999. Ponto Verde is conscious that the achievement of the defined targets depends essentially on the participation of the citizens in the programs of selective collection. That is why SPV foresees to invest during the year 2000 about 900 million escudos in awareness campaigns.

Regarding recycling, it can be expected that there is sufficient capacity within Portugal for all packaging materials in the coming years. An increase of the use of recovered paper/cardboard should be possible since the utilisation rate in paper/cardboard production in Portugal is far below the European average. With regard to plastics recycling, PLASTVAL, the association for management and recovery of plastics packaging, sees at present no need for an increase of recycling capacities, since the available capacities are only used at 50 % to 60 %. However, in the longer term, significant increase in recycling capacities should be necessary to reach the recycling target defined in our scenario 2.

4.2.10 Spain

Future Packaging Consumption

The Spanish Packaging and Packaging Waste Act (Law 11/1997 of April 24, 1997) stipulates in art. 5 that before 30th June 2001 all packaging waste generated shall be reduced by at least 10 % by weight (including GDP growth), taking 1997 as a reference year. Up to now, it can not be assessed, how the Spanish prevention regulation will affect future packaging consumption and which materials will be concerned most. Accordingly, the possible effects of the prevention target were not considered in the scenario and may lead to considerably lower growth rates for packaging consumption. The results of the scenarios for Spain are given in the figures below.

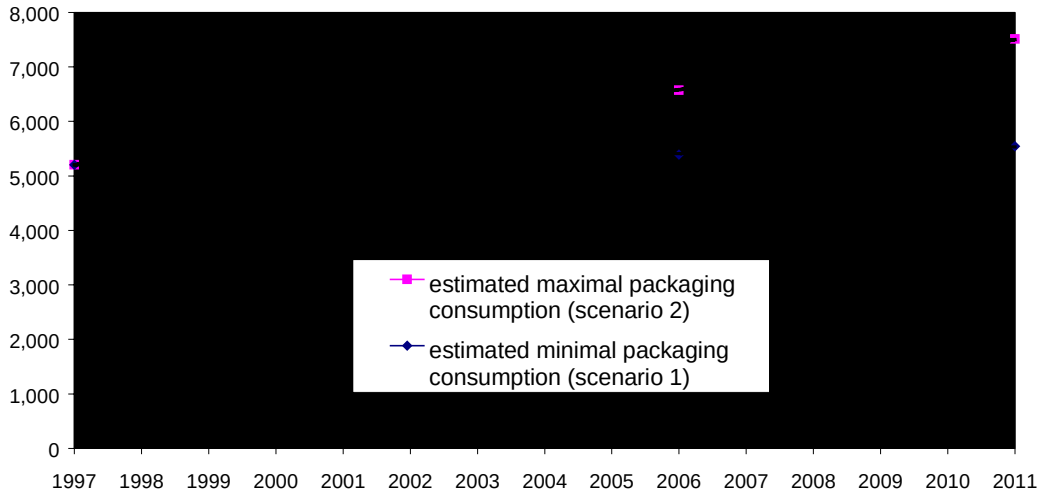

Figure 39: Estimated development of packaging consumption in Spain from 1997 to 2011 (1,000 t)

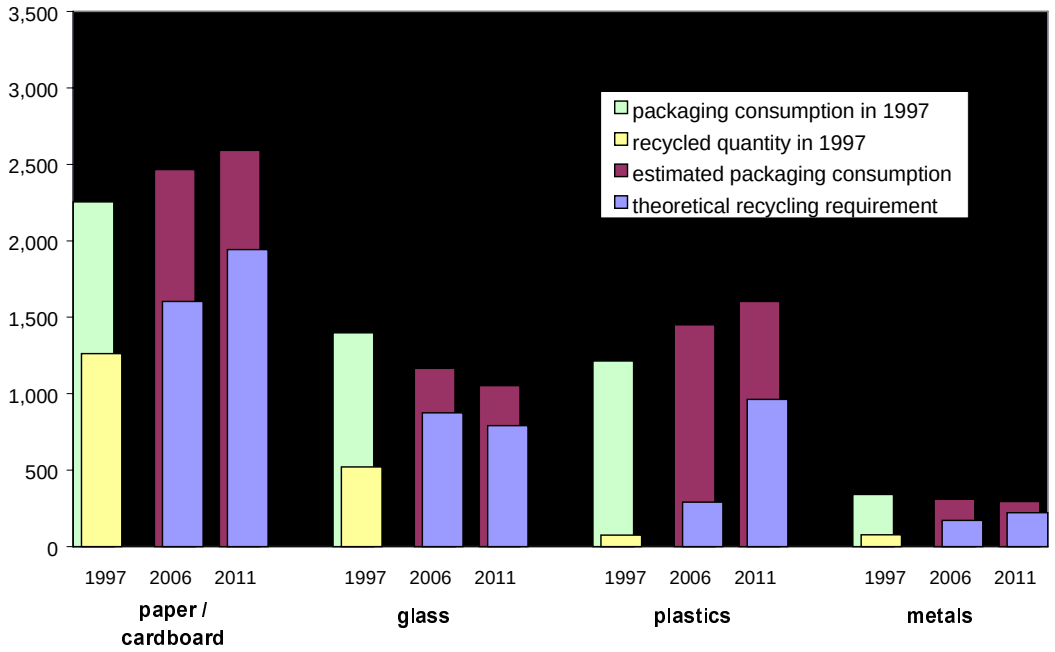

Figure 40: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain (1,000 t)

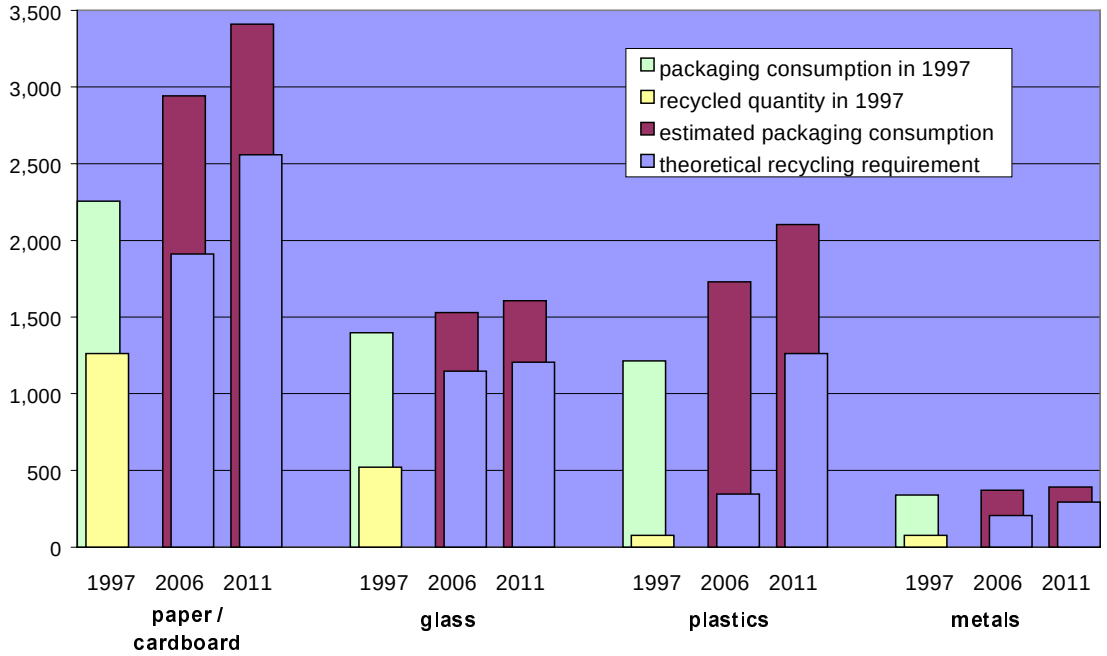

Figure 41: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain (1,000 t)

Conclusion

With an overall recovery rate of 36.0 % and a recycling rate of 6.7 % for plastic packaging in 1997 Spain still fell clearly below the respective targets of the Directive for 2001. Energy recovery contributed only to a small extent to the global recovery rate. Thus, the targets of the Directive for 2001 have to be met mainly by recycling.

The main problem in Spain is the availability of the material for recycling. Accordingly the extension of the separate collection for all packaging materials is a prerequisite to comply with current and future targets. To increase glass recycling, the colour-separated collection has to be improved along with, in longer term, an increase in recycling capacities. According to figures from ASPAPEL, Spain is currently a net importer of paper waste. This should allow to recycle all paper waste collected even according to the scenario 2. For plastics, sufficient recycling capacities seem to be available to comply with the targets in 2001 and the theoretical requirements for 2006. However, a recycling target for plastic packaging of 60 % in 2011 would require the installation of new recycling capacities.

As a result of the Spanish prevention targets, growth rates of packaging consumption may be considerably lower than assumed in the scenarios, resulting in lower quantities of waste to be recycled.

4.2.11 Sweden

Future Packaging Consumption

In contrast to the development in other countries, plastic packaging consumption in Sweden did not increase from 1997 to 1999, but may even have decreased. Based on this development and the general trend of general increase of plastic packaging consumption in EU we have reduced growth rates for the scenarios, assuming that plastic packaging consumption will stay on the same level or increase with 3 % per year at maximum. Scenario 1 results in a rather stable level of packaging consumption in Sweden, which is assumed to be the most probable development.

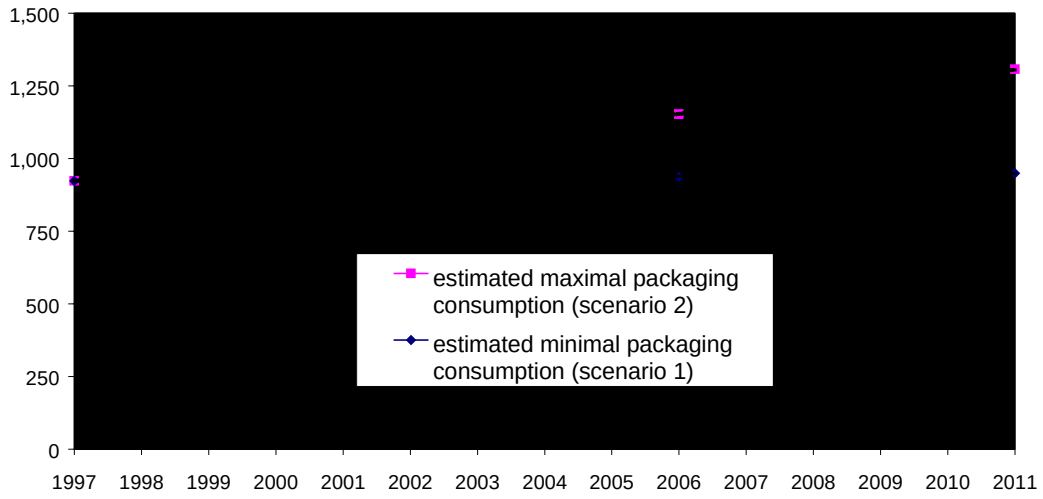

Figure 42: Estimated development of packaging consumption in Sweden from 1997 to 2011 (1,000 t)

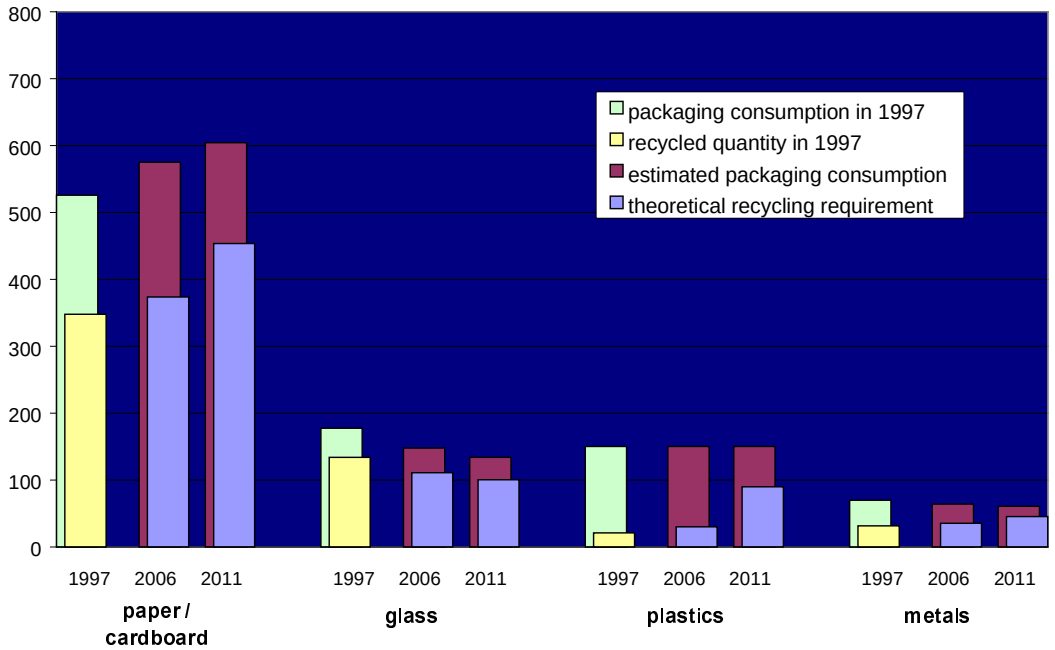

Figure 43: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden (1,000 t)

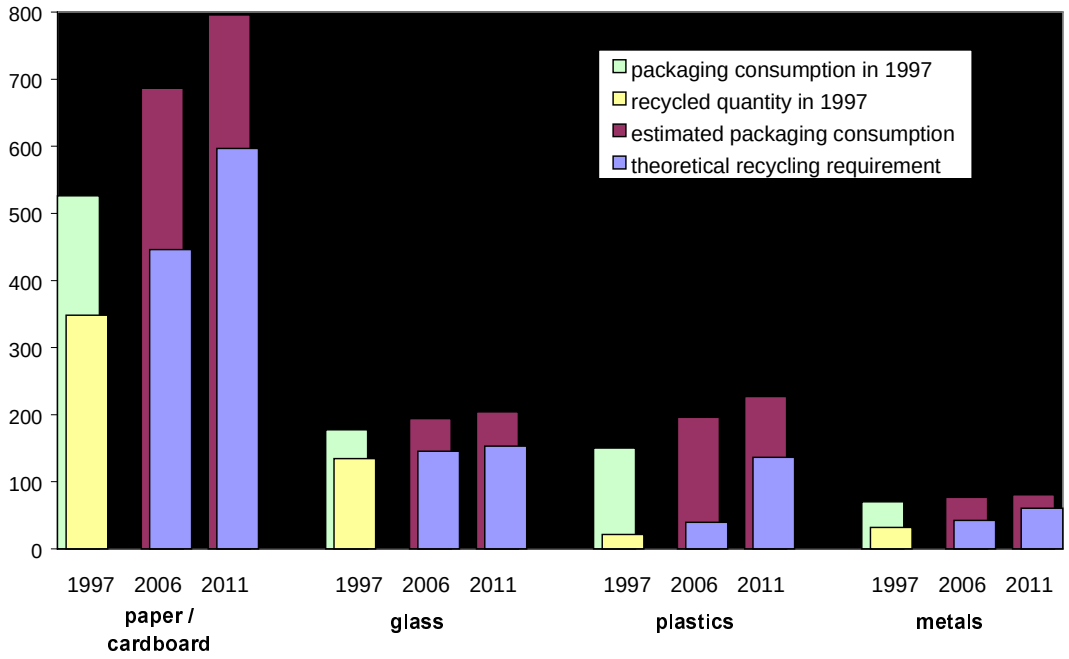

Figure 44: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden (1,000 t)

Conclusion

Major efforts in Sweden would be necessary to meet the theoretical future recycling targets for plastics in 2011. In 1997 Sweden achieved a recycling rate of 14 % for plastic packaging, corresponding to 21,000 tonnes of recycled material. According to the material organisation Plastkretsen, the recycled quantity increased in 1998 to 24,000 tonnes. To meet a recycling target of 20 % in 2006 some additional 6,000 tonnes up to 15,000 tonnes would have to be recycled. As demand for plastic waste in Sweden is reported to be higher than supply, this should be feasible by mechanical recycling. However, a further increase of recycling targets combined with an increase of consumption would afford building up new recycling capacities in the long term, if energy recovery should not be allowed.

The assumed target for paper/cardboard for 2006 was met by Sweden already in 1997 (recycling rate: 66.2 %). Sweden achieves very high recycling rates for corrugated cardboard (84 %), while recycling of paper packaging, which reached 34 % in 1997, could probably be improved by extension of collection from households.

For metal packaging Sweden reached a recycling rate of 45.4 % in 1997. Recycling rate is highest for aluminium drink cans, which form part of a deposit system (about 90 %), and lowest for other aluminium packaging (about 33 % in 1999). To reach higher targets collection from households would have to be improved.

For glass packaging Sweden met the target assumed for 2011 already in 1997 (recycling rate: 75.6%).

4.2.12 The Netherlands

Future Packaging Consumption

The annual report of the Packaging Committee of October for the year 1997 gives the RIVM (Rijksinstituut voor Volksgezondheid en Milieuhygiene) assessment of absolute quantities of packaging waste (from households, from office, shop and services sectors – OSS, and from the

industrial sector) including recycled packaging waste for the years 1986 and 1991 to 1997. The table below reproduces these figures and gives the total and the annual growth rate for this period[8].

Table 19: Development of packaging waste arising in the Netherlands

	Absolute quantities of packaging waste (from all sectors) including recycled packaging waste (1,000 tonnes)								Growth rate	
Packaging material	1986	1991	1992	1993	1994	1995	1996	1997	Total Growth rate	Average Annual Growth rate
Glass	515	558	523	504	461	453	474	469	-8.9%	-0.8%
Paper-cardboard	1,111	1,688	1,658	1,500	1,408	1,359	1,413	1,449	30.4%	2.4%
Plastics	520	645	647	538	606	596	618	611	17.5%	1.5%
Ferrous	184	263	325	201	187	198	207	196	6.5%	0.6%
Non ferrous	17	46	49	18	18	20	18	20	17.6%	1.5%
Total	2,347	3,200	3,202	2,761	2,680	2,626	2,730	2,745	17.0%	1.4%

(Source : Packaging Committee, annual report – October 1998)

The Packaging Covenant and the Commitment of Dutch industry to reduce the quantity of packaging put on the market (in comparison with the growth of Gross National Product) has allowed limiting the average growth of the Packaging put on the market to 1,4 %[9] per year (RIVM assessment). It seems likely that the increase of overall packaging consumption will continue, growth rates being strongest for plastic packaging and for paper and cardboard packaging. Besides, since the prevention target covers the total amount of packaging, it is likely that the perceived decrease of glass packaging will continue at the benefit of lighter concurrent materials as plastics and beverage cartons. The results of the scenarios for the Netherlands are given in the figures below.

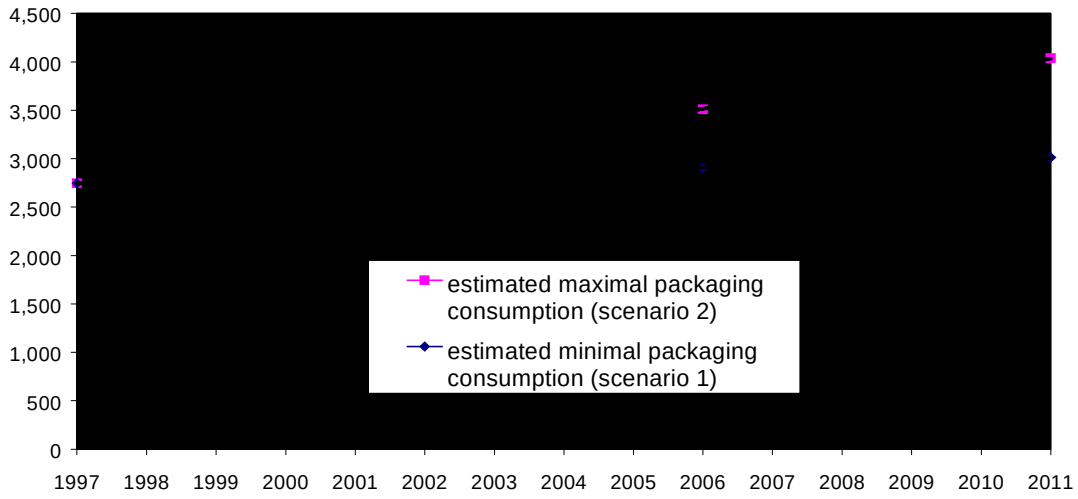

Figure 45: Estimated development of packaging consumption in The Netherlands from 1997 to 2011 (1,000 t)

[8] During this period the Gross National product increased approximately by 35%.
[9] 0.5% per year according to the survey made by Pricewaterhouse Coopers.

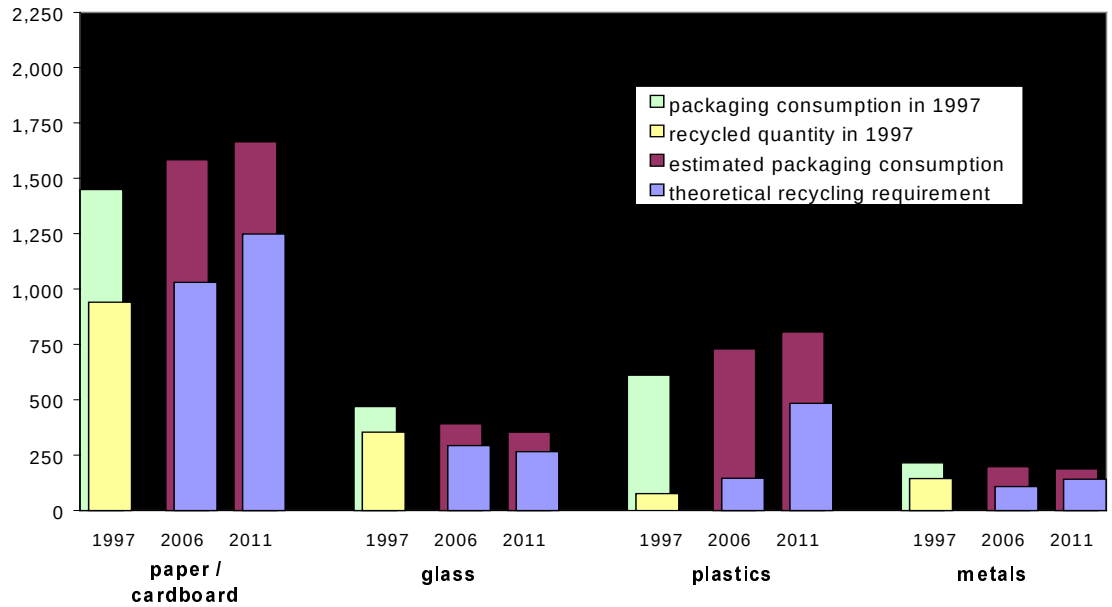

Figure 46: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands (1,000 t)

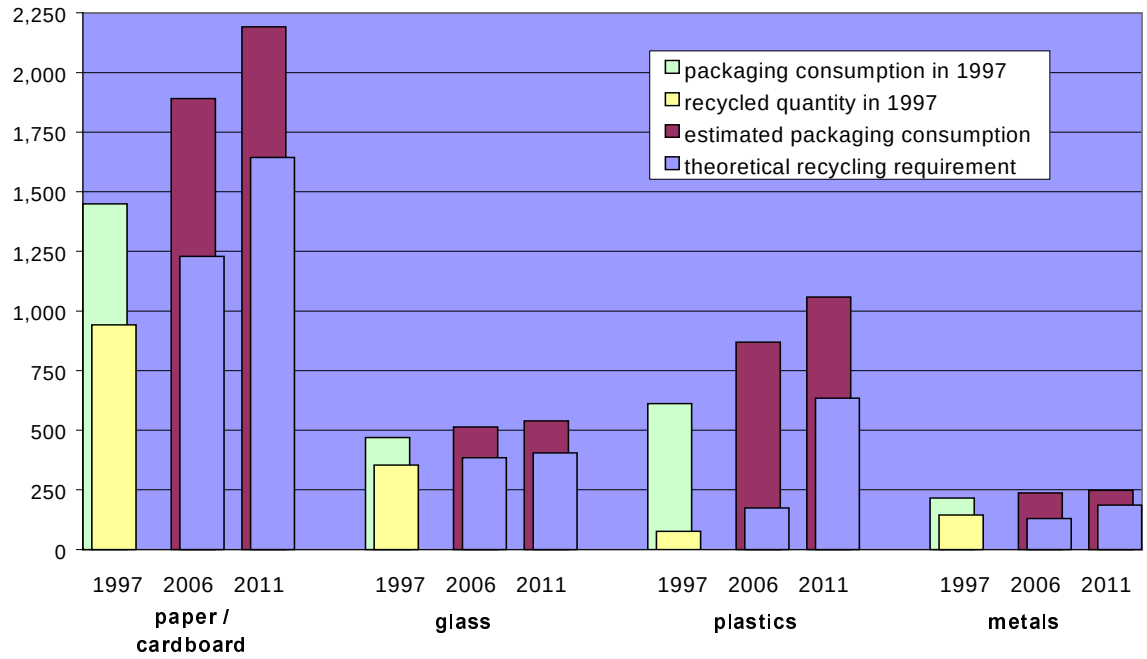

Figure 47: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands (1,000 t)

Conclusion

The results of the scenarios show that the recycling requirements for glass and metals assumed for 2006 were achieved already in 1997, and in the case of a strong increase of packaging consumption (scenario 2) only small additional efforts would be necessary. For 2011 an increase of collection and recycling will also be necessary for paper and cardboard packaging. For plastics, considerable efforts will be necessary not only to provide for sufficient recycling capacities and marketable products but also for collection and sorting.

4.2.13 United Kingdom

Future Packaging Consumption

The quality of data submitted to the UK Agencies by businesses obligated under the Packaging Regulations was improved after 1997 following discussions with relevant parties, including the Materials Organisations ("MOs") and the Agencies. However, the figures reported to the Agencies do not incorporate the tonnage of packaging produced and handled by businesses first obligated under the Regulations in 2000, nor the packaging produced and handled by businesses which do not have an obligation under the UK Regulations.

Some research into this area has begun and is continuing. Final figures for such tonnages are not yet available, but UK MOs have estimates which suggest that in 1999 there is around 9.2 million tonnes of packaging (including wood and others) flowing into the UK waste stream. We have therefore used data referring to the year 1999 (for reason of comparison excluding wood and others). The results of the scenarios for UK are given in the figures below.

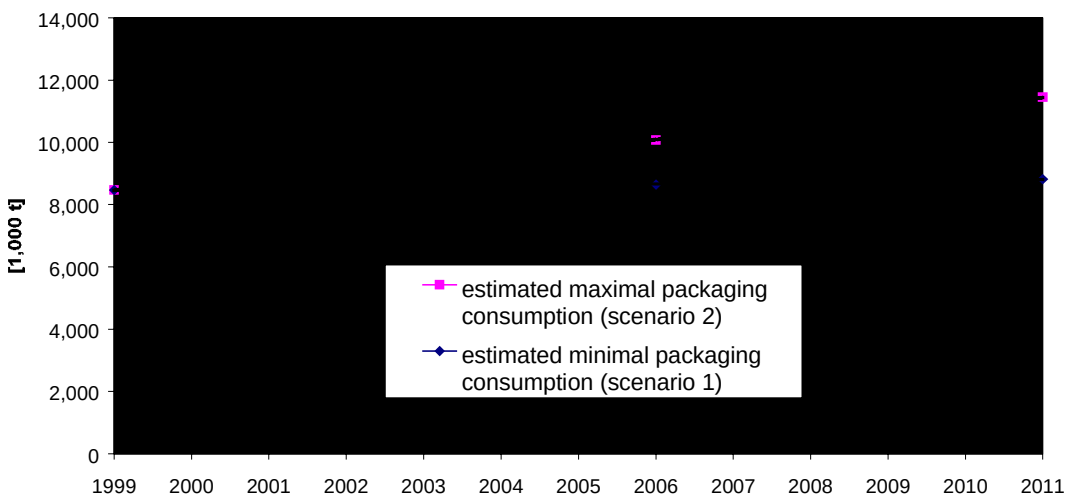

Figure 48: Estimated development of packaging consumption in UK from 1999 to 2011 (1,000 t)

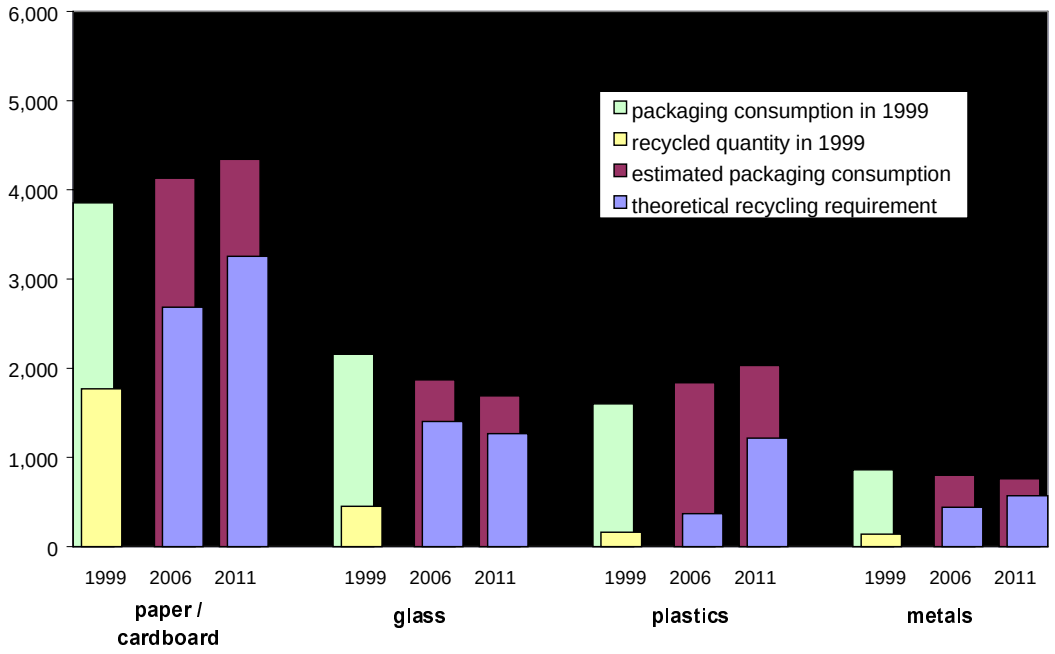

Figure 49: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK (1,000 t)

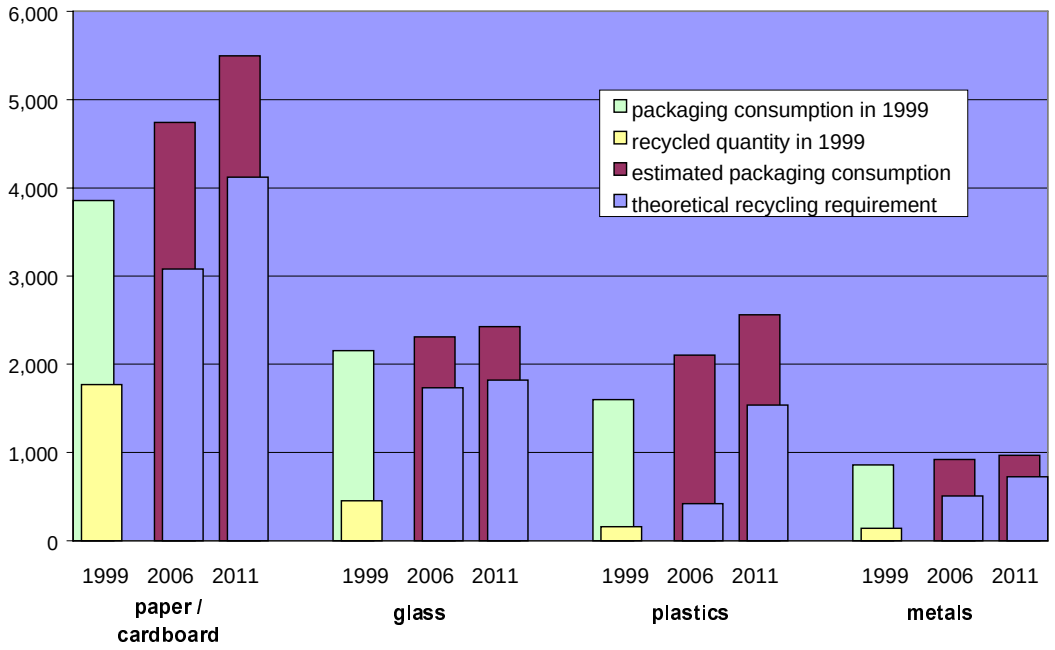

Figure 50: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK (1,000 t)

Conclusion

There are problems in every sector in increasing the collection and recycling quantities in the UK. While for some packaging waste the current limiting factor seems to be the availability of the material for recycling (aluminium, tinplate) there are particular problems for other packaging waste materials with regard to reprocessing and marketing:

- green glass: more than 50% of the glass collected by local authorities is green and only a limited amount of glass manufactured (17%) is green. Alternative markets are being developed in processing green cullet for aggregate use in asphalt.
- the amount of paper being reprocessed in the UK is going down due to the high value of £ sterling compared to the Euro.
- although the plastics sector is expanding the particular problem are recycling techniques for plastics and the marketing of secondary products.

The low market value of secondary products is the main limiting factor for collection and recycling of packaging waste. In contrast to most other Member States the UK packaging waste management system is a solely market driven system characterised through the trade of Packaging waste Recovery Notes (PRN). Therefore, an increase of PRN revenues will be crucial for allocating funds necessary for expanding the collection of packaging waste particularly from household sources and for supporting the development of new reprocessing capacities in order to meet higher recycling targets.

4.3 Future development of packaging consumption within the European Union

According to our assumptions the consumption of total packaging will range in 2006 from 53.6 to 64.9 mill tonnes and in 2011 from 54.6 to 73.7 mill tonnes. It has to be stressed that the development of packaging consumption is most likely to oscillate between the two figures for 2006 and 2011 mentioned above. Particularly the high increase of consumption is not very likely to occur as the development of consumption of different packaging materials will be influenced and compensated by each other.

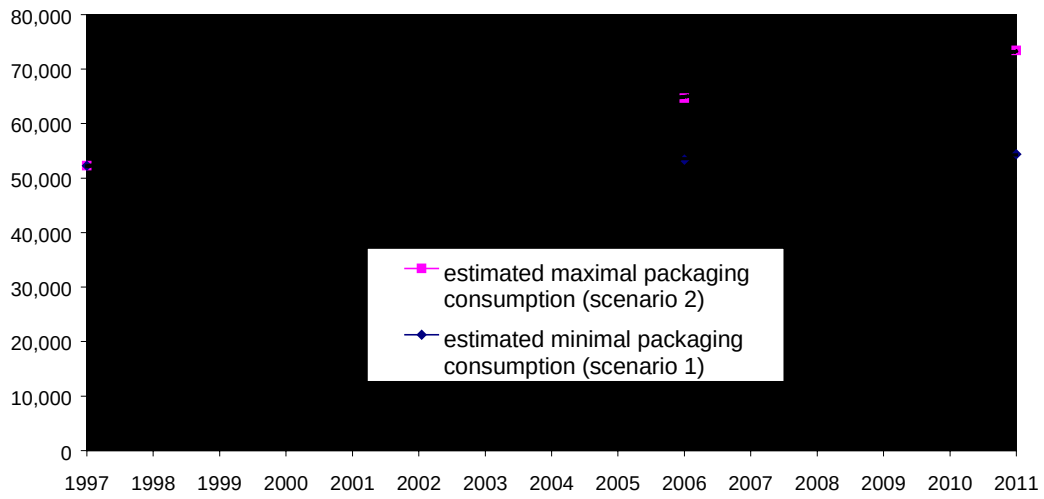

Figure 51: Estimated development of total packaging consumption in EU from 1997 to 2011 (1,000 t)

The development of packaging consumption per material and the estimated recycling capacity requirements according to scenario 1 and scenario 2 is shown below.

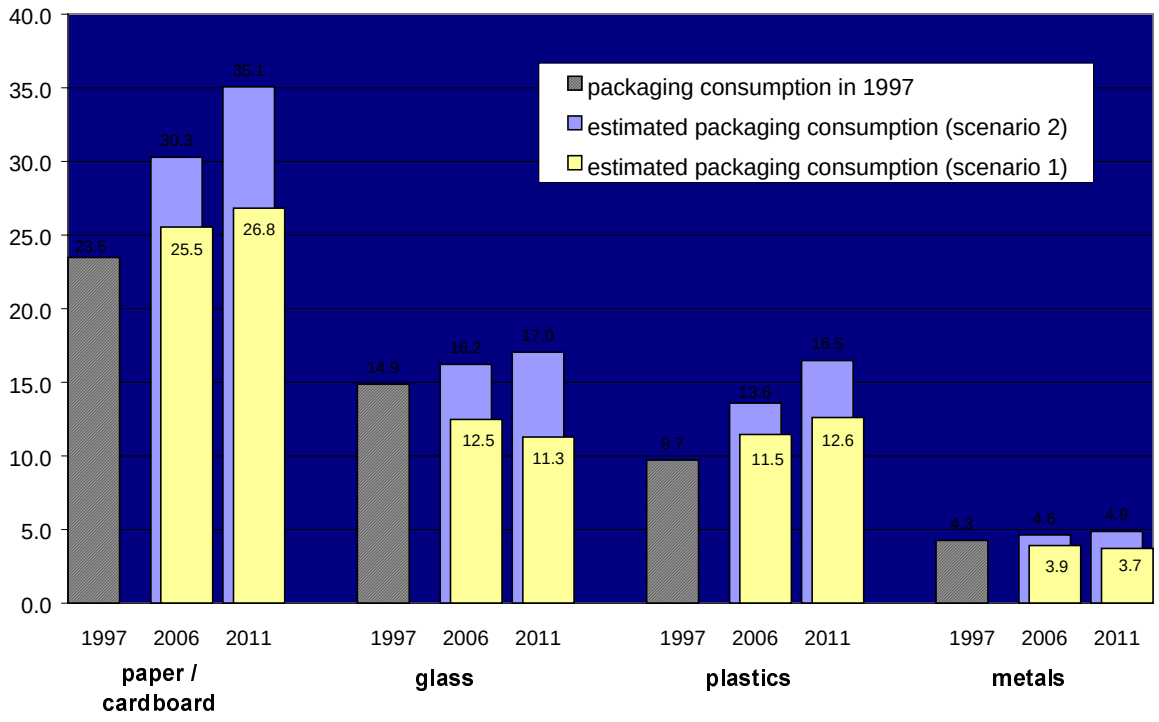

Figure 52: Estimated development of packaging consumption in 2006 and 2011 in EU according to material (million tonnes)

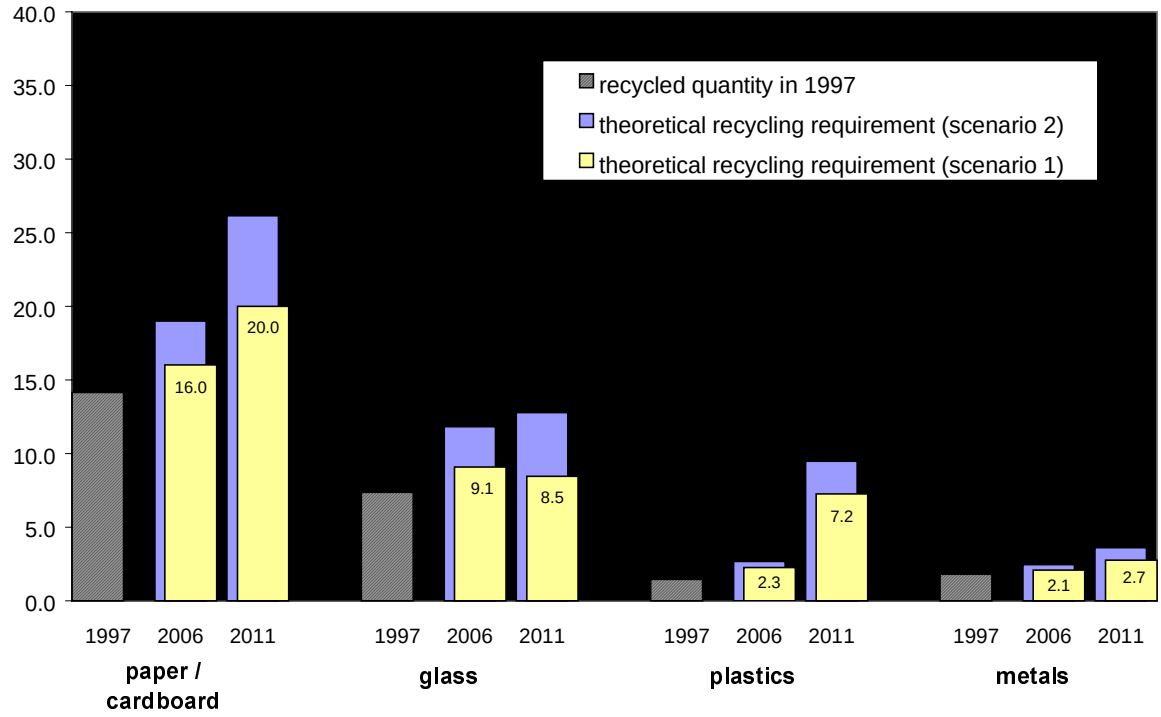

Figure 53: Estimated recycling capacity requirement in 2006 and 2011 in EU according to material (million tonnes)

A considerable increase in packaging consumption can be expected for paper/cardboard and for plastics. The development of glass and plastic packaging consumption is, as long as beverages are concerned, interdependent from each other. The metal packaging market is regarded as being rather stable.

With regard to future recycling capacities the highest extension of reprocessing capacity would be necessary for the recycling of plastics from 1.5 mill tonnes to a range of 7.2 to 9.5 mill tonnes in 2011.

5 Conclusion

Member States have transposed the EU Packaging Directive's requirement in a manner best fitting their national circumstances, their waste management concepts and planning practices. The prevailing waste management conditions before implementation of the directive, such as

- waste management measures regarding packaging waste,
- existence of reuse system,
- extent of separate collection schemes,
- development of recycling infrastructure,
- importance of incineration/ landfilling,

have fundamentally influenced the implementation processes in Member States.

Furthermore, the Packaging Directive contains provisions that leave certain latitudes for regulation to Member States. Decisions as to the format of economic instruments and how to integrate environmental costs within national economies are left almost entirely to the discretion of Member States. Also with regard to reuse Member States are given the right to develop their own policies on the sole condition that they respect the Treaty. Prevention obligations are regulated to a certain extent (essential requirements and standardisation, concentrations of heavy metals in packaging), however, in addition to these, Member States are required to adopt "other preventive measures". Nonetheless, the freedom of Member States to adopt additional measures is limited to complying with the Directive's objective of functioning of the internal market.

There are other aspects affecting the national packaging waste management, such as consumption pattern, public awareness, taxes, regulation on landfilling of waste, etc. Besides, factors such as recycling calculation methods, private and public efforts on monitoring, definition of recycling and recovery (i.e. feedstock processes and energy recovery) may affect the announced national recycling results. This illustrates the complexity of the packaging waste management systems. Consequently, not all of these aspects and their reciprocity of influence could have been considered within the scope of this study.

As a result, although the Directive aims to harmonise national measures concerning the management of packaging and packaging waste, in practice, the general approaches and the systems implemented in Member States differ widely. These differences are mainly relevant for:

- the scope and extent of preventive measures and reuse systems
- the scope of the mandatory global recycling targets and specific targets (according to packaging material)
- the scope and the extent of the producer responsibility

Despite the described problems, the Packaging Directive :

- has had positive effects in promoting the development of selective collection schemes and in this way helped to diminish the gap between Members States where prevailing selective collection schemes existed before the Directive and others,
- has provided a considerable incentive to research and to technical innovation in sorting and recycling
- has brought an important contribution to the citizens awareness of the environmental dimension of waste and has contributed to increase its participation in waste management.

Preventive measures and reuse systems

Some Member States have introduced targets for the prevention of packaging. In effect, different approaches were followed with regard to prevention targets, predominately aiming at quantitative prevention through the reduction of packaging consumption. However, in other Member States prevention of packaging consumption in terms of weight was induced as well, either as a consequence of the general cost and material saving development in packaging production, or as a result of the national packaging regulation through the reduction of not absolutely necessary packaging (grouped packaging). At present a quantitative evaluation of the effects of preventive targets is not yet possible.

The scope and extent of targets for reuse of packaging, mainly referring to beverage packaging, and generally aiming to support and/or protect already existing reuse systems, differ from the combination of reuse-recycling-recovery targets to refill quotas. In practice, the combination of reuse-recovery targets have not proven to be an adequate incentive to promote the reuse of packaging as is demonstrated by the development of the use of refillable glass packaging in Austria.

Although Member States are explicitly required and encouraged to adopt preventive measures and to introduce reuse systems the question remains what room for manoeuvre the Member States actually have for setting up systems such as mandatory quotas, deposits or eco-taxes on disposable packaging. As is demonstrated by the cases in Germany and Denmark protection of reuse systems may give rise to controversial debates. Furthermore, a common concept has to be developed on how prevention of packaging at source is to be measured and considered in the context of quantitative compliance with the Directive.

Mandatory global and material specific recycling targets

In practice, Member States have introduced different material specific recycling targets and different concepts of "global recycling rates" which cover different packaging waste flows such as

- all packaging waste
- municipal packaging waste
- non-municipal packaging waste
- defined percentage of municipal packaging waste
- sales packaging
- drink packaging

Targets for different packaging waste streams, in particular municipal packaging, have a fundamental effect on expenditure for compliance. The collection and processing of municipal packaging waste is more cost intensive than from industrial sources, and, for some materials, results in lower quality of secondary material. Targets applying to specific packaging waste materials (e.g. PET-bottles, Aluminium cans, transport packaging made of cardboard) have been introduced in the majority of Member States, however these targets and the packaging materials affected differ between Member States. In summary, the national quantitative recovery and recycling objectives impose a range of particular requirements on economic operators responsible for packaging and results in very specific approaches of compliance.

Producer responsibility

Differences in the extent of implementation of the concept of producer responsibility arise mainly with regard to the financial responsibility for packaging used by households. It ranges from covering the costs for recovery of glass and paper-cardboard only, to systems where industry is bearing the complete costs of collection, sorting, recycling/ recovery for municipal packaging waste. The coverage of costs between private actors (compliance scheme) and public sector (municipalities) is mainly a

result of the balance of power between these actors. This is, to a certain extent, also reflected by the large differences in licence fees.

Recycling and recovery rates

Recycling/recovery rates are lowest in those countries where waste management strategies and regulations aiming at separate collection and recycling hardly existed before the transposition of the Packaging Directive, and where landfilling was the predominant waste management option. These countries still have large deficits to make up with regard to establishing collection systems and building up recycling and recovery capacities.

The overall recycling and recovery rates in Member States amounted to 46.3 % and 52.6 % respectively on average in EU-11 (without Greece, Ireland, Luxembourg and Portugal). These rates were achieved mainly by the recycling/recovery of paper/cardboard and glass. Whereas the share of paper/cardboard and glass amounted to 64 % of the total packaging consumption, they constituted 79 % of the recycled material. Since recycling targets are expressed in weight, lower recycling/recovery rates for plastic, metals and composite are preferably compensated by glass and paper/cardboard.

However, it has to be pointed out that there are still areas of uncertainty which influence the comparability of data. The implementation of a comprehensive accounting system is still underway in some Member States and statistics reported by these countries needs further consolidation. Furthermore, inconsistencies in data are caused by different understanding of the definition of reuse, recycling and in particular energy recovery. For example, commonly defined criteria for the minimum thermal efficiency treatment plants must achieve to be distinguished from common incineration plants are lacking.

Material-specific aspects

For paper/cardboard and glass, the material specific recycling target of the Directive was exceeded by far by all Member States as early as 1997, the average recycling rates amounting to 59.0 % and 52.2 % respectively. Selective collection and recycling are well established activities and standards are in place for secondary raw materials. Recycling rates are growing and paper industry may rather easily adapt their infrastructure to the global supply of separated paper waste and to the demand of recycled paper.

With regard to glass packaging it has to be stressed that the extension of colour-separated collection and the reduction of impurities is a major prerequisite for an increase in recycling. As recycling capacities are limited in some Member States on account of imbalances between production and imports/exports of glass, an increase of recycling targets will lead to higher imports/exports of glass packaging waste and to a need for alternative uses.

As ferrous packaging and especially aluminium packaging is in demand as a secondary raw material and recycling capacities are available in excess, recycling rates are generally restricted by collection. As separate collection is increasing, especially in Southern Europe and in Scandinavia, it can be expected that all Member States will achieve the Directive's target and a further increase of recycling targets will be feasible.

In several Member States major problems still exist with a view to the recycling of plastic packaging waste, and some may have problems to meet the target in 2001. Most countries rely on the mechanical recycling of distribution packaging from trade and industry and to a minor degree on bottles and flasks collected from households. The main barriers to the recycling of plastic packaging are the low collection rates and the lack of competitive pricing compared with virgin materials and the restricted markets for secondary raw materials.

From an ecological point of view, it is widely acknowledged that mechanical recycling has higher benefits than other forms of recovery or disposal, provided that the recycled material substitutes at least a proportion of virgin polymers. The potential for mechanical recycling is limited, the achievable rates are hotly debated. The highest mechanical recycling rates which were achieved in only three Member States in 1997 ranged from 20 to 25%. It can be expected that new sorting and reprocessing techniques will increase the share of plastic packaging feasible for mechanical recycling.

However, a significant strengthening of recycling targets would probably only be possible if feedstock processes are considered as a recycling option. The general problem in this context is the lack of certainty about markets and funding. As feedstock processes are comparatively expensive technologies, which demand high investments, they will not be economically viable unless a legal incentive is given.

Country specific aspects

The performance and efficiency of packaging waste management in Member States differs widely, inter alia because of largely different prevailing waste management conditions at the time when the Packaging Directive was to be transposed. Accordingly, while a number of countries have gathered experiences in establishing and refining their packaging waste management systems over several years, other Member States are still in the phase of development. Generally, considering the results of the scenarios an increase of recycling targets would be feasible for some Member States but may cause conflicts in other Member States either because:

- recycling capacities are limited due to their own production capacities (colour specific glass, paper production), or
- their general focus in waste management (incineration with energy recovery), or
- a very low packaging waste flow (as result of low population density and/or high reuse systems).

In summary, an increase of targets in the course of revision of the EU Packaging Directive is feasible from the technical point of view and a number of Member States already achieve recycling rates higher then the EU targets. Furthermore, global growth of packaging production means that recycling targets will have to be increased or prevention/reuse targets will have to be introduced in order to maintain the current level of packaging waste to be disposed of. In most of the other Member States the particular challenge is the extension and qualitative improvement of packaging waste collection which at present hampers the efficiency of the systems. However, as mentioned above there are a number of other aspects namely the prevention and reuse of packaging, and definition, which needs further consideration when aiming at a harmonised legislative framework for packaging waste management.

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ANNEX I

Description of
Packaging Waste Management Systems
in Member States

ANNEX I

Description of Packaging Waste Management Systems in Member States

Austria

Belgium

Denmark

Finland

France

Germany

Greece

Ireland

Italy

Luxembourg

Portugal

Spain

Sweden

The Netherlands

United Kingdom

Austria

Contents

1 Packaging Legislation and Voluntary Agreements 1
1.1 Definition 1
1.2 Responsibilities of economic operators 2
1.3 Targets and Instruments 3
1.4 Further Provisions 4
2 Packaging Waste Management System 5
2.1 Compliance scheme 5
2.2 Interactions between operators and local authorities 7
2.3 Collection and sorting 8
2.4 Treatment systems and outlet of recycling activity 9
2.5 Financing of the system 11
2.6 Monitoring and control 15
2.7 Quantities of circulated packaging and recovered packaging waste 15
3 Further development 17
4 References: 19

List of tables

Table 1: Quantity threshold 2
Table 2: Minimum quota for companies not part of a scheme 3
Table 3: Targets for reuse and recovery (material and energy) for beverage containers 3
Table 4: Maximum quantities for landfilling and incineration without energy recovery 4
Table 5: Glass collection and recycling in Austria 10
Table 6: Recovery of plastics in 1998 11
Table 7: Tariffs for packaging materials 13
Table 8: ARA distribution of costs 14
Table 9: Packaging quantities, recycling and recovery in Austria, 1997 16
Table 10: Recycling capacities within Austria and packaging waste exports 16
Table 11: Medium-term development according to the activities collection, sorting and recovery/recycling 18

1 Packaging Legislation and Voluntary Agreements

1) The Waste Management Act (first published in 1990, amended in 1996 - Federal Law Gazette No. 434/1996) enables the Minister for Environment together with the Minister for Economic Affairs to lay down taking back and recovery obligations for certain types of waste. This was done for packaging as well as for one-way-dishes and one-way-cutlery in the Packaging Ordinance from 1992, which was amended in 1996 to implement the EC Packaging Directive (Federal Law Gazette No. 648/1996: Ordinance of the Federal Minister for the Environment, Youth & the Family, on the avoidance and recovery of packaging waste and certain product residues and on the establishment of recovery systems). The Target Ordinance (Federal Law Gazette No. 646/1992, as amended by 649/1996) lays down joint reuse, material recovery and energy recovery targets for beverage containers, based on the numbers of litres placed on the market.

2) With regard to packaging waste the Waste Management Act regulates

- the requirements for compliance schemes,
- a price monitoring procedure for kerbside and door-to-door collection, and
- supervisory powers for the Minister of Environment.

1.1 Definition

3) For the purpose of the Packaging Ordinance "packaging materials" mean the following products, from which packaging or ancillary packaging is directly manufactured:

- Paper, card, board, and corrugated board
- Glass
- Wood
- Ceramics
- Metals
- Textile fibre materials
- Plastics
- Composite materials
- Other packaging materials, in particular if they are biodegradable

4) "Large waste holders" means businesses which are listed in the register pursuant to article 9 (1) of the Packaging Ordinance (see below)

5) The Packaging Target Order specifies "reuse quotas" in the domain of beverages and residual quantities. In the case of packaging beverages, the "reuse and / or recycling quotas" must be attained by refilling packages, recycling and thermal recovery of old packaging materials.

6) "Thermal recycling" within the means of the use of combustible packaging waste for the production of energy through direct incineration with or without other types of waste, in any case with recovery of the heat. The following conditions must be met:

- adherence to emission standards in force
- adherence to emission limit values for dioxin/furan compounds
- no worsening the emissions situation of the plant
- conservation of resources through substitution of conventional fuels
- optimal use of energy content of all input materials
- a defined quality of all input materials

1.2 Responsibilities of economic operators

7) Manufacturers, fillers, distributors and importers are obliged to take back packaging, disposable dishes and cutlery they put on the market free of charge and either recover or recycle it using state-of-the-art technology. All affected enterprises have the choice to fulfil their obligations by their own or to pass these obligations over to an authorised compliance scheme. The key requirements for enterprises are:

- obligation to take back and recover used packaging
- to document the amount of packaging put on the market and the return- and recovery-quotas which have to be reported to the Minister for Environment

8) Producers and distributors of transport and sales packaging are exempt from most obligations, provided that either the annual turnover is less than 10 million ATS or that the amount of packaging they place on the market does not exceed the annual amount as shown below.

Table 1: Quantity threshold

Packaging material	Limit
Paper, cardboard, corrugated cardboard	300 kg
Glass	800 kg
Metals	100 kg
Plastics	100 kg
Woods	100 kg
Total of other materials	50 kg

9) To improve controls on "free-riders", businesses not already members of a compliance scheme and which cannot show that they have taken back and recycled the appropriate quantity of packaging (see below material-specific targets for individual company compliance), must join a compliance scheme in respect of residual quantities of packaging waste. If they have achieved a return rate of 50% or more, they will have to sign up with an organisation such as ARA for the difference between the return rate and 90% of the packaging they have placed on the market; if they have achieved a return rate of less than 50% they will have to sign up for the difference between their actual return rate and 100% of what they place on the market. This is intended to avoid situations where an individual company recycles 60% of its packaging waste and some of the residual 40% ends up in ARA collections without a licence fee having been paid.

10) With the amendment of the Packaging Ordinance in 1996 a new business category, 'large waste holders' has been created. Businesses on whose premises more than 80 tonnes of paper/board, 300 tonnes of glass, 100 tonnes of metals, or 30 tonnes of plastics becomes waste each year, now have the option of registering as large waste holders. 'Large waste

holders' are responsible for reusing or recycling the packaging supplied to them. The idea is that since this material can be collected relatively cheaply, this shortcut approach will reduce overall costs.

11) "Large waste holders" must submit data of the anticipated quantity of packaging waste arising, categorised by packaging material for the subsequent two calendar years and must notify the Environment Minister no later than 3 months after the end of each calendar year the packaging arising and the packaging recovered or directed to recovery categorised by material.

1.3 Targets and Instruments

12) Austria has in effect three sets of targets:

- The material specific and overall target set out in the EU Packaging Ordinance, expressed as percentages of packaging placed on the market which must be delivered to a recycler. Economic operators (manufacturers, importers, fillers and distributors) which take part in a collection and recycling scheme (compliance scheme) approved by public authorities have to achieve a recovery rate of 50%, a recycling rate of 25%, with a minimum of 15% for each packaging material.
- Material-specific targets for individual company compliance, expressed as percentages of packaging taken back and own packaging waste arisings which must be recycled (Packaging Ordinance, 1996)

Table 2: Minimum quota for companies not part of a scheme

Packing material	in %
Paper, cardboard,	90
Glass	93
Ceramics	95
Metals	95
Plastics	40
Composite cartons	40
Other composites	15

- The Target Ordinance sets the following ratios of drinks packaging as a proportion of the bottling volume sold on the domestic market which shall be met through re-filling, recycling and energy recovery (table 3) and targets for maximum amounts of packaging waste other than beverage containers that can be landfilled (table 4).

Table 3: Targets for reuse and recovery (material and energy) for beverage containers

Beverages	1997	2000
Mineral water, table water, soda water	92 %	96 %
Beer	92 %	94 %
Soft drinks	80 %	83 %
Fruit juices	60 %	80 %
Milk and milk products	60 %	80 %
Wine	80 %	80 %
Sparkling wine and spirits	70 %	80 %

Table 4: Maximum quantities for landfilling and incineration without energy recovery

Packaging material	1998	2000
Paper, cardboard, corrugated cardboard	140,000	99,000
Glass	54,000	38,000
Metals	36,000	17,000
Plastics	90,000	60,000
Composites	50,000	30,000

13) All these targets, combined, lead Austria to exceed the maximum recycling target set by Directive 94/62/EC. Austria has therefore made use of Article 6(6) of this Directive. A Commission Decision (1999/42/EC) was adopted confirming the measures notified by Austria pursuant to this Article.

1.4 Further Provisions

14) There are no taxes for the landfilling of waste, 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 landfill which fulfil the requirements of available techniques are:

Date	residue waste (Euro/t)
1 January 1998	10.85
1 January 2004	14.47

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.

15) 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 (Landfill Ordinance dated 10 April 1996).

16) 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; full enforcement of all provisions will be in place by 1 January 2004. On account of the Landfill Ordinance the construction of more waste treatment plants is to be expected in Austria in the next few years.

2 Packaging Waste Management System

2.1 Compliance scheme

Requirements for compliance schemes

17) The Packaging Ordinance envisages an integrated collection and recovery system covering both household and commercial/industrial waste. The key requirements for compliance schemes are:

- the obligation to contract with every affected enterprise which wishes to do so
- to install sufficient collection facilities in comparison to the supply network
- to provide sufficient container collection volume (litre per capita and year) in comparison to the amount of packaging which takes part of the system
- to guarantee reasonable costs for collection and recovery and to calculate adequate fees (no cross - subsidising)
- to document the amount of packaging material collected and recovered

18) Prior to approving authorisation, which is limited to five years, a compliance scheme has to provide the following information:

- packaging material to be collected and recovered
- areas of collection activities (location and type of packaging according to sources - e.g. nation wide collection, only in certain provinces or districts, packaging from commercial users or from households)
- financing of the system
- other authorisation requirements (e.g. permit for collection of hazardous waste)
- calculation factors for different fees of packaging
- costs for collection, sorting, recovery and administration
- ownership of the system
- internal administrative structure of the system
- terms of trade
- local authority association and other approved systems operating in the same area (in terms of geography or type of waste) have a right to comment on the application

19) There are a number of authorised compliance schemes responsible for different packaging material and for different industrial branches. As an example an overview on the ARA system is given below.

The ARA system

20) Altstoff Recycling Austria (ARA) was created by industry in order to fulfil the legislation on packaging on a nation-wide basis. ARA authorises the "green dot" logotype to be placed on the packaging of products whose manufacturers have paid a given rate. The green dot indicates that the companies have transferred their obligation of taking care of the collection and recovery of material to ARA, who finances the collection, sorting and recovery of the packaging waste. Unlike the German DSD, the ARA covers both the private sector as well as the commercial/industrial sector, and is directed at all types of packaging except drinks cartons.

21) ARA AG is wholly owned by the 300 members of the association Altstoff Recycling Austria. The ARA-Verein which consists of three committees - corresponding to the three economic groups involved, i.e. the packaging industry, the filling and trade industry and the retail trade - holds 100% of the shares of Altstoff Recycling Austria AG. Any company in the 'packaging chain' may join the association, only companies from the waste management industry are excluded in order to avoid any conflict of interests. The non-profit principle applies to all companies in the ARA system. Profits are not distributed. Instead they are used to reduce the tariff for the relevant packaging material in the following year.

22) ARA acts as a funding organisation and interface between packers, fillers and importers (ARA's licensees) and the branch recycling companies (Branchenrecycling-Gesellschaften, BRG), the sectoral organisations providing the take-back guarantees. An overview of the ARA system is shown below:

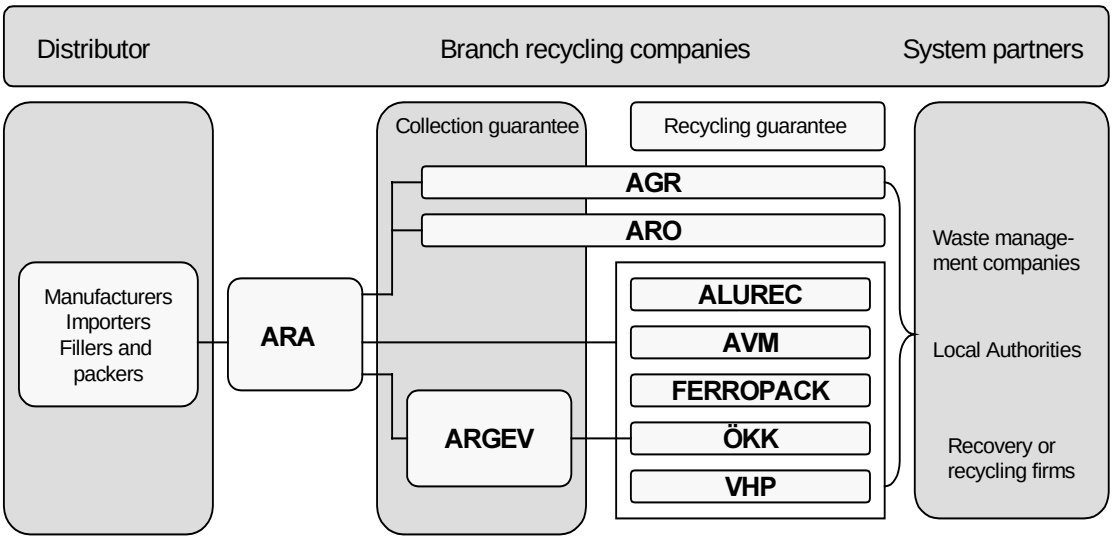

Figure 1: The ARA system

Branch recycling companies		Responsibilties
ARGEV	ARGEV Verpackungsverwertunggesellschaft m.b.H. Lindengasse 43/12 A-1071 Vienna Tel. 01/521 49-0, Fax: 01/523 85 40	Collects and sorts packaging manufactured from plastic, metal, wood, textiles, ceramics and composite materials
ÖKK	Österreichischer Kunststoff Kreislauf AG Handelskai 388/Top 841 A-1020 Vienna Tel. 01/720 70 01, Fax: 01/720 70 01-40	Responsible for the recovery of plastic and textile packaging
ALUREC	Aluminium Recycling GmbH. Langegasse 30 A-2603 Felixdorf Tel. 02628/639 330, Fax: 02628/639 334	Organises the recycling of aluminium packaging
FERRO-PACK	FerroPack Recycling GmbH. Obere Donaustraße 71 A-1020 Vienna Tel.: 01/214 56 00, Fax: 01/214 56 16	Coordinates the recycling of packaging manufactured from ferrous metals (tinplate and steel)
VHP	Verein für Holzpackmittel Hochstraßgasse 33 A-7423 Pinkafeld Tel. 03357/46242, Fax 03357/462 42-4	Forwards collected wooden packaging for recovery and recycling
AGR	Austria Glas Recycling GmbH. Obere Donaustraße 71 A-1020 Vienna Tel.: 01/214 56 00, Fax: 01/214 56 16	In charge of the collection and recycling of used glass
ARO	Altpapier Reycling Organisations GmbH. Gumpendorfer Straße 6 A-1061 Vienna Tel. 01/581 35 00, Fax 01/581 39 91	Responsible for the collection and recycling of paper packaging
AVM	Arbeitsgemeinschaft Verbundmaterialien Handelskai 388/Top 841 A-1020 Vienna	In charge of recovery and recycling of packaging manufactured from several materials, with the exception of beverage cartons

Öko-Box Sammelgesellschaft, which does not belong to the ARA System but cooperates closely with it, is responsible for beverage cartons

2.2 Interactions between operators and local authorities

23) If compliance schemes are dealing with packaging waste from households and organise the collection in the form of a kerbside collection, they need to have permit to use public areas to station containers. They may conclude contracts with municipalities for certain services in the context of packaging waste management. This may cover the emptying of containers, the cleaning of container areas, sorting activities, and other services.

24) Several waste disposal companies have associated to negotiate prices with ARA and local authorities. The idea is that a triangle balance of power is maintained between the three.

25) In order to ensure that collection, sorting and recovery and recycling is carried out on a nationwide basis, in urban and rural districts and for different branches of industry, the ARA System has concluded appropriate agreements with all Austrian municipalities, with more than 200 relevant waste management companies and recovery and recycling firms.

2.3 Collection and sorting

26) A national collection and recycling system in compliance with the Packaging Ordinance exists if:

- Collection points having an adequate intake capacity are set up throughout the federal territory at a reasonable distance from the relevant place where waste arises and the packaging is recycled within the meaning of the Packaging Ordinance;
- The distance to collection points is not greater than the mean regional distance to the service facilities for goods of the kind in which the packaging are sold; but at least one collection point must be set up and operated in each community; in the case of individual packaging materials that arise in small quantities, one collection for each district is sufficient;
- The legal entity for each individual collection and recycling system states the factors for calculating the business costs of collection and treatment and, on request, submits these to the Federal Minister for the Environment.

27) Austrian consumers have a very dense network of around 860,000 collection containers at their disposal. In addition, plastics and composite materials are collected in yellow bags in various regions. For trade customers, the ARA system offers more than 150 collection locations nationwide and several hundred recycling stations are available for the collection of trade packaging.

28) The actual collection and recycling operations are carried out by eight BRGs. ARO (the waste paper recycling organisation) and AGR (Austria Glas Recycling) are responsible both for collection and for recycling. Their existing 'bring' collection systems have been brought within the new structure. ArgeV collects the lightweight fraction, passing the materials it collects to sectoral organisations with which it has negotiated recycling guarantees - ÖKK for plastics, AMV for composites, FerroPack for steel, ALUREC for aluminium and VHP for wood. AMV is a joint venture owned 50% by ÖKK and 50% by ARO. ÖKK serves as a coordination point for the preparation and recycling of collected plastics packaging. It will help create material recycling capacities while also adapting or constructing thermal recycling plants.

29) The receiving stations used by the paper organisation ARO are not the same as used by ArgeV (lightweight fraction). Both continue to use their existing infrastructures. The situation with kerbside collection is not so clear-cut: all materials may be collected together.

30) The ArgeVs commercial/industrial collection systems are as follows:

- for 'minimum quantities' (up to 240 litres per month), public drop-off sites and commercial drop-off centres.
- for 'small quantities' (240-1,100 litres per month) kerbside collection from households (annual registration is required).
- for 'commercial quantities' (above 1,100 litres per month), there are 100 regional collection centres (a licence declaration is required).
- for 'large quantities' (more than 300 tonnes per annum), a direct contract with the ARA system is required. There are also industry-specific arrangements.

Paper

31) Depending on the state and region, paper collection is organised by way of a bring system (in rural areas) or a kerbside system (urban areas). The lids of the collection containers are red. In order to collect as much paper packaging as possible and to utilise the collection infrastructure to the full, packaging manufactured from paper, cardboard and corrugated

board is collected together with newspapers and printed matter. Packaging paper amounts to ca. 15% within the paper collected from households.

Glass

32) Glass has been collected in Austria even before the transposition of the Packaging Directive. A nationwide collection system has been in existence since the beginning of the seventies. Austria was one of the first countries in the world to introduce a consumer-oriented, colour-sorted glass collection. The collection system covers all types, shapes and sizes of container glass, i.e. all types of glass packaging such as bottles, jars, flasks etc. The glass is colour-sorted into clear glass and coloured glass (primarily green, but also brown or blue). Colour-separated of glass is a prerequisite for effective use as secondary raw material.

Metals

33) Packaging manufactured from ferrous metals and aluminium is mostly collected in blue containers. In a few selected areas, metals are collected in the yellow containers with plastics and composites.

Plastics/composite materials

34) Separate collection of plastic and composite packaging does not have such a long collection tradition as the other materials described above, however, large quantities have been collected separately since the introduction of the Packaging Ordinance in 1993. Collection varies from region to region, in some cases with so-called "yellow container" which are located in public places, in others with "yellow bags" which are distributed directly to households and picked up from them at certain intervals. Beverage cartons are also collected in the same containers in areas where is no eco-box or eco-bag collection. Öko-Box GmbH, which specialises in the collection of beverages cartons, participates in the ARGEV collection in respect of collected beverages cartons.

35) The collected recyclables are sorted into the different fractions in about 40 sorting plants all over Austria. The total quantity of plastic and composites packaging waste produced by households in 1998 amounted to about 74,000 tonnes. Around 21,000 tonnes were collected separately by trade and industry (The green dot in Europe - we are in, 1999).

36) In order to optimise the separate collection of plastics and composites the so-called Viennese model (separate collection of particular recyclable plastic fractions, leafing small plastic items in household waste and using their calorific value for energy recovery) is envisaged to be extended in the vicinity of waste incineration plants with energy recovery.

2.4 Treatment systems and outlet of recycling activity

Paper

37) In 1998, the Austrian paper industry recycled around 1,700,000 tonnes of waste paper and used it as raw material for the production of new paper products such as packaging. In 1999, 520,000 tonnes packaging manufactured from paper, carton, corrugated cardboard were put on the market and 441,000 tonnes of paper packaging were collected and recycled within Austria, this corresponds to a recycling rate of 84.8 %. Hygienic paper, news paper and intermediate products for paper packaging are the most common outlets of paper recycling activities.

Glass

38) The collected glass is used to 100 % in the packaging industry of which 4/5 is recycled within Austria and the rest in Germany, Italy and in the Czech Republic. The following table provides an overview on collection and recovery of glass in Austria:

Table 5: Glass collection and recycling in Austria

Collected and recycled in 1999	199,684 tonnes	
Collected and recycled from private households	178,142 tonnes	
Per capita collection rate from households	23 kg	
Available collection containers	90,000	
Available collection volume	145 l/capita/year	
Recycling rate	86%	
Glass packaging remaining in household waste	37,000 tonnes	
Max. percentage of cullets use in glass production	Colourless glass	60%
	Brown glass	70%
	Green glass	100%

Source: Homepage AGR, www.agr.at

Metals

39) The quantity of metal packaging collected in Austrian households in 1998 amounted to about 28,000 tonnes. Slightly more than 2,000 tonnes were collected from trade and industry. With the aid of magnets, the collected material is sorted easily into a ferrous and an aluminium fraction. Tinplate and steel packaging is recycled 100 percent. After being shredded or pressed into bales it is transported to Austrian steelworks where it is used to produce articles such as automobile and train components, high-speed tracks, casings for washing machines and similar items. Aluminium is smelted and processed into high-quality cast parts.

Plastics

40) Plastics and composites are recovered by means of recycling and incineration with energy recovery. In 1998, 77,500 tonnes plastic packaging from households, and trade and industry and 7,000 tonnes resulting from collection of the previous year were recovered. Plastics were processed in 20 plastic treatment plants in Austria and 4 plants in the neighbouring countries (D, CH, NL). 11 of these companies recycle sorted plastic fractions (foils, bottles, cups etc), 9 companies recycle PS, 2 plants recycle mixed plastics and 2 plants use mixed plastics for energy recovery. 54% of the recovered amount of plastics was recycled and 46% incinerated with energy recovery, 82% was treated inside Austria and 18% was exported for recovery. The following table provides an overview on the recovery of plastic packaging:

Table 6: Recovery of plastics in 1998

	Recycling/Recovery (tonnes) in Austria	outside Austria	Total
LDPE-foils	19.410	2.133	21.543
HDPE-hollow container	5.436	235	5.671
PET-bottles	31	6.073	6.104
PS/PP-cups	3.293		3,293
Total sorted plastics	29.209	8.441	37.650
Mixed plastics	3.024	4.610	7.634
Total recycling	32.233	13.051	45.284
Energy recovery	37.133	2.097	39.230
Total recovery	69.366	15.148	84.514

Source: Homepage of ÖKK, www.okk.co.at

41) Plastic secondary raw materials are use for the following products or in industrial branches:

Product/branch	Share in %
Foils	53
Pipes	14
Injection moulding	9
Fibre industry	7
Roof tiles, paving stones	7
Construction industry	5
Pallets	5

42) According to personal communication from ÖKK the future total packaging consumption is expected to be more or less stable, however an alteration within the packaging market in favour to plastics packaging is already observable and is likely to continue in the future. For example, an exceptional high increase of PET is recorded between 1997 and 2000 of yearly 20%. In contrast, glass beverage packaging has dropped from 96% to 46% in 2000. The Austrian plastic recycling organisation (ÖKK AG) has announced that since September 1999 a PET recycling plant with a capacity of 10,000 tonnes/a has started to process PET on pilot scale.

43) Today, 5000 tonnes (200 million bottles) of PET from mineral water, soft drinks and milk are being recycled to granules in the new PET recycling plant in Völkermarkt. At present only clear PET is recycled, in the future also coloured PET will be recycled. So far, the bottles were transferred to the Netherlands causing transport costs of 1000 ATS per ton. The secondary raw material PET is mainly sold to Italy and Germany to produce insulating fillings, disposable medical products and polyester fibres for sweaters

2.5 Financing of the system

44) If businesses decide to participate in a compliance scheme they have to pay licence fees according to the amount and type of packaging they put on the market. The licence fee is calculated by weight of the packaging taking into account the difficulties of collection and

recycling of different packaging materials. Municipalities are paid for services which they carry out on behalf of the compliance scheme (see section 2.2).

45) The work of the ARA system is financed by fees for the specific packaging materials which are paid to ARA by Austrian companies. Each company wishing to transfer the obligations imposed on it by the Packaging Ordinance to the ARA system becomes a licensee of ARA and pays license fees depending on the quantity and type of packaging it puts on the market. In order to ensure fair distribution of the costs, the tariffs are based on the expenditure incurred for the collection, sorting and recovery or recycling of the individual packaging material.

46) The licence fees paid to ARA are calculated by multiplying the quantity of packaging (i.e. weight) with the respective tariff. The number of items of packaging circulated in Austria are registered on a monthly or quarterly basis depending on annual packaging use. ARA provides licensees with the "ARA Editor", a software program which simplifies registration.

47) Companies with small quantities of packaging (up to an annual licence fee of ATS 25,000) can register their sales and pay their licence fees on a yearly basis. The "representative selection method" has been developed for larger companies with many different articles. In this case, the weight of the individual packaging materials are extrapolated using a representative sample of the products.

48) The ARA tariffs for 1999 and 2000 are shown below. Prices particularly for plastics have been reduced up to 24 % in 2000.

Table 7: Tariffs for packaging materials

Packaging material		Tariffs per kg excl. VAT in 1999 ATS	from 1.1.2000 ATS	€
1.1	Sales packaging (Paper, cardboard)	2.79	2.79	0.20
1.2	Transport packaging (Paper, cardboard)	1.19	1.19	0.09
2.1	One-way glass	1.20	1.20	0.09
2.2	Re-use glass	0.20	0.20	0.01
3.	Wood	0.31	0.31	0.02
4.	Ceramics	4.00	4.00	0.29
5.1	Ferrous-metals small < 10 l	5.49	5.49	0.40
5.2	Ferrous-metals large > 10 l	2.69	2.69	0.20
5.3	Aluminium	6.35	6.35	0.46
6.	Textiles	16.37	12.21	0.89
7.0	Plastics small < 1.5m² or < 0.15 kg	18.13	15.09	1.10
7.1	Plastics large > 1.5m² or > 0.15 kg (hollow containers > 5l, foils > 1.5m² or > 0.15 kg, EPS > 0.1 kg)	8.48	6.42	0.47
8.0	Composites (excluding beverage containers)	17.54	14.40	1.05
9. Industry and trade plastic packaging				
9.1	Pallets (L(L)DPE) > 1.5 m² Tray films (LDPE) > 0.25 m², > 60 µm, (> 6 VE - Food, > 3 VE – non-food, no multi-packs)	5.18	3.98	0.29
9.2	Hollow containers (HDPE, PP) > 5 l, Sacks (LDPE, PE/PP) > 25 l	5.18	3.98	0.29

Note: According to § 7e, 3 AWG the Ministry for Environment is allowed to supervise and to fix tariffs for packaging from households (packaging materials 1.1, 2, 3, 4, 5.1, 5.3, 6, 7.0, 8).

49) Since the introduction of the Packaging Ordinance in 1993 the most significant reduction of recovery tariffs have affected prices for plastics packaging sourced from households which were reduced by about 59%, for plastics resulting from the trade and industry sector tariffs have been reduced since 1994 by ca. 44%. The ARO AG plans to reduce their tariffs for paper and cardboard for the year 2001. The reasons for this development are manifold and include a continuous increase of the number of licensees, optimisation of collection and sorting, and cost reduction of recovery operations.

50) The budget of ARA is allocated to the main activities as follows:

Collection, sorting and recovery	95.5%
Labour costs	1.3%
Depreciation	0,1%
Public communication	1.9%
Overhead	1.2%

51) The distribution of costs for collection, sorting and recovery varies according to the packaging material:

Table 8: ARA distribution of costs

	Collection	Sorting	Recovery
Paper sales packaging	98%	0%	2%
Paper transport packaging	94%	0%	6%
Glass (one-way)	100%	0%	0%
Wood	21%	36%	42%
Ceramics	0%	100%	0%
Ferrous metals small <10l	71%	29%	0%
Ferrous metals large >10l	60%	40%	0%
Aluminium	63%	37%	0%
Textiles	0%	19%	81%
Plastics small	48%	35%	17%
Plastics large	8%	55%	36%
Composites	65%	19%	16%
Industry-& trade plastics	0%	48%	52%

2.6 Monitoring and control

52) Manufactures, importers, and packer/fillers must no later than three months after the end of each calendar year supply data relating to the previous year to the Minister of Environment of the

- quantity of packaging by material which they placed on the market
- the quantities of packaging taken back and estimated return rate in percent
- quantity of packaging waste transferred to collector, sorter or recoverer; the company must keep evidence of transfer (delivery notes or invoices) and, on request, submit it to the Ministry of Environment

53) Insofar as the businesses obligated participate in a collection and recycling system and can provide evidence of this, the reporting obligation shall pass to the operators of this system. The operator of a collection and recovery system shall submit to the Minister of Environment each year by 10 April of the following year as evidence that it has operated properly

- evidence of the quantities collected of each fraction and of the collection rate of each material and the recovery rate of the quantity of packaging participating in this system, both the total and for each material and quantities of missorted material;
- an inventory of the quantities of packaging retrieved from commercial waste holders and public collections, categorised by packaging material and by transit and sales packaging;
- a list of contractees, including name, address, economic sector, quantity of packaging which participates in the system and whether and to what extent the contractee participates pursuant to Art 3 (9) of the Packaging Ordinance, categorised by packaging materials,
- an activity report

2.7 Quantities of circulated packaging and recovered packaging waste

54) A Commission Decision was adopted on 22 December 1998 confirming the measures notified by Austria pursuant to Article 6(6) of Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste.

55) The quantity of packaging placed on the market and recovered in Austria in 1997 as reported to the European Commission according to article 12 of the Directive are shown in Table 9. Information on recycling capacities and import and export of packaging waste are given in Table 10. Total packaging consumption in 1997 amounted to 1,269 ktonnes which corresponds to 157.3 kg per inhabitant and year. According to the reported data Austria achieved a recovery rate of 65.6 %, mainly by recycling. The highest recycling rate was achieved for glass packaging with 76.5 %, the lowest for plastic packaging (20 %). Thus, the recovery targets of the Packaging Ordinance were exceeded for all materials by far.

Table 9: Packaging quantities, recycling and recovery in Austria, 1997

Material	Quantity put on the market [kt]	sorted for recycling [kt]	recycling [kt]	energy recovery [kt]	total recovery [kt]	recycling [%]	energy recovery [%]	total recovery [%]
Glass	260	199	199			76.5%		76.5%
Plastic	180	83	36	46	82	20.0%	25.6%	45.6%
Paper/ cardboard	666	500	500		500	75.1%		75.1%
Metals	85	29	29		29	34.1%		34.1%
Total	1,269	835	779	53,5	832,5	61.4%	4.2%	65.6%

Note: data on composites are included in the data of the predominant material

Table 10: Recycling capacities within Austria and packaging waste exports

Material	Recovery capacities in the Member State	Imports and exports of packaging waste for recovery
Glass	▪ sorting, crushing etc. is done by Austrian Glass companies (Vetropack Austria GmbH, Stölze Oberglas AG) ▪ recycling rate 86% in 1999 ▪ current utilisation rate: 60% for clear glass, 70 % for brown glass, 100 % for green glass	▪ ca. 10,000 t of packaging glass waste is exported to Czech Republic for recycling
Plastic	▪ 41 facilities for sorting of plastic packaging ▪ in 1998 20 facilities for recycling in Austria ▪ recovery routes in 1998: about 54 % of the recovered plastic packaging waste is recycled and 46 % are used for energy recovery in waste incineration plants ▪ recycling is done for PET, EPS and a part of the other plastic packaging waste	▪ in 1998 plastic packaging was exported to Germany, Switzerland and the Netherlands for mainly for recycling ▪ 82% of recovered plastic packaging waste was treated in Austria, 18% was exported
Paper / Cardboard	▪ paper packaging is treated in Austria ▪ recycling rate 84.8% in 1999	
Metals Steel Aluminium	▪ recycling of steel and aluminium is carried out in Austria	▪ no information about exports

3 Further development

56) In 1997, ARA has carried out a survey among its licensees on the subject of packaging optimisation and/or reduction (The green dot in Europe - we are in, 1999). The results indicate that in spite of an increase in economic growth, practically no change in the total annual quantity of packaging an the market was observed. This corresponds to the results of a study carried out by Prognos (1995) stating a decoupling of packaging production and economic growth.

57) According to companies participating in the survey, turnover increased by about 3% on average per year. In contrast, the quantity of packaging on the market dropped slightly in the same period. This development illustrates that an increase in turnover and packaging production are no longer as closely linked within the trade sector either. For the majority of companies involved, the main reason for optimising packaging is to reduce costs. Their activities included:

- Elimination of packaging
- Weight and material reduction
- Substitution of packaging materials
- Use of reusable packaging systems

58) The following table shown overleaf provides an overview on the planned medium-term development structured according to the activities collection, sorting and recovery/recycling. With regard to collection only for glass some adjustments are planed concerning a reduction of the number of containers and concurrently an increase of container volume.

59) Glass as packaging for beverage decreased from 76,9% to 46,4% in February 2000, giving way to plastic that held only a market section of 7%, 3 years ago. Today 43% of all mineral water is bottled in PET. The trend increased since glass packaging for mineral water is not compulsory any more and led to replace returnable bottles with one way plastic bottles.

60) Sorting is presently predominantly done by hand-sorting. The planed medium-term development is to investigate semi-automatic sorting, however according to personal communication[1] current experiences are not very encouraging. There are no projections to increase recycling capacities, but due to the enforcement of the landfill ordinance in 2004 the construction of new incineration plants is very likely.

[1] ÖKK

Table 11: Medium-term development according to the activities collection, sorting and recovery/recycling

		Glass	Planed medium-term development [1]	**Light-weight packaging** (plastics, composites)	Planed medium-term development [1]	**Metals**	Planed medium-term development [1]	**Paper**	Planed medium-term development [1]
Collection									
	Number of containers 1999	89,819	<	201,907	=	47,407	=	526,612	=
	predominate container volume [l]	240	<	1,100	=	1,100	=	240 /1100	=
	average container volume [l]	755	>	400	=	600	=	327	=
	Households connected to collection using bags	-	-	830,000	=	134,000	=	-	-
	Average provided collection volume [l/capita, a]	133	=	494	=	111	=	615	=
	of which kerbside system [%]	-	-	43% [5]	=	6% [5]	=	45% [6]	=
	bring system [%]	100%	=	57% [5]	=	94% [5]	=	55% [6]	=
	Number of collection points	-	-	380	=	380	=	750	>
	Development of collection costs in the last years [>, =, <]	<	<	<	<	<	<	<	<
Sorting									
	Number of sorting plants	3	=	41	=	15	=	40	<
	of which: hand sorting	-	-	41	<	10	=	40 [3]	=
	semi-automatically sorting	-	-	-	>	-	-	-	-
	automatically sorting	3 [2]	=	-	-	5	=	-	-
	Development of sorting costs in the last years [>, =, <]	>	=	<	<	<	<	<	<
Recovery/Recycling									
	Number of recovery plants	3	=	27	=	4	=	13	=
	Development of recovery costs in the last years [>, =, <]	=	=	<	<	=	=	4	4

1 [>] increase [=] no change [<] decrease

2 automatic sorting combined with hand-sorting

3 around 10 equipped with drum/sieve

4 short-term variable income (ca. 100 ATS to 1,500 ATS)

5 in % of households

6 in % of collection volume

4 References:

Homepage ARA, www.ara.at

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Contents

1 Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 1
1.2 Responsibilities of economic operators 3
1.3 Targets and Instruments 3
1.4 Further Provisions 5
2 Packaging Waste Management System 5
2.1 Compliance scheme 5
2.2 Interactions between FOST Plus and local authorities 8
2.3 Collection and sorting 10
2.4 Treatment systems and outlet of recycling activity 12
2.5 Financing of the system 12
2.6 Monitoring and control 17
2.7 Quantities of circulated packaging and recovered packaging waste 19
2.8 The recycling and recovery capacities in Belgium 22
3 Future developments 24
4 References 26

List of tables

Table 1: Collection methods for waste and packaging waste 11
Table 2: Green Dot tariffs established by FOST Plus (in BEF/kg and €/kg without VAT) 13
Table 3: FOST Plus expenses according to activity 14
Table 4: Average Costs per tonne of packaging material for 1999 (in €/tonne) 15
Table 5: Prices for secondary material 15
Table 6: Material based fees of VAL-I-PAC 16
Table 7: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1997 20
Table 8: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1998 20
Table 9: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1999 20
Table 10: Industrial packaging waste declared and recovered in 1999 22
Table 11: Packaging consumption and packaging waste recovery in 1997 22
Table 12: Recycling targets in the Waste Management Plan for in the Brussels-Capital Region 24
Table 13: Selective collection target in the Management Plan of the Flemish government 25
Table 14: Estimation of household packaging waste amounts in coming years Walloon Region 25
Table 15: Evolution of production and treatment of household packaging waste: 25
Table 16: Evolution of production and treatment of industrial packaging waste 26
Table 17: Collection targets for specific materials according to the Region plans 26

1 Legislation and Voluntary Agreements

1.1 Objectives, Definitions and Field of Application

1) The packaging Directive is transposed into Belgian Law via the following texts:

- The Ordinary Act of 16 July 1993 aimed at completing the federal structure of the state (on "Eco-taxes")
- The Co-operation Agreement on the prevention and management of packaging waste of 30 May 1996
- The Law related to standards for products aiming at promoting sustainable consumption patterns and the conservation of Environment and Health of 21st of December 1998. This mainly transposes essential requirements of the Packaging Directive into National Law
- The Royal Decree of the 25th of March 1999 defining standards for packaging.

The Co-operation Agreement (CA)

2) Belgium is a federal state and the waste management falls within the competence of the Regions. The Co-operation agreement however indicates that in the particular case of packaging, a co-ordinated policy is necessary to allow the control, at the national scale, of the whole circuit of production and distribution. The three Regions thus approved on May 30, 1996 a common regulation which determines the management of packaging waste. This text came into effect on March 5, 1997, the day of its publication to the Official Journal.

The Eco-taxes Act

3) The federal legislator introduced on 16 July 1993, the Ordinary Law aiming at completing the federal Structure of the State. Under the pressure of the Green parties, this Ordinary Law provides for the application of eco-taxes on products put on the market, because of the ecological nuisances they are supposed to generate". It tends to favour reuse in the first place, and then the recycling of certain types of packaging. Several categories of products are concerned by the eco-taxes. Among those products, there are:

- <u>Packaging for Beverages</u>: the eco-taxe is 15 BEF (0.09 €) per packaging whatever the content, the capacity measure and the packaging material are (cfr. Art.370 and following).
- <u>Packaging for some industrial professional products</u> (inks, glues, solvents, pesticides): the eco-taxe varies between 25 and 500 BEF (0.62 and 12.39 €) according to the volume of the packaging (cfr. Art.379 and following).

4) The person liable for the above mentioned eco-taxes (in theory, the person who is delivering the products to the shopkeepers) must be registered at the Administration of Customs and Excise. When they are marketed, the "eco-taxed" products must wear a distinctive sign and a registration number (cfr. Art 391). Eco-taxes exemptions are provided on certain conditions (reuse of packaging, recycling rates to be achieved, …).

5) <u>Beverage packaging</u> is exempted from tax provided that it meets the following requirements:

- to be reusable, i.e. that it can be refilled at least 7 times;
- to be taken-back via a deposit system of minimum 7 BEF (0.17 €) per packaging of 50 cl or more and of 3.5 BEF (0.09 €)for containers of less than 50 cl;
- to be effectively reused;
- to wear a distinctive mention indicating that the packaging is submitted to a deposit and reusable.

6) Beverage recyclable packaging is also exempted from tax - during a transition period going from 1996 to 2000 - on condition that the following yearly recycling rates are fulfilled (art.373 § 4):

	1996	1997	1998	1999	2000
Glass	55 %	62 %	67 %	73 %	80 %
Metals	40 %	47.5 %	58 %	64 %	80 %
Plastics	20 %	30 %	43 %	56 %	70 %
Beverages packaging	20 %	30 %	43 %	56 %	70 %

7) In accordance with the Community Directive, the Co-operation Agreement applies to all transport, grouped or sales packaging waste and to packaging waste from households and related sources as well as to packaging waste of industrial origin. It aims notably to:

- prevent or reduce the production or the harmfulness of packaging waste;
- guarantee that the share of reusable packaging for the same goods that have been brought on the market does not decrease in comparison with the previous year and guarantee that the total volume of one-way packaging for the same goods that have been brought on the market, is reduced in comparison with the previous year,
- promote the reuse.

8) The packaging definition is the same as the European definition. It however proved to be necessary to clarify the definition of packaging in order to cover the field realities. Thus in Belgium, while waiting of a consensus at the European level, is regarded as packaging any element which consists of materials of any nature, with the following characteristics (FOST Plus Agreement, art. 1):

- it constitutes a support or an element of the support of the products put on sale;
- its principal function is to contain, protect, allow handling and the routing or to ensure the presentation of the aforesaid products;
- it does not form integral part of the product;
- it generally contains consumable, i.e. a product of which the use involves the progressive disappearance of this one or of its active ingredient (e.g.: the tea bag);
- it can also contain a non consumable product. In this case, either packing is not necessary to the good conservation of the product between the successive uses, or it has characteristics such as its life-span will be, in any cases, lower than the one of its contents (ex. the plastic film around the CD box).

Definitions of reuse, recycling and recovery

9) The definitions of reuse, recycling, organic recycling, recovery and energy recovery given into the co-operation agreement are the same as the ones of the 94/62/CE Directive. These definitions have not been clarified already by the Interregional Packaging Commission.

1.2 Responsibilities of economic operators

10) The party responsible for packaging waste management are called "packaging responsible" in the Belgian Regulation[2]. This regulation distinguishes three categories of packaging responsible (CA, art. 2):

- Any party who packages or has had goods packaged in Belgium with a view to or as a result of marketing them,
- Where products brought on to the Belgian market have not been packaged in Belgium, the party importing the packaged goods who does not consume them,
- The consumer who imports directly in Belgium packed industrial products which are not packed in Belgium.

11) Regulation imposes three main obligations to the packaging responsible which will be further described below:

- The take-back obligation (which is the obligation for companies to take-back their packaging waste and to achieve the recycling and recovery objectives defined – see 1.1.1.3.,)
- The information obligation
- The obligation of introducing a prevention plan

1.3 Targets and Instruments

Prevention

<u>The Co-operation Agreement</u>

12) The person who packages or has had goods packaged in Belgium with a view to or as a result of marketing them in the Belgian market with at least 10 tonnes of packaging/year, must also submit every three years a general prevention plan to the Interregional Packaging Commission (Co-operation Agreement art. 4). This plan must describe the foreseen measures and the objectives related to:

- The increase of recyclable packaging waste in comparison with non recyclable packaging;
- The increase of re-usable packaging in comparison with one-way packaging;
- The improvement of the packaging composition in order to make it re-usable or recyclable;
- The improvement of the packaging composition in order to minimise the environmental impacts of packaging waste management;
- The decrease of one-way packaging quantities.

13) In each sector of economic activity, the packers may entrust, by agreements, their prevention obligations to a legal body (that is mainly Professional Federations). The Interregional Packaging Commission assesses and approves or refuses general prevention plans. In case the Interregional Packaging Commission (IVCIE) refuses the plan, this should be presented again in the time limits fixed by the IVCIE with the modifications asked by the Commission.

14) <u>N.B</u>.: Since the Co-operation agreement provides that accredited organisms must only undertakes actions related to its scope of activities (i.e. recycling and recovery of packaging waste), the accreditation act of FOST Plus forbids this organism either to finance any action

[2] There can only exist one packaging responsible by packaging.

concerning prevention or to undertake any communication campaign in this field except for promoting easy to recycle packaging or the use of recycled material (accreditation act, art. 18). FOST cannot neither intervene in the development of prevention plans. The same provision applies for VAL-I-PAC.

The federal dispositions

15) The Law of 21st of December 1998 related to standards for products (…) transposes into National Law the essential requirements of the Directive. It also provides a standstill disposition for the weight of disposable packaging put on the market. This means that any person putting packaged products on the Belgian market wrapped in non-reusable packaging, must pay attention that, for the same material, the ratio between the weight of the packaging and the weight of the product put on the market in this packaging does not increase compared to the same existing report to the date of entrance of the law (art. 11 § 2). This means that for each packaging material, the following ratio cannot increase.

$$\frac{\text{Total weight of one-way packaging}}{\text{Total weight of the goods marketed}}$$

16) Some dispensations to this obligation are foreseen when the packaging incorporate recycled material, for hygiene, security and conservation reasons or for other specific technical reasons.

Reuse

17) No mandatory targets for reuse are fixed in the Interregional co-operation agreement. Nevertheless, this text sets among its objectives to guarantee that the share of reusable packaging for the same goods that have been brought on the market does not decrease in comparison with previous years and guarantee that the total volume of one-way packaging for the same goods that have been brought on the market is reduced in comparison with the previous years.

Recovery

The take-back obligation:

18) The Co-operation agreement imposes to the packaging responsible to reach minimum objectives of recovery and recycling for packaging waste put on the Belgian market (art 3):

	1996	1997	1998	1999
Recycling	35%	40%	45%	50%
Total recovery (recycling + energy recovery)	50%	60%	70%	80%

19) Besides the general take-back obligation, there is a take-back obligation by material. It aims to reach (before 1 January 1998) a minimum recycling rate of 15% for each type of packaging material.[3] These percentages are calculated in relation with the total weight of marketed one-way packaging by the packaging responsible (for the packer and the importer),

[3] The two accreditation acts of FOST Plus define following material categories: glass, plastic, paper and cardboard, metals, complex materials. For VAL-I-PAC, the categories defined in its accreditation act of March 31st, 1999 are paper-cardboard, plastics, metals and wood.

or in relation with the total weight of consumed one-way packaging (for the consumer of industrial products). The IVCIE is to define the calculation modalities (see further).

20) In view to maintain a equilibrated coverage of the accredited bodies between the regions, minimum recycling rates must theoretically be reached in each Region for household packaging waste as well as for industrial packaging waste. In practice, it is not possible to assess the quantities of products sold in each area of the country.

1.4 Further Provisions

The information obligation:

21) It is the obligation for the packaging responsible to communicate, each year, to the Interregional Packaging Commission all the information related to his take-back obligation and notably:

- The total quantity of commercialised primary, secondary and tertiary packaging distinguishing one-way from re-usable packaging;
- The composition of each type of packaging, mentioning used materials, notably the presence of heavy metals and recycled materials;
- By packaging material, the total quantity of packaging waste which is collected, recycled, recovered, incinerated with or without energy recovery and landfilled;
- By packaging material, the total quantity of commercialised products in one-way packaging;
- By packaging material, the total quantity of packaging which is considered as hazardous because of their contamination by the products they contain.

22) If the packaging responsible joins an accredited body, he will endorse the obligation of information towards the Interregional Packaging Commission.

2 Packaging Waste Management System

2.1 Compliance scheme

23) The packaging responsible can either comply by himself with his take-back obligation (directly or via another chosen person), or can call on an accredited body[4]. The accredited body can globally reach its recycling and recovery objectives for all its associates (Co-operation agreement, art. 8).

24) The parties responsible for packaging who fulfil their take-back obligation by themselves bear the real and total cost of these operations. The parties responsible for packaging who entrust their obligations to an accredited body contribute to the financing of their obligation according to the mechanisms described below (see 2.5. Financing modalities).

The statutes of accredited bodies

25) According to the co-operation agreement, the accredited bodies must be non-profit-making associations. The accredited body can only have one statutory object which is the

[4] In 1999, around 1.800 companies declared to the Interregional Packaging Commission complying by themselves (directly or indirectly) to the take-back obligation set up by the Co-operation agreement. However, a large number of these companies controlled by the IVCIE was not able to display correctly the requested pieces of evidence for the effective recycling of their packaging waste. The IVCIE intends, during the coming years, to step up in the control of those companies.

take-back obligation for its adherents. It can only have among its shareholders persons who are in full possession of their civil and political rights and who have never been condemned for infringement to the environment regulation of the regions or of one of the European Union Member States (Co-operation agreement, art. 9). The organisations which could be put in charge by the packaging responsible of their take-back obligation must be authorised by the Interregional Packaging Commission. The accreditation has a renewable maximum duration of 5 years.

26) The organisations has to reach globally the rates of recycling and of total recovery for all the packaging responsible who contract with it. The accredited body must collect, in a non-discriminatory way, from its contracting parties, the indispensable membership fees to cover real and complete cost for all the obligations. It is obliged to fulfil the conditions of the accreditation and submit annually to the Interregional Packaging Commission balance sheets and income and expenditure statements for the previous year and its budget for the following year. If the take-back obligation concerns household packaging waste, the accredited body is performing a mission of public service and must notably:

- cover in a homogeneous way the whole of the Belgian territory
- accept to enter into a contract with any party responsible for packaging who so requests (CA, art. 13)
- conclude a contract with local authorities in view of the full payment of packaging waste collection, sorting and recovery

27) The Interregional Packaging Commission may proceed to suspension or temporary or final withdrawal of the accreditation if:

- the recycling and recovery percentages the accredited body is obliged to meet have not been achieved;
- the accredited body has not fulfilled its information obligation;
- the accredited body no longer satisfies the conditions of accreditation;
- infringements of the environmental regulations are discovered.

28) At this stage, two organisations have been accredited for packaging waste management: FOST Plus for household packaging and VAL-I-PAC for non household packaging waste.

A specific situation for Belgium: the distinction between municipal packaging and industrial packaging.

29) Considering that waste of municipal origin[5] and those of industrial origin covers appreciably different realities, the co-operation agreement imposes different obligations for the producers of these two categories of packaging waste. This has lead to the creation of two different approved organisations for household and for industrial packaging waste, respectively FOST Plus and VAL-I-PAC.

30) The licensing acts of these two organisations give a more detailed list of characteristics distinguishing municipal waste from industrial waste. It was indeed necessary for the producer of packed products to know exactly with which body he had to contract when putting his packed good on the market. Further the two organisations have defined an exhaustive list of industrial and household packaging in order to further define their respective scope of activities. This list was approved by the Interregional Packaging Commission (IVCIE).

[5] According to the CA, the Municipal packaging waste is packaging waste coming from the normal activity of the households as well as packaging waste with comparable characteristics which are found elsewhere. Packaging waste of industrial origin is all packaging waste which is not regarded as municipal packaging waste.

31) FOST Plus collects household packaging waste and VAL-I-PAC concentrates on commercial and industrial packaging waste but it might be that packaging considered as meant for households will be used by industrial actors and will follow the collection and recovery circuit for these waste. The contrary is also true and the limit between the both packaging (waste) streams (for industrial and household use) was fixed after negotiations between both organisations in order to equilibrate the transfers in both directions.

32) These negotiations have led to the following decisions:

- All tertiary packaging are industrial and therefore to declare to VAL-I-PAC.
- All secondary packaging are industrial, except grouped packaging of a maximum volume of 0.5 m³, conceived in order to constitute an unit of sale (multi-pack).
- Primary packaging may be either domestic, either industrial. If the product is conceived for the exclusive use of professionals, industries, schools, hospitals,... the primary packaging is also considered as industrial. If not, it is necessary to consult the list of domestic products which has been established by the sectoral federations, FOST Plus and VAL-I-PAC and was approved by the Interregional Packaging Commission.

33) Both organisations have decided to work together and to create a common registration program for their adherents (Packbase). This common system allows companies, to declare all their packaging in one single system which automatically calculates respective contributions to both organisations. This agreement between FOST Plus and Val-I-PAC may prevent double registrations and make it easier to distinguish between industrial and household packaging and stick as much as possible to reality.

FOST Plus – The situation for household packaging waste

34) FOST Plus was created on 28/03/94 as a co-operative and became a non profit organisation on 01/01/96. FOST Plus received its accreditation for the first time on 18 December 1997. At the end of 1998, FOST Plus got a second accreditation, which will last until the end of 2003.

35) FOST Plus covers the take-back obligation and the obligation of information for household and assimilated packaging responsible. The founder members of the non-profit-making association FOST Plus (the shareholders) are recruited from companies, federations or associations whose principal activity is either:

- the production or the importation of packaged products
- the production or the importation of packaging or packaging materials
- the distribution.

36) Nowadays, FOST Plus has 56 associated members. The association is managed by a Board of 32 Directors, associate members or not, nominated by the associate members gathered in sectoral groups.

37) By August 1999, 5,400 companies had joined FOST Plus . They represented a total of 650,000 tonnes of packaging per year, i.e. more than 85% of the total estimated packaging tonnage brought to the Belgian market every year. Their membership and their contribution to FOST Plus gives them the right to place the green dot logo on their packaging.

The relationship between FOST Plus and the adherent companies.

38) By the adhesion contract with FOST Plus, the adherent companies[6] – the packaging responsible – entrust, completely or partially, their take-back obligation to FOST Plus in return for an annual fee based on the types of packaging materials used and on the amount of packaging put on the market. Among the contractual obligations of the parties, there are particularly:

- For FOST Plus, the obligation to respect the obligations of the co-operation agreement, the confidentiality regarding all the information communicated by the packaging responsible without prejudice to the information obligations towards public authorities.
- For the packaging responsible, the supplying to FOST Plus of all the demanded information regarding nature, composition, weight and quantity of packaging put on the market and payment of fixed fees.

39) FOST Plus uses the "Green Dot" as the indication that the "packaging responsible" financially support the integrated system of selective collection and recycling of its packaging waste (and that he has paid his membership fee to FOST Plus). However, this is not mandatory: the membership to FOST Plus only gives the right to print the 'Green Dot" on the packaging, it is not an obligation[7].

The legal take-back obligation for all retailers from March 2000

The Co-operation Agreement provides for that, all retailers – i.e. shops with an overall sales surface of 200 m2 or less, must also satisfy to the take back obligation for packaging they put on the market as of 05 March 2000. This is mainly service packaging (such as carrier bags, chip bags and bread bags). Assessments estimates the number of these retailers to over 100,000. In order to facilitate their task, a specific procedure for retailers has been developed which was approved by the Interregional Packaging Commission. This procedures offers service packaging providers the opportunity to join FOST Plus directly or through their packaging suppliers. By 15 April 2000, over 130 suppliers had already joined FOST Plus (from FOST Plus annual report 1999).

2.2 Interactions between FOST Plus and local authorities

40) According to the Co-operation Agreement, if the take-back obligation concerns household packaging waste, the accredited body is performing a mission of public service and should conclude an agreement with any public legal entity with territorial responsibility for household waste products. As far as collection modalities are concerned, the co-operation agreement imposes to the accredited bodies concerned by the take-back of household packaging waste to comply with the modalities of collection determined by public legal entities with territorial responsibility for household waste collection (art. 13). The agreement between FOST Plus and the local authorities institutes the collaboration between parties for selective collection and household packaging waste on the concerned territory.

[6] Besides, Fost Plus also allows foreign companies to be mandated by Belgian companies responsible for packaging . Their tonnage however, only represented 5.7% of the total FOST Plus tonnage and their contribution did not exceed 3.4% of the Green Dot revenues.

[7] Let's mention that the „Green Dot" logo was not approved by the IVCIE which considered that the signification of this logo was too restricted and even „confusing" because it could not be used by the citizens to help them to sort their packaging waste.

41) FOST Plus must:

- Pay to the municipality or association of municipalities a total amount equal to real and complete cost of selective collection and sorting of glass, paper and packaging waste of PMD (Bottles and jars in Plastic, Metals and Beverage Cartons) fraction selection. When the operations are realised by private operators, FOST Plus commits itself to pay the invoices to these operators once they have been approved by the public legal entity.
- Inform and heighten municipalities consumers awareness, in co-operation with the public legal entity, in order to make them participate as much as possible in the correct selection of the different fraction of packaging waste.
- To take all possible measures to guarantee the disposal of collected and/or sorted household packaging waste.

42) The municipality or the association of municipalities must:

- Ensure, directly or indirectly, packaging waste selective collection and sorting.
- Ask and/or monthly produce the minutes and reports regarding the obtained results and communicate them to FOST Plus ;
- Jointly and with consultation with FOST Plus, inform and make households aware to make them participate as good as they can in their packaging waste collection;
- Insist near the affiliated municipalities to establish and/or modify all the necessary and useful police regulations in order to permit the execution of contract obligations.

43) FOST Plus has, in the general flow of packaging, an essential interface role to play between the different actors of packaging life cycle (industries, public legal entities, consumers, recycling and recovery operators). However, it does not have any infrastructure, nor trucks. It does not employ any workman. The role of FOST Plus materialises by a series of contracts where it is organising the good execution of the system.

Control of the communication campaigns

44) National communication campaigns must be submitted to the Interregional Packaging Commission previous approbation. For the communication campaigns aimed at local populations concerned with selective collections, the contracts which bind FOST Plus to the municipalities and association of municipalities provide that the two parties commit themselves to consult each other to define jointly a communication procedure aiming to inform and make the population of the municipalities aware and to incite them to sort the various fractions of household packaging waste.

Recourse to the Council of State

45) Two Flemish intermunicipal authorities, IGEMO and Interleuven, sought cancellation of the Interregional Packaging Commission's decision on FOST Plus accreditation dated 23 December 1998 from the Council of State. The provisions under attack refer to the co-responsibility of FOST Plus and the inter-municipal authorities in terms of financing PMD residue[8], modification of the packaging/non packaging distribution key for the paper and cardboard (which passed from 50 to 25% of the total paper and cardboard waste stream collected) and the calculation procedure for monitoring expenses which FOST Plus must pay for the inter-municipal authorities. IGEMO accompanied this application for cancellation with a

[8] The accreditation act also introduces a co-responsibility principle for the collection of light packaging waste (PMD fraction) which aims at involving both FOST Plus and Municipalities in the improving of the quality of selectively collected fractions. This means that FOST Plus, since 1st January 2000, must not reimburse municipalities for the collection, sorting and recovery costs of the residues of the PMD fraction when this residues exceeds 20% of the total weight of PMD collected. This measure, has led to the settlement of a task force gathering all responsible actors involved in collection of packaging waste.

suspension request. This latter petition was rejected by the Council of State on 28 June 1999 but others are still pending.

VAL-I-PAC – The situation for industrial packaging waste

46) The obligations for companies generating industrial packaging took effect on 5 March 1998 (art. 36 of the CA). These obligations are the same as those for household packaging waste. Companies may transfer these obligations to an IVCIE-recognised institution or set up their own system. On 31 March 1999, VAL-I-PAC was recognised by the Interregional Packaging Commission as competent organisation for non-household waste (that is commercial and industrial packaging waste). This accreditation is valid till the end of 2001.

47) VAL-I-PAC was created on 7 November 1997 on the initiative of about thirty Belgian companies and about twenty Professional Federations. Packaging responsible have the majority of votes in the decision body of VAL-I-PAC. VAL-I-PAC started its activities in July 1998. It addresses all the industrial activity sectors and all the packaging waste streams/materials. It relies on already existing collection, sorting and recovery structures and intends to gather, for its members, the pieces of evidence for recycling and recovery of industrial packaging waste. At the end of 1999, VAL-I-PAC reported about 5,000 companies adhering to its system. This represented (on an annual basis) a total amount of 445 ktonnes of packaging put on the market which represents, according to VAL-I-PAC assessments, approximately 60% of the total amount of industrial packaging put on the market .

2.3 Collection and sorting

FOST Plus – The situation for household packaging waste

48) According to the Co-operation Agreement, when a accredited body intervenes in the collection of household packaging waste, it is performing a mission of public service and must conclude an agreement with any competent local authorities (that is municipalities). Collection modalities must be determined by local authorities (art. 13). These schemes must correspond to collection schemes framework defined in the Regional Waste Management Plans. However, FOST Plus has defined collection scenarios it considers optimum (see table below). Contracts with municipalities adopting these scenarios are called “FOST Plus” projects. Other collection scenarios are called “existing systems”. Financing modalities for collection varies according to the type of scenarios concerned (see also section 2.5)

49) Besides, as far as the choice of collected packaging waste is concerned, FOST Plus, being bound by a global obligation of result, has defined, among the packaging waste, materials which offer the most economical and ecological conditions for collection, selection and recycling rending it possible to reach mandatory targets. It has, thus, selected packaging waste whose selective collection give enough secondary materials and correspond to the recycling industry requirements. The following table details, by great group of materials, the packaging which are selectively collected to be recycled as well as the collecting methods advocated by FOST Plus:

Table 1: Collection methods for waste and packaging waste

Materials	Selectively collected	Non selectively collected	FOST Plus collection scenario
Glass	Empty bottles and glass jars without lid or cork	Stoneware, earthenware, porcelain bottles or pitchers, panes, mirrors, flowerpots, lamps and bulbs, medicine bottles	Glass containers 2 separated colours (1 site/1000 inhabitants) and containers area
Paper-cardboard	Non soiled paper-cardboard, paper bags, cardboard boxes (along with magazines, newspapers, advertising folders, books, directories, computer paper, typing paper,..)	Dirty or greasy paper, aluminium paper, cellophane paper, wallpaper, paper with plastic film	Monthly door-to-door collection of Packaging and non packaging paper and containers area
Plastics (PVC, PET, PEHD)	Empty plastic bottles and flasks used for kitchen (cleansing product and food), washing and bathroom.	Butter pots, yoghurt pots, sachets, plastic sheets or films, chips sachets,	Door-to-door collection 2 times a month and containers area
(Ferrous and non-ferrous) metals	Empty metallic packaging (cans, tins, aluminium dishes, boxes and flasks, metal lids and stoppers to be screwed, capsules and lids of jars and bottles.	Aluminium foils, synthetic resins, aerosols, gas bottles..	
Beverage Cartons	Beverage cartons for milk, fruit juices…		

50) Zones where the scenario defined by FOST Plus is proposed to inhabitants are called FOST Plus projects. At the end of 1999, some 7.2 million inhabitants participating in the “FOST Plus projects”. Furthermore, 2.6 million inhabitants contributed to the FOST Plus results through contracts drawn up within the framework of existing systems. On average, consumer participation rates exceed 90%, 12 months after the launch of an intensified sorting and collection project. This degree of participation for the three fractions continues to grow over time (FOST Plus, annual report 1999).

VAL-I-PAC – The situation for industrial packaging waste

51) VAL-I-PAC relies on already existing collection, sorting and recovery structures and intends to gather, for its members, the pieces of evidence for recycling and recovery of industrial packaging waste. At this end, VAL-I-PAC concludes contracts with operators in which the latter commit themselves to provide VAL-I-PAC on a monthly basis the information on how much tonnes they brought into recycling or recovery. Measures are taken to prevent double counting in case of transfers between operators. The operators can be waste collectors, sorting centres, recuperators, etc. as long as they collected the packaging waste from the final holders. VAL-I-PAC participates to the administrative expenses of the co-contracting party on the basis of a yearly fixed sum and of a share proportional to recycled quantities. At the end of 1999, VAL-I-PAC had already concluded contracts with more than 130 operators active in Belgium.

2.4 Treatment systems and outlet of recycling activity

Procedure used for selling secondary materials

52) The FOST Plus accreditation imposes that the markets must be attributed by FOST Plus according to the principles of the procedure of general or restrictive call for tender. The draft terms of references are elaborated by a mixed committee, including FOST Plus representatives, local authorities for household waste collection and the Interregional Packaging Commission which acts as an observer.

53) FOST Plus must ensure an adequate advertising to the call for tender, notably by the dissemination of essential characteristics of the market. This is done at an international level. The market must be attributed to the tenderer that provides for the most interesting offer. On FOST Plus initiative, independent " Networks " taking each one a different material in charge (paper-cardboard, plastics, metals, glass, PET, beverage cartons) have been formed. The FOST Plus accreditation, limits these "networks" tasks to sole administrative ones. The role of the "networks" is thus only a technical support for the specification of terms of references for the attribution of recycling markets.

Choice of the collection and sorting operator

54) In principle, the party responsible for the attribution of the market chooses the operator. For collection and sorting, it is thus inevitably the municipalities and the associations of municipalities. In practice, an association of municipalities which wants to develop a partnership with FOST Plus in the framework of a so called "FOST Plus" project invites FOST Plus to be present at all the steps of the tender procedure in order to come to an agreement on the financing of selective collection and selection operations.

2.5 Financing of the system

FOST Plus – The situation for household packaging waste

55) FOST Plus uses the revenue of the fee collected from the parties responsible for packaging to finance mainly the selective collection and the sorting which it organises via public legal entities with territorial responsibility for household waste collection. These carry out themselves the operations or subcontract them, partially or entirely, to private operators. The raw materials collected and possibly sorted in this way (case of the PMD), are put at the disposal of the purchasers. When the value of these materials is negative, FOST Plus pays this negative value. On the opposite, the positive value returns to FOST Plus. Besides, FOST Plus also contributes in the financing of the public awareness campaigns for selective collection systems. The Green Dot tariffs established by FOST Plus for 1997, 1998, 1999 and 2000 are the following ones:

Table 2: Green Dot tariffs established by FOST Plus[9] (in BEF/kg and €/kg without VAT)

Material	1997-1998	1999	2000
Glass (bottles and jars)	0.31 BEF 0.007 €	0.69 0.017	0.78 0.0193
Paper-cardboard (> 85%)	0.33 BEF 0.008 €	1.26 BEF 0.031 €	1.52 BEF 0.0377 €
Steel	1.34 BEF 0.033 €	1.67 BEF 0.041 €	2.34 BEF 0.0580 €
Aluminium (> 50 microns)	2.96 BEF 0.073 €	5.39 BEF 0.134 €	6.45 BEF 0.1599 €
PVC bottles	8.27 BEF 0.205 €	11.55 BEF 0.286 €	-
PET bottles	8.21 BEF 0.203 €	11.55 BEF 0.286 €	14.04 BEF 0.3480 €
HDPE Bottles	8.27 BEF 0.205 €	11.55 BEF 0.286 €	14.04 BEF 0.3480 €
Beverage cartons	5.70 BEF 0.141 €	8.50 BEF 0.210 €	9.18 BEF 0.2276 €
Others recoverable	13.63 BEF 0.338 €	13.14 BEF 0.326 €	16.06 BEF 0.3981 €
Others, non recoverable	13.63 BEF 0.338 €	14.46 BEF 0.358 €	17.67 BEF 0.4380 €

56) Green Dot tariffs have been stable during 4 years since their creation on 1/1/1995. After, in 1999, they increased by 28%. This increase is the result of the accreditation conditions of FOST Plus which impose notably to FOST Plus to pay the costs which are not covered already and limit its scope of activities (commercial packaging not taken into account) and, therefore, the amount of packaging for which a membership fee is due. It is also the result of the obligation for FOST Plus to launch new projects of selective collection which are likely to enable it to fulfil, before 2002, its legal obligation of covering the entire national territory.

57) To calculate its tariffs, FOST Plus applies a common differentiated tariff by material but based twice on solidarity. This means that , a double solidarity system has been foreseen:

- **at recycling rates level:** the recycling rate of certain materials is higher than the law demands, which means that the global recycling objective fixed by the co-operation agreement can be reached for all packaging materials, whether they be recycled or not;
- **at a financial level:** materials which are hardly, if ever recycled, pay more than their real costs in solidarity, in order to finance and reduce the real costs of materials with higher recycling rates. As a consequence, materials or packaging which are not collected pay the highest tariff.

58) Indeed, since each material incurs extremely varied costs, recycling results and have different selling prices, the strict implication of the real costs would however imply a zero tariff for materials or packaging not covered by collections.

59) At the end of 1999, 5,441 companies had joined FOST Plus . They represented a total of 691,000 tonnes of packaging per year i.e. more than 90% of the total estimated packaging tonnage brought to the Belgian market every year. The Green Dot revenues represented in 1999, 2,618 million Belgian francs (64.90 million €). Besides, revenue for the purchase of

[9] A minimum annual contribution of 1.500 Bef (37.18 €) is set by FOST Plus.

positive value-materials amounted to 101 million Belgian francs (2.5 million €). The main expenses posts for FOST Plus in 1999, ranged as follows:

Table 3: FOST Plus expenses according to activity

Activity	Expenses (x 1,000 BEF)	Expenses (x 1,000 €)
Collection and sorting	1,888	46.80
Support to existing projects	233	5.78
Costs linked to start-up	40	0.99
Energy Recovery	100	2.48
Negative material value	51	1.26
Communication	104	2.58

Financing modalities for selective collection and sorting

60) The accreditation act of FOST Plus, obliges the organisation to cover the whole national territory before the end of 2001. FOST Plus has chosen a progressive approach which will enable it by the year 2002 to cover all the Belgian territory by "FOST Plus "projects . By the FOST Plus projects, FOST Plus commit itself to reimburse the real and total cost of selective collections and sorting[10]. Besides this real and total cost, FOST Plus must reimburse municipalities for follow-up costs which are fixed in the accreditation act to 10% of the total collection costs. Besides, FOST Plus must reimburse 1.573 FB (38.99 €) / ton of household waste which is recovered in incineration plants.

61) In the framework of the so called "FOST Plus" projects, FOST Plus negotiates the contracts with each municipality or association of municipalities. The methods of refunding are defined individually[11]. They can be calculated by collected ton, by collection point or on the basis of mixed formula taking also into account fixed costs, distances, etc....If a public legal entity with territorial responsibility for waste collection decides to set up more constraining scenarios, FOST Plus reimburse a lump sum by ton equal to collection medium cost.

62) In the meantime, FOST Plus contributes to the packaging waste management in the municipalities where it has not yet been able to organise a FOST Plus project, by a lump sum intervention (calculated by ton of recycled materials) in the costs of existing systems of selective collection and recycling. In these systems, FOST Plus reimburse a lump sum by material by ton of 500 BEF (12.39 €) for glass and paper/cardboard and of 10,000 BEF (247.89 €) for PMD (14.250 BEF - 353.24 €/t under some conditions). The collection and transport costs of metals collected at the entry or at the exit of incinerators are reimbursed to the Regions for the lump sum of 1.800 BEF/t (44.62 €).

63) The attribution of recycling markets is done by FOST Plus which receives the positive value of material resale or finances the costs when this resale value is negative. In its annual report 1999, FOST Plus assesses collection, sorting and recycling costs for various materials as follows:

[10] The accreditation act also introduces a co-responsibility principle for the collection of light packaging waste (PMD fraction) which aims at involving both FOST Plus and Municipalities in the improving of the quality of selectively collected fractions. This means that FOST Plus, since 1st January 2000, must not reimburse municipalities for the collection, sorting and recovery costs of the residues of the PMD fraction when this residues exceeds 20% of the total weight of PMD collected. This measure, has led to the settlement of a task force gathering all responsible actors involved in collection of packaging waste.

[11] The IVCIE and FOST Plus are currently working on calculation methods for an harmonised refunding system.

Table 4: Average Costs per tonne of packaging material for 1999 (in €/tonne)

Material	Collection and transport	Sorting	Purchase price by the recycler (Average take-back value for 1999)
Glass	51.26	-	10.41
Paper and cardboard	43.53	-	- 2.40
PET bottles	177.19	194.94	-19.86
HDPE bottles and flasks	177.19	194.94	14.60
Steel	177.19	194.94	3.54
Aluminium	177.19	194.94	220.38
Drinks cartons	177.19	194.94	-31.63

The specific case of paper and cardboard

64) In the particular case of paper-cardboard, because packaging waste are selectively collected with other waste of the same material, FOST Plus posts and reimburses a lump sum of 25 % of mixed selectively collected lots of paper/cardboard. The recycling percentage of packaging paper/cardboard can never exceed 100%[12].

Secondary material sale prices.

65) The table below gives the take-back value at the end of 1999 as well as the average take-back value for 1999 for various secondary materials (Source: FOST Plus, annual report 1999):

Table 5: Prices for secondary material

Material	Approximate purchase price by the recycler at the end of 1999[2] (in € per tonne)	Average purchase price by the recycler for 1999 (in € per tonne)	Tendency
Glass	10.6 €	10.41	Increase
Paper-cardboard	12 €	- 2.40	Increase
PET	17 €	-19.86	Increase
HDPE	112 €	14.60	Increase
Steel	5 €	3.54	Stable
Aluminium	300 €	220.38	-
Drinks Cartons	- 30 €	-31.63	Stable

Note: PVC bottles are gradually disappearing from the Belgian market and is therefore becoming quite marginal in Belgium, with the result that FOST Plus intends not to look for outlets for PVC bottles in 2000 (FOST Plus, annual report 1999).

VAL-I-PAC – The situation for commercial and industrial packaging waste

66) The packaging responsible may comply by himself with his take-back obligation (directly or via another chosen person). He must then finance the collection, sorting and recycling the waste of the packaging he put on the market and provide the requested pieces of evidence to the Interregional Packaging Commission. In 1999, around 1.800 companies declared to the

[12] Since paper and cardboard packaging are collected along with other paper waste as magazines, newspapers, the share of the packaging in the paper and cardboard fraction collected is defined arbitrarily. In 1998 and before, the fixed rate of packaging content was set to 50% of the total paper-cardboard fraction collected. In the FOST Plus accreditation act of the end of 1998, the proportion of packaging in the paper-cardboard selectively collected was reduced to 25%. Besides, due to the still lacking information on the exact proportion of packaging waste in the paper-cardboard selectively collected from households, the accrediation act adds that the recycling rate for paper and cardboard can never exceed 100%.

Interregional Packaging Commission complying by themselves (directly or indirectly) to the take-back obligation set up by the Co-operation agreement. However, a large number of these companies controlled by the IVCIE during 1999 was not able to display correctly the requested pieces of evidence for the effective recycling of their packaging waste. The IVCIE intends, during the coming years, to step up in the control of those companies (IVCIE, annual report 1999).

67) In their contract with VAL-I-PAC, the companies adhering to VAL-I-PAC entrust completely (except in very few case, no partial adhesion is allowed by VAL-I-PAC) their take-back and information obligation to VAL-I-PAC. For this service, they have to pay an annual fee based on the types of packaging materials used and on the amount of packaging put on the market.

Table 6: Material based fees of VAL-I-PAC

	Fee (in BEF and €/ tonne of packaging material)		
Packaging material	1998	1999	2000
Paper, cardboard, metals, wood, glass, textiles, other recyclable materials	420 10.4€	490 12.1€	580 14.4€
Plastics (recyclable or not)	1.420 35.2€	1.490 36.9€	1.580 39.2€
Non recyclable materials	1.420 35.2€	1.490 36.9€	1.580 39.2€
Re-usable packaging	0	0	0

68) The members declarations must be certified by a registered auditor if the contribution is higher than 100,000 BEF (2478.63 €). Other controls are also foreseen for smaller contributors. VAL-I-PAC can also make controls in direct (see further). The packaging responsible commits himself to supply to VAL-I-PAC of all the requested information regarding nature, composition and weight of packaging put on the market.

Financing modalities for selective collection and sorting

69) VAL-I-PAC provides for direct refund of a fixed sum by container to the final holder. These are encouraged to sort their packaging waste by a contribution to the annual renting costs of containers. These annual contributions range between 1,500 and 4,000 BEF (37.18 and 99.16 €) /year according to the size and the type of containers for selective collection of materials. For the year 2000, VAL-I-PAC has provided for a total budget of 120 M° BEF (3M° €) for the refunding of the containers.

70) Another contribution aims at increasing recycling of plastic packaging waste. This contribution of 2,000 BEF (49.58 €) /ton covers all recyclable plastic packaging generated in Belgium (many Belgian collecting companies have activities abroad) and delivered in homogenous fractions. For the year 2000, VAL-I-PAC has provided a total budget of 66 M° BEF (1.64 M° €) for the recycling of industrial plastic packaging waste.

71) These contributions are reimbursed each year to the companies which unpack packed products and thus must dispose of the packaging waste (they are called unpackers of final owner of the packaging waste) on basis of certificates delivered by the collecting, sorting or recycling operators. The system set up by VAL-I-PAC leans on a totally different approach

than the “FOST Plus system”. VAL-I-PAC, in contrast to FOST Plus, never intervenes in the attribution of recycling markets and does not receive the positive value of material resale and or financially intervene when this resale value is negative.

Comment

72) The system put in place by VAL-I-PAC does not fit completely with the principle defined in the Interregional Co-operation agreement which aims at “the full transfer of the costs of the management of packaging waste to those responsible for packaging” (art. 3 § 2). This was criticised notably by the Professional Federation of Construction companies which sought cancellation of the Interregional Packaging Commission’s decision on VAL-I-PAC accreditation from the Council of State. This procedure is still pending. Among other, the main reasons for the settlement of such a system advocated by VAL-I-PAC are:

- the recycling rate for industrial packaging waste already attained 64% before VAL-I-PAC started its activities
- most of the final owners of industrial packaging waste are also “packaging responsibles” and they have interest in keeping the packaging waste management cost as low as possible,
- VAL-I-PAC intends to maintain the costs as low as possible by keeping the administrative burden as light as possible and by relying on existing systems and companies for the collection, sorting and recycling of waste.

73) The system set up for the operators leans thus on several principles:

- not to disturb the structures currently set up by the actors of waste collection and recovery.
- to let free competition run between the different actors,
- to encourage and boost the initiatives already taken for recycling/recovery of industrial packaging waste.

74) The Interregional Packaging Commission accepted this construction scheme but accredited VAL-I-PAC only temporarily until the end of 2001. A “Following Committee” was set up. It is composed of representatives of VAL-I-PAC and of the Interregional Packaging Commission. It aims notably at assessing the development of the VAL-I-PAC system and at assessing the management cost of the industrial packaging waste with the view of increasing the contribution of the packaging responsible in those industrial packaging waste management costs (Valipac, accreditation act, 31th of March 1999).

2.6 Monitoring and control

Control by the authorities

75) The agreement of co-operation creates the Interregional Packaging Commission in charge of the control of the agreement provisions. It must notably verify the way in which the parties responsible for packaging or the accredited bodies meet the minimum recovery and recycling targets. The Interregional Packaging Commission is composed of a decision-making body and a permanent secretariat, whose role is to assist the decision-making body. The decision-making body is composed of nine members appointed by the three Regions. In 1999, the permanent secretariat was composed of 22 civil servants who were placed at the disposal of the IVCIE by the 3 regional governments. Every party responsible for packaging, every seller and every accredited body is obliged to produce all requested documents and to submit information on the execution of their legal obligations. Important administrative fines as well as penal sanctions are provided.

76) The Interregional Packaging Commission initiated a series of inspections in companies as well as in the accredited bodies to control both the declarations of the quantity of packaging placed on the market and the effectively recycled quantities. Around 25% of the companies controlled, beforehand selected in “risky groups” , did not properly fulfil their take-back obligation. They were given a time limit to regularise their situation (Interregional packaging Commission, Annual report 1999).

Control by the private sector

FOST Plus – The situation for household packaging waste

a) Marketing control

77) Companies which decide to entrust FOST Plus with their take-back obligation must annually declare the amounts of packaging put on the market. The contract stipulates that each company whose contribution exceeds 100,000 BEF (2478.9 €) per year must have its final declaration certified on an annual basis[13]. This certification must be provided by an independent auditor or by a chartered accountant. The possibility for FOST Plus to make the necessary verifications by itself or via a corporate inspector bound by professional secrecy is also provided for. As of May 2000, 150 to 200 companies responsible for packaging, selected at random each year – will be subject to an inspection by an auditor (these controls will be co-ordinated with VAL-I-PAC). Moreover, FOST Plus regularly identifies, in commercial areas, products with disposable packaging which do not have the Green Dot or which have the Green Dot but whose party responsible for marketing is not member of FOST Plus. Besides, some external offices check the weight and composition of packaging declared.

b) Recycling rates control

78) Recycling rates must be calculated according to the formula presented below (see section 2.7.). This formula takes into account the material losses which intervene in the recycling process. These material losses are different for each process and specific studies are necessary to determine them. Moreover, the Interregional Packaging Commission must be able to control that packaging waste have actually been recycled. In this perspective, the FOST Plus accreditation provides that it must conclude with an independent office of experts a convention on the control and the certification of good execution of recycling contracts with recycling installations. The control of the independent office of experts must permit to control that packaging waste received from FOST Plus have been properly recycled. The mission of the independent office of experts focuses, among others, on:

[13] Due to the high costs of these monitoring, annual certification has been replaced by an 1-3-6-9 basis one (FOST Plus , annual report 1999)

- The control of technical capacities and of human means enabling to ensure recycling activities of the co-contracting party.
- The verification of the effective recycling, by the co-contracting party, of the packaging waste concerned by the contract with FOST Plus
- The assessment of the numerator of recycling percentages defined in the accreditation
- The verification of the figures and financial data provided by the co-contracting party about waste flows coming in the installations and waste or recycling materials coming out the installations.

VAL-I-PAC – The situation for commercial and industrial packaging waste

79) In order to ensure that recycling/recovery rates are effectively achieved and provide evidence for it to the Interregional Packaging Commission, VAL-I-PAC must control both quantities collected from final holders and quantities collected, sorted, recycled or recovered by the operators.. Therefore, it needs information on:

- The origin (industrial, Belgian),
- The nature (packaging waste and kind of material),
- The destination (recycling, recovery, other …) of collected waste.

80) VAL-I-PAC has decided to obtain this information from the collecting, sorting or recycling operators or from the final holder himself because these are the only ones who have information on the origin and the destination of waste flows. Therefore, VAL-I-PAC concludes convention with these operators which oblige them to present a descriptive report with the working methods that have been used:

- For data management and archiving
- For determining the quantity of industrial packaging waste in collected waste.

81) The control assured by VAL-I-PAC must enable to check if the co-contracting party meets all its obligations and to control how much he reassigns to the final holder. These controls are realised by different means:

- The operator must present each year a summary document giving an assessment of the stocks. This must be certified by a registered auditor.
- VAL-I-PAC can assess via polls and samplings, quantities of Belgian industrial packaging waste in flows coming out of the selection centres and can sound out the reality of the figures by direct controls and samplings of the waste flows.
- VAL-I-PAC can appoint an independent inspector bound by professional secrecy, in order to control the co-contracting party regarding data such as prices, clients list, types of rented containers, number of collections, assessment of quantities of waste collected each month, …

82) In its convention with operators, VAL-I-PAC provides sanctions in case distortion of more than 10 % between the information given by the operators and quantities of packaging waste really collected or received by him. Controls realised by VAL-I-PAC most of the time stops when the material comes out of the sorting plants, when mono-material batches are constituted.

2.7 Quantities of circulated packaging and recovered packaging waste

A. Household packaging waste

83) The recycling results declared by FOST Plus in 1997, 1998 and 1999 are distributed as follows:

Table 7: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1997

	Entrusted to FOST Plus (in tonnes)	Recycling total (in tonnes)	Recycling rate (in %)
Paper-cardboard[14]	180,800	144,800	80.1
Glass	280,000	197,287	70.5
Plastics	121,000	19,711	16.3
Metals	82,500	48,682	59.0
Beverage Cartons	17,200	5,180	30.1
Others	6,800	-	-
Total	671,100	410,480	61.2

Table 8: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1998

	Entrusted to FOST Plus (in tonnes)	Recycling total (in tonnes)	Recycling rate (in %)
Paper-cardboard[15]	132,100	259,112	196.1[16]
Glass	296,000	221,008	74.7
Plastics	119,100	24,030	20.2
Metals	84,750	54,323	64.1
Beverage Cartons	19,300	7,399	38.3
Others	10,350	-	-
Total	642,300	558,473	86.9

Table 9: Amount of packaging waste recycled and recycling rate (FOST Plus) in 1999

	Entrusted to FOST Plus (in tonnes)	Recycling total (in tonnes)	Recycling rate (in %)
Paper-cardboard[17]	139,870	162,389	116.1
Glass	324,840	245,373	75.5
Plastics	127,190	35,335	27.8
Metals	88,600	61,820	69.8
Beverage Cartons	18,610	10,034	53.9
Others	10,830	-	-
Total	691,330	504,916	73.0

84) These rates are calculated in relation to the total weight, by material, of packaging declared to FOST Plus. They are measured when they come out of the sorting plants and take thus into account all the materials responding to the technical specifications of the recycling operators and which are considered marketable. For the paper and cardboard, the packaging waste selective collections are made together with all the other paper and cardboard (magazines, newspapers,…). From 1999, FOST Plus is posting and reimbursing a fixed rate of 25 % of the quantities of mixed selectively collected paper/cardboard.

[14] Including Drink cartons

[15] Including Beverage cartons

[16] Since paper and cardboard packaging are collected along with other paper waste as magazines, newspapers,… the share of the packaging in the paper and cardboard fraction collected is defined arbitrarily. In 1998 and before, the fixed rate of packaging content was fixed to 50% of the total paper-cardboard fraction collected. In the FOST Plus accreditation act of the end of 1998, the proportion of packaging in the paper-cardboard selectively collected was reduced to 25%. IVCIE has started a study to define with more accuracy the exact proportion of packaging waste in the paper fraction selectively collected.

[17] Including Beverage cartons

Calculation methods of the recycling results of FOST Plus

The accreditation of FOST Plus holds that « the numerator ($Q_{N,i}$) is calculated at the beginning of the recycling process. The amount of recycled packaging materials (i) is obtained by multiplying the amount of collected and sorted packaging waste ($Q_{D,i}$) in the recycling process, by the purity level of the packaging waste ($1 – x_i$) and by the inclusive output of recycling ($\eta^*_{P,i}$).

$$Q_{N,i} = Q_{D,i} \cdot (1 - x_i) \cdot \eta^*_{P,i}$$

with: $Q_{N,i}$: *amount of recycled materials packaging waste*

QD,i: amount of collected and sorted packaging waste in the recycling process and measured according to the article 3, a) of the present accreditation.

xi: impurity level of collected and sorted materials packaging waste.

"Packaging waste impurities" means all the materials which are different from the packaging material such as it has been put on the market and posted to the denominator of the objectives the material recycling.

The notion of "'impurities" includes, therefore, on the one hand, all the pollutants (remains of contents, stains, humidity, ...) different from the packaging material and on the other hand, other packaging materials than the packaging material (for example: tops, labels, inside PET bottles).

*η*P,i: inclusive output of recycling due to the loss of packaging material during the recycling process.*

This output depends on the nature of the packaging material and on the type of recycling process. In the absence of a sufficient knowledge of the performances of the recycling process, this output will be contractually fixed to the output of the recycling process of the least performing material of the present state of the technique.

*Without prejudice to the decisions which will be taken at the European level concerning Directive 94/62/CE, the formula [(1 - xi). . η*P,i] is equal to 1 for all packaging materials "*

Sooner or later, studies specific to each process should permit to re-examine the average material losses in the recycling processes and so to make correspond recycling rates to reality.

VAL-I-PAC – The situation for industrial packaging waste

85) The following table presents 1999 data on quantities of industrial packaging waste which:

- are declared by parties responsible for packaging who have a contract with VAL-I-PAC.
- are collected on the Belgian territory and led to recycling/energy recovery by the operators who have concluded a contract with VAL-I-PAC agreement.

Table 10: Industrial packaging waste declared and recovered in 1999

Packaging declared to VAL-I-PAC		Information received from the operators				
		Recycling (in tonnes)	Energy recovery (in tonnes)	Total recovery (in tonnes)	Recycling* (in %)	Total* recovery (in %)
Plastics	57,116	21,035	11,675	32,710	36.8%	57.3%
Paper/cardboard	236,913	253,076	11,221	264,297	100%	100%
Metal	33,820	26,731	0	26,731	79.0%	79.0%
Wood	108,183	58,891	11,034	70,195	54.4%	64.9%
Others	8,968	196	1,172	1,369	2.2%	15.3%
Total	445,000	359,929	35,372	395,301	77.3%	82.7%

* calculated

Total packaging consumption and packaging waste recovery

86) The quantity of packaging placed on the market and recovered in Belgium in 1997 as reported to the European Commission according to article 12 of the Directive are shown in Table 11.

87) Total packaging consumption in 1997 amounted to 1.356 ktonnes which corresponds to 133.3 kg per inhabitant. According to the reported data Belgium achieved a recovery rate of 62.3 %, only by recycling. The highest recycling rate was achieved for paper/cardboard packaging with 77.5 %, the lowest for plastic packaging (25.3 %). Thus, the recovery targets of the Packaging Ordinance were exceeded for all materials by far.

Table 11: Packaging consumption and packaging waste recovery in 1997

	Quantity put on the market	recycling	recycling
Material	kt	kt	%
Glass	310,000	217,287	70.1%
Plastic	208,000	52,711	25.3%
Paper and cardboard	529,600	410,620	77.5%
Metals	120,500	84,682	70.3%
Composites	17,200	5,180	30.1%
Wood	142,000	75,000	52.8%
Other	28,800	n.a.	n.a.
Total	1,356,100	845,480	62.3%

n.a.: data not available

Source: Notification to the Commission acc. to Art. 12 of the Packaging Directive

2.8 The recycling and recovery capacities in Belgium

88) Belgium is quite a small country in Europe. It relies thus, to a certain extent, on neighbour countries for the recycling of collected and sorted packaging waste. Moreover the accreditation act delivered to FOST Plus by the Interregional Packaging Commission imposes the Green Dot organisation to ensure sufficient information on the call for tenders for the recycling of packaging in order to guarantee a sufficient openness on the recycling market. Consequently, calls for tenders are launched on an international level.

89) Since Belgium, in the Co-operation agreement provided for recycling and recovery targets beyond the limits defined in the Directive 94/62/CE on packaging and packaging waste, it has to comply with the procedure foreseen in the article 6(6) of the said Directive. In its notification to the Commission, Belgium provided the following information for the various materials:

Glass

90) Belgium indicated that a recycling rate of 55 % of glass packaging had already been achieved in 1997 and that no capacity problems exist for absorbing the brown and green glass packaging waste arising. Recycling capacities are ensured by the existence in Belgium of a site capable of recycling 160 000 tonnes of glass per year as well as of five treatment sites which produce secondary material which is demanded both by Belgian and foreign recyclers. White glass is exported to foreign industries which are willing to buy such wastes (Belgian notification to the EC).

91) Filglass, the organisation gathering glass recyclers in Belgium assessed in 1999, the recycling capacities to more than 370,000 tonnes in Belgium. These figures, however, concern mainly actors involved in the purification and preparation process of crushed glass to be smelted in the glass industry.

92) The collapse in 1999 of Verlipack group, the only Belgian group to use hollow household glass, had considerably lowered the demand for waste glass in Belgium and according to FOST Plus, had led to fears of lower market demand accompanied by a reduced waste take-back price by the recyclers. This did not occur due to the Belgian recycler's high level of technical competitiveness and sustained demand by the international market (FOST Plus, annual report 1999).

Paper and cardboard

93) Belgium reported a recycling capacity of over one million tonnes per year already existing in 1997 for paper and board. Belgium added that Industry from this sector needs to import waste paper in order to be profitable and that, therefore, no recycling capacity problems exist (Belgian notification to the EC).

94) These figures, however concern only the first step of the recycling process which consists of sorting paper by specific quality and place them into bales ready to be used in paper factories. Capacities of using waste paper in paper industry (in pulper) range between 350,000 and 500,000 tonnes per year (source: FOST Plus and Coberec – personal communications)

Metals

95) According to the Belgian notification to EC, no capacity problems exist for metal packaging, given that 3,5 million tonnes of ferrous metals are consumed yearly in Belgium by the steel industry and 1,27 million tonnes of such materials are imported. As regards non ferrous metals, Belgium has a capacity exceeding 500 000 t/year (Belgian notification to the EC).

Plastics

96) Belgian authorities indicated the existence of several companies active in mechanical recycling of synthetic materials, which altogether in 1997 already guaranteed the recycling of 50,000 tonnes of materials per year. The number of economic operators in this industry indicated a market which can further expand, particularly in the sectors of work roads, public

amenities and sewage pipes. Besides, the remaining fraction could be sent to municipal waste incinerators or cement kilns. Energy recovery in cement kilns concerned 10 000 tonnes of plastic waste in 1997 but recovery capacity may be increased up to 60 000 to 80 000 tonnes per year. Sufficient recovery capacities also exist in municipal waste incinerators equipped with heat recovery devices as well as in steel production sites (Belgian notification to the EC). FOST Plus assesses the annual recycling capacities for plastics in Belgium as follows:

- PET: 0
- HDPE: 10,000 tonnes
- Mixed plastics: 5,000 tonnes

3 Future developments

97) Article 3§2 of the Co-operation agreement stipulates that no later than January 1 1999, the IVCIE shall formulate proposals to the Regions with a view to raising the recycling and recovery targets. These targets shall be fixed with a view to the objective of the total recovery of all packaging waste and the full transfer of the costs of management of packaging waste to those responsible for packaging. Nevertheless, up to now the mandatory recycling and recovery targets in Belgium have not been raised. Future targets for selective collection and recycling are defined in the Regional waste management plans.

The Brussels Region

98) The prevention and management Plan for waste in the Brussels-Capital Region estimates the total production of packaging waste from households to 80,000 tonnes and between 60,000 and 100,000 tonnes from other sources. The Plan aims at a global 10% prevention target for all types of waste and all sectors. The Plan foresees the development of selective collection schemes, notably door-to-door, in order to reach by 2002 following recycling targets:

Table 12: Recycling targets in the Waste Management Plan for in the Brussels-Capital Region

Materials	Recycling targets (in %)
Glass	75
Paper	20
Cardboard	50
Plastics	20
Steel*	60
Aluminium	15
Beverage cartons	15

*: Metals from incineration slags excluded
Source: La prévention et la gestion des déchets en Région de Bruxelles-Capitale – Le Plan 1998-2002

The Flemish Region

99) In June 1999, the Flemish government adopted the Management Plan for packaging waste. This defines prevention targets of 13% to be reached by 2001 (compared with figures of 1995) and of 19 % to be reached by 2006 (compared with figures of 1995). This means that

the production of packaging waste may not increase between 1995 and 2006. Besides, the Plan also provides for following selective collection targets to be reached by 2001:

Table 13: Selective collection target in the Management Plan of the Flemish government

Materials	Selective collection target (in %)	Selective collection target (in tonne)
Glass	80	122,000
Paper and cardboard	65	73,000
Plastics	25	26,000
Plastic bottles	60	12,000
Metals	35	18,000
Beverage cartons	40	7,000

The Walloon Region

100) The Plan Wallon des Déchets defines targets for prevention, recycling, incineration and landfilling for household and industrial packaging waste (see table 15 and table 16). The extension of selective collection of packaging waste is envisaged, with regard to metals the recovery after incinieration is planed to be intensified. Costs for packaging waste management are expected to increase.

Table 14: Estimation of household packaging waste amounts in coming years Walloon Region

	Proportion of packaging in materials	Evolution of amounts of household packaging waste (in tonnes)			
	(in %)	1995	2000	2005	2010
Glass	98	137,417	140,620	151,448	163,260
Paper-cardboard	30	95,135	97,352	112,344	129,576
Plastics	85	100,498	102,841	126,905	156,729
Metals	75	38,009	38,895	42,940	47,413
Beverage cartons	100	19,433	19,886	22,392	25,215
		390,492	399,594	456,029	522,193

Source: Horizon 2010 –Plan Wallon des Déchets – Cadet International

Table 15: Evolution of production and treatment of household packaging waste:

	1995	2000	2005	2010
Production (in tonnes)	390,500	399,600	456,000	522,200
Prevention	-	7%	17%	38%
Recycling	24%	47%	53%	56%
Incineration	41%	35%	47%	44%
Landfilling	35%	18%	0%	0%

Source: Horizon 2010 –Plan Wallon des Déchets

Table 16: Evolution of production and treatment of industrial packaging waste

	1995	2000	2005	2010
Packaging waste	262,000	286,000	302,000	320,000
Prevention	-	7%	13%	16%
Recycling	43%	70%	84%	88%
Incineration	19%	21%	16%	12%
Landfilling	38%	9%	0%	0%

Source: Horizon 2010 –Plan Wallon des Déchets

Table 17: Collection targets for specific materials according to the Region plans[18]

Material	2000		2005		2010	
	Quantities selectively collected (in tonnes)	Selective collection rate (in %)	Quantities selectively collected (in tonnes)	Selective collection rate (in %)	Quantities selectively collected (in tonnes)	Selective collection rate (in %)
Glass	93,560	70	94,367	75	93,619	80
Paper-cardboard	120,908	40	142,276	50	145,559	55
Plastics	22,540	15	26,523	25	24,668	25
Metals	38,645	80	38,654	85	38,065	90
Beverage cartons	2,778	15	3,488	20	3,244	20

Source: Horizon 2010 –Plan Wallon des Déchets

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Vos emballages, vous en êtes responsables ! Tout ce que vous devez savoir pour rempli vos obligations légales, Commission Interrégionale de l'Emballage, Bruxelles, s.d. ;

Denmark

Contents

1 Packaging Legislation and Voluntary Agreements 1
1.1 Responsibilities of operators 2
1.2 Targets and Instruments 3
1.3 Further Provisions 4
2 Packaging Waste Management System 5
2.1 Compliance scheme 5
2.2 Interactions between operators and local authorities 5
2.3 Collection and sorting 5
2.4 Treatment systems and outlet of recycling activity 6
2.5 Financing of the system 10
2.6 Monitoring and control 10
3 Current situation 11
4 Further development 14
5 References 16

List of tables

Table 1: Taxes on packaging valid from 1 January 1999 4
Table 2: Treatment and capacity of recovery facilities 9
Table 3: Quantity of waste being incinerated 10
Table 4: Treatment rates of packaging waste (percentages compared to total supply for 1998) 12
Table 5: Recovery and recycling in Denmark in 1998 13

1 Packaging Legislation and Voluntary Agreements

1) Below is a list of legislation, voluntary agreements, proposals for new legislation, strategies and statistics. The legislation in force implements the EU Packaging Directive and gives regulations for packaging for beer and soft drinks. Furthermore, other types of legislation are listed concerning waste in general. In Denmark voluntary agreements have been made with the industry that supports the aim of increasing the recycling of packaging.

Legislation in force

- Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste
- Law no. 726 of 7 October 1998 regarding taxes on certain packaging and certain bags of paper or plastic etc. as amended by law no. 912 of 16 December 1998 and law no. 380 of 2 June 1999
- Environmental Protection Act 698 of 22 September 1998
- Statutory Order no. 298 of 30 April 1997 on certain requirements for packaging, DEPA
- Statutory Order no. 299 of 30 April 1997 on waste, DEPA
- Statutory Order no. 124 of February 27, 1989 on packaging for beer and soft drinks as amended by statutory order no. 540 of 1991 and no. 583 of 1996 and no. 300 of 30 April 1997, DEPA
- Statutory Order no. 600 of September 18 1987, on labelling of recyclable packaging, DEPA
- Law no. 570 of 3 August 1998 regarding taxes on waste and raw materials as amended by law no. 1034 of 23 December 1998 and law no. 380 of 2 June 1999.

Voluntary agreements:

- Voluntary agreement on PET, DEPA, 14. September 1994
- Voluntary agreement on recovery of transport packaging, DEPA, 16 August 1994

Proposal for new legislation

- Proposal regarding taxes on PVC and phthalates no. L69 of 27 October 1999.

Strategies:

- Waste Management Plan 1998-2004, Affald 21 (Waste 21), DEPA, 1999

1.1 Responsibilities of operators

2) According to the Environmental Protection Act 698, the municipalities are obligated to assign/direct possibilities of disposal of waste, and they are in charge of collection and further disposal including recycling. Private households and companies are obligated to use the waste systems assigned by the municipalities. Enterprises or installations that receive waste for the purpose of recovery or disposal shall keep records on waste data and inform the municipality or DEPA when they are requested to do so.

3) Municipalities are obligated to include initiatives for minimisation and recycling of packaging waste in their waste management plans *(Statutory Order no. 299 of 30 April 1997 on waste)*. The municipalities are responsible for the collection of glass and paper from towns with more than 2,000 citizens. Accordingly, the municipalities are obliged to assign the following types of waste to recycling, which means that the municipality must prepare regulations that oblige enterprises (and in some cases public/private institutions) to recycle the waste:

- paper, cardboard, carton, cardboard materials and products made of cardboard materials from enterprises and from public and private institutions
- recyclable waste transport packaging in the form of plastic from enterprises
- steel drums from industrial and commercial enterprises

4) The *Statutory Order no. 298 on certain requirements for packaging* covers primary, secondary and tertiary (except road, railroad, ship, and airplane containers) packaging. In appendix 1, the following essential requirements for packaging are given:

- requirements specific to the manufacturing and composition of packaging
- requirements specific to the reusable nature of packaging
- requirements specific to the recoverable nature

5) The above complies with Article 9 of the EU Packaging Directive. For example, maximum limits are given for the content of heavy metals in the packaging materials, and it is stated that hazardous compounds in the materials must be minimised. This complies with Article 11 in the EU Packaging Directive. Furthermore, the *Statutory Order no. 298 on certain requirements for packaging* stipulates that the volume and weight of the materials must be minimised. Producers of packaging materials must secure utilisation (for example recycling), reuse or energy production in order to minimise the environmental impact from the disposal of the materials.

6) In addition, producers or importers shall, at the request of the Environmental Protection Agency, submit documentation that the packaging complies with the requirements for the manufacture, composition and utilisation of packaging.

7) The beverages (beer and soft drinks) covered by the s*tatutory order no. 300 of 1997 on packaging for beverages,* shall be marketed in Denmark only in refillable packaging. Before packaging for beverages is approved, the following must be fulfilled:

- the packaging must be suitable for use in a return system
- a considerable part of the packaging must be returned for refilling
- a suitable, accessible and approved refillable packaging of the required volume must not already be available

8) Imported beverages can be marketed in packaging provided that:

- the packaging is not made of metal
- a return and deposit system is established
- the party responsible for marketing shall inform the Agency

9) According to *statutory order no. 600 of 1987, on labelling of recyclable packaging*, recyclable packaging for liquid foodstuff offered for sale shall be labelled if the packaging is covered by a system to be returned for refilling or recovery. The Statutory Order contains a list for foodstuff for which the labelling of packaging is required.

Voluntary agreements:

10) In Denmark, the Danish industry has entered into 2 voluntary agreements with the Danish Environmental Protection Agency (DEPA) regarding packaging waste. The agreements include the increase of reuse or recycling of bottles of PET and of transport packaging made of cardboard, paper and plastic.

11) The agreement on bottles of PET from 1994 enables the producers to use the bottles in the Danish reusing system for bottles. The producer has to provide data for DEPA regarding rates of reuse for each bottle and DEPA will control if the rates are acceptable.

12) The agreement on recovery of transport packaging covers both reuse and recycling of material for packaging. This agreement sets the objective of reaching a level of 80% collection and recovery of transport packaging by direct reuse or material recycling. The agreement requires that existing collection schemes be extended. It is presupposed that the schemes set up cover all types of industrial companies producing transport packaging waste. According to *statistic on packaging of plastic 1998, DTI*, the target can be reduced to 40% recycling of transport packaging because this will secure a total recycling rate of approx. 15% of the plastic packaging which will fulfil the national target (see below chapter 3.1.1.2).

1.2 Targets and Instruments

Targets in national waste management strategy:

13) “Waste 21” *(Waste Management Plan 1998-2004, Affald 21 (Waste 21), DEPA, 1999)* is the national waste plan of the Danish government. In the following the most important strategies are described in brief. For recycling of packaging waste in 2001 the following targets are set up:

Packaging material	Recycling target
Paper and cardboard	55 %
Glass	65 %
Metals	15 %
Plastics	15 %

14) The above targets can be compared with the targets in article 6 of the directive /0/. The main part of the packaging waste that is not recycled is incinerated on incineration facilities with energy recovery. Because of present and future initiatives it is expected that the total recovery of packaging waste will exceed 80%. This statement is also based on the *statutory order no. 299 on waste* that forbids landfilling of combustible waste. Instruments in laws:

15) The *law no. 380 of 1999* demands taxes on primary packaging and multi-packaging (secondary packaging), collected from packers/fillers and importers, with a volume below 20 litres and on bags of plastics or paper with a volume above 5 litres. The taxes are summarized in the table below.

Table 1: Taxes on packaging valid from 1 January 1999

Packaging material	Volume	Range of Tax
Carton or composites	below 0,1 litre to above 1,6 litre (divided into 6 intervals with a certain tax for each)	0,15 to 2 DKK (all together 6 taxes; one for each interval)
Packaging for beverage	below 0,1 litre to above 1,6 litre (divided into 6 intervals with a certain tax for each)	0,25 to 3,2 DKK (all together 6 taxes; one for each interval)
Other primary and secondary packaging of paper /cardboard (non-recycled or recycled), plastics, aluminium, steel, glass, ceramics, composites and wood (all together 13 materials)	-	0,75 to 30 DKK (all together 13 taxes for each material)
Bags of paper	above 5 litre	10 DKK/kg
Bags of plastic	above 5 litre	22 DKK/kg

16) It is stated in *law no. 380 of 1999* that if there is no documentation of the content of recycled material being above 50% in packaging of carton and cardboard a tax shall be paid.

17) Labelling demanded by statutory order no. 600 from 1987, on labelling of recyclable packaging of reusable/recyclable packaging for liquid foodstuff is an instrument to increase knowledge of reusable/recyclable packaging and thereby increasing recycling rates. The labelling shall clearly show that the packaging is recyclable. The labelling system described does not fully comply with article 8 (marking and identification system) of the EU Packaging Directive, because the Directive describes a more detailed identification system with numbering of materials.

Targets and instruments in voluntary agreements:

18) The target in the voluntary agreement between the industry and DEPA on cardboard and paper transport packaging is set to be 80% recovery from year 1998 and for plastic transport packaging 80% recovery from year 2000.

1.3 Further Provisions

19) National waste taxes in law no. 380 of 1999 regarding taxes on waste and raw materials include the following:

- 375 DKK/tonne of waste for landfilling
- 280 DKK/ tonne of waste for incineration and production of both electricity and heat (min. 10% electricity)
- 330 DKK/tonne of waste for other incineration

20) These national taxes together with the prohibition of landfilling of combustible waste (Statutory Order no. 299 on waste) will increase the amount of packaging waste which will be incinerated for energy production or recycled.

2 Packaging Waste Management System

2.1 Compliance scheme

21) The municipals are responsible for the correct handling of the waste. Generally municipalities co-operate in inter-municipal waste organisations/companies. These companies are of a public nature and have often non-profit goals. Typical activities of inter-municipal waste organisations/companies in relation to packaging waste are:

- Collection of household waste including separate collection of glass and paper
- Incineration (large waste companies) of combustible waste (includes packaging waste)
- Recycling stations must be used by inhabitants and small private companies for separation of waste into 10-15 fractions including paper, cardboard, glass for recycling and combustible waste for incineration
- By municipal regulations private companies are obligated to follow correct handling of waste fractions such as:
  - Glass, paper, cardboard
  - Recyclable plastic transport packaging waste
  - Steel rollers

22) The private companies shall use and pay to municipal collection systems if such systems are established or they shall use a collection system assigned/directed by the regulations of the municipality. Collection and treatment companies can offer waste services for private companies in accordance with municipal regulations. This is typically the case for paper and cardboard from offices.

2.2 Interactions between operators and local authorities

23) As mentioned above, municipalities are often organised in inter-municipal waste companies that are responsible for collection and treatment of waste. The municipalities or the inter-municipal companies choose the operators for handling of household waste. Then individual contracts are made in each case. The municipalities and the inter-municipal waste companies perform and control campaigns of correct source separation of waste and they inform of the existing waste systems in the territory. The collection and treatment companies shall every year inform DEPA of waste statistics according to statutory order no. 299 on waste.

2.3 Collection and sorting

Packaging waste collection from households

24) Regarding packaging waste, not very many municipal (separate collection) systems are established. The municipalities are obligated to collect glass and paper from towns with more

than 2,000 citizens (statutory order on waste). Most of the municipalities have collection of glass and paper in containers (bring-system). The citizens deliver waste to these containers but the paper delivered is mostly newspapers and small amounts of packaging paper. The containers are placed in central locations with a typical density of (200-1,000) citizens/container. In some households, collection systems are established with green waste (organic biodegradable waste) and other household waste collected in separate containers.

25) In the middle of 1999, there was a collection system or an assign system for plastic from households and/or companies in 206 of the 275 municipalities in Denmark according to statistic on packaging of plastic, Danish Waste Management Information Centre, DTI, 1998. According to Waste Management Plan 1998-2004, Affald 21 (Waste 21), DEPA, 1999, in the future the municipalities must extend collection systems for paper from households by establishing collection systems. The strategy includes that by year 2000, the paper must be collected in a two-stream system with collection of both paper and garbage from the households. This strategy has caused much debate lately in Denmark.

26) Inhabitants and small private companies deliver other types of waste to municipal recycling stations used for separation of waste into 10-15 fractions including paper, cardboard, glass for recycling and combustible waste for incineration. In a few municipalities colour separation of glass is carried out (statistic on glass, bottles and cullet, 1996, Danish Waste Management Information Centre, DTI).

Packaging waste collection from private companies

27) Regarding garbage, private companies are generally obligated to use the municipal collection systems. For other types of waste (for example food waste, electronic waste) some municipalities have established collection systems that the companies are obligated to use. For the waste types for which the municipality has not established a collection system, the private companies have to organise waste collection themselves in accordance with municipal regulations. The private companies must pay for waste collection and sorting. Paper and cardboard from offices (not only packaging waste) are typically collected by a private waste collection company. Packaging waste of plastic is typically compressed into bales and then transported to recovery facilities.

Sales packaging

28) Packaging for beer and soft drinks is systematically reused in a return system. For each bottle of glass or plastic the buyer has to pay deposit, and when the bottle is delivered at the shops/supermarkets the deposit is paid back. The shops have to sort the different types of bottles. Then the empty bottles are transported to a manufacturer for reuse. If bottles cannot be reused, they are delivered into municipal containers and then transported to a treatment company.

2.4 Treatment systems and outlet of recycling activity

Glass

29) The sorting of the collected glass takes place at recycling stations, shops selling bottles or at one of the 4 places where bottles are rinsed in Denmark (statistic on glass, bottles and cullet, 1996, DTI). The whole refillable bottles are rinsed and refilled. The rest of the reusable glass is defined as cullet and is used in the production of new glass. Some of the cullet is non-reusable because it is mixed with ceramics, porcelain etc. and is landfilled or sent to waste incineration.

30) In Denmark whole bottles as well as cullet and other packaging glass is recycled. There is only one company, Holmegård Glasværk (glass factory) in Denmark that recycles cullet for production of new glass. In 1996, Holmegård melted approx. 60,000 tonnes of packaging glass including broken beverage glass. Today up to 80% of cullet is used in the production of new glass. Dansk Flaskegenbrug is a Danish company that washes and reuses bottles of glass.

31) According to statistic on glass, bottles and cullet, 1996, DTI, approx. 7,400 tonnes of packaging glass were exported for recycling in 1996. Both washed and non-washed bottles are exported. The prices of broken glass vary depending on prices of raw materials, energy prices, quality of colour separation and the rate of impurities. The variation of prices of 1994-1996 have been:

- Non-coloured broken glass: 240-250 DKK/tonne
- Coloured broken glass: 120-130 DKK/tonne
- Mixed broken glass: 30-35 DKK/tonne

Paper and cardboard

32) Collected paper is treated at paper recycling companies. There is enough capacity for recycling of paper in Denmark (Waste Management Plan 1998-2004, Affald 21 (Waste 21), DEPA, 1999). Paper can be recycled both inside Denmark and can also be exported, depending on prices that vary significantly. There are approx. 20 companies in Denmark today that trade recycled paper and 5 companies that use the recycled paper for production of new products. The capacity in Denmark for treatment of paper is sufficient to recycle an increasing amount of paper.

33) In the statistics, it is difficult to separate recycling of packaging paper according to paper sources. Corrugated cardboard is certainly packaging waste and in 1996 approx. 200,000 tonnes were collected and 157,000 tonnes were recycled. Other types of packaging paper were recycled but it is not possible to isolate this amount in the statistics (statistic on return paper, 1996, DTI). Some treatment companies (for example Hartmann) recycle cardboard and produce new packaging products.

34) According to the Waste Management Plan 1998-2004, the possibilities of selling recovered paper are present both in Denmark and internationally. Prices of corrugated cardboard and mixed paper for recycling vary considerably:

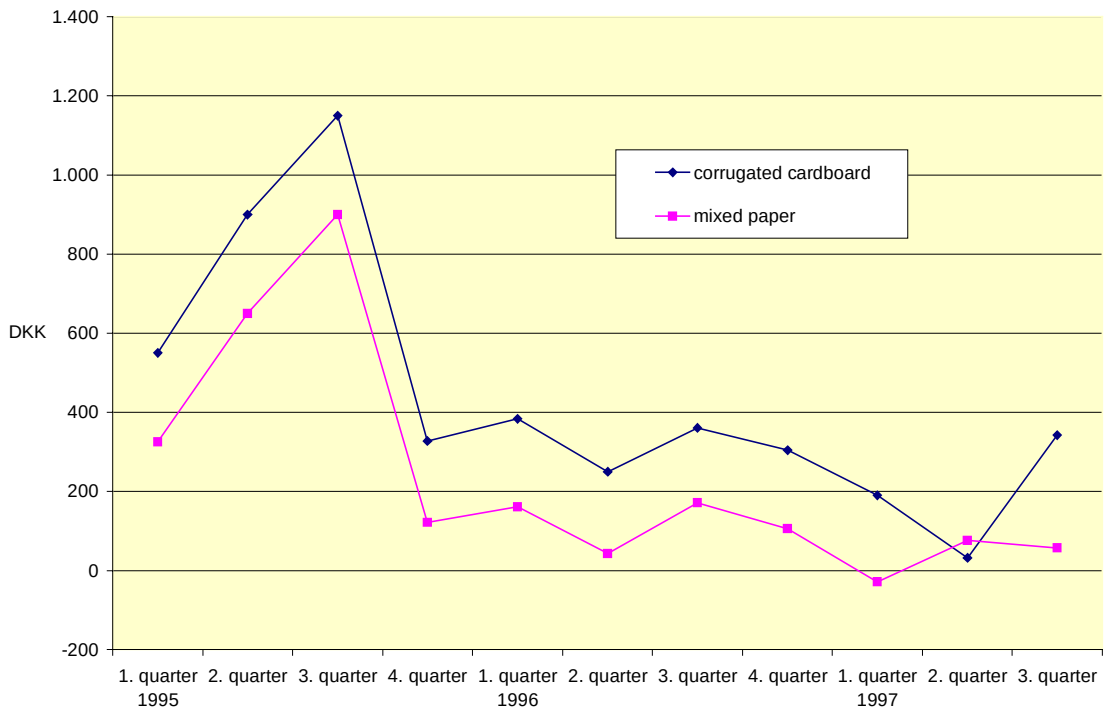

Figure 1: Price development for paper from 1995 to 1997

35) The prices in Denmark depend on international prices. If prices in the Danish market are high, then paper for recycling is imported from Germany. This shows that paper for recycling is an international commodity with prices depending on supply and demand such as other industrial raw materials. The prices vary considerably which makes long-term investment planning difficult for the recovery companies to make budgets of the economy. Sometimes, prices are negative which means that treatment companies have to pay to get paper for recycling/recovery into new products.

Plastics

36) According to the statistic of packaging of plastic 1998 (DTI) the following describes the situation in Denmark:

- The total supply of packaging of plastic in 1998 in Denmark was approx. 172,000 tonnes.
- In 1998, 6.7 % (11.455 ton) of the packaging waste of plastic was collected for recycling.
- The content of PE in the collected amounts was 80%.
- The main part of the packaging of plastic that was recovered in Denmark was in 1998 imported from abroad.
- The plastic recovery companies have enough capacity to receive min. 25% more packaging of plastic than they receive at present.

37) The amount of recycled packaging waste of plastic was in Denmark approx. 22,500 tonnes in 1998 including approx. 13,700 tonnes imported from abroad (statistic on packaging of plastic 1998, DTI). In the statistic on packaging of plastic 1998, DTI, it is estimated that 15% of the transport packaging of plastic was recycled in Denmark in 1998. As described above, the target in the voluntary agreement on transport packaging of plastic is 40% recycling of the total amount. The treatment and capacity of recovery facilities in Denmark is:

Table 2: Treatment and capacity of recovery facilities

	Amount for treatment (tonnes)		Capacity (tonnes)	
Treatment	1997	1998	1997	1998
Recovery incl. wash	20,500	23,114	25,500	25,500
Recovery excl. wash	14,248	11,656	17,279	17,244

38) Recycled plastic is transformed to plastic granulate etc. that can be used for production of new packaging, containers, pipes etc. The cleaner the granulate is, the better are the possibilities of replacement of virgin plastic in the production. The Danish company Replast has a treatment facility for transport packaging of LDPE-foils. The recovery capacity at Replast is 12,000 tonnes/year and with a possibility of expanding the capacity to 16,000 tonnes/year. Prices of PE-plastic (production waste and post-user) were in 1996-1999 approx. 1-2 DKK/kg according to statistic on packaging of plastic 1998, DTI, 1999.

Steel and metals

39) According to statistic on supply of packaging in Denmark in 1997, DTI, 1999 the supply of metals for packaging in Denmark (excl. aluminium) was 67,391 tonnes in 1997. Approx. 85% of the metals is used for production of cans and similar. The main steel transport packaging item is 215 litres rollers and the annual supply of steel rollers in Denmark is. approx. 13-14,000 tonnes. Of this amount approx. 1/3 is recycled and the rest is exported. There is one steel roller recovery company in Denmark, “Kundby Tromlerenseri” (rollercleaning) that recovers approx. 60,000 rollers per year (approx. 1,200 tonnes/year).

Aluminium

40) According to *statistic on supply of packaging in Denmark in 1997, DTI, 1999* the supply of aluminium for packaging in Denmark was 18,773 tonnes in 1997. Approx. 54% of the aluminium is used for production of cans and similar and the rest for foils.

Wood

41) According to *statistic on supply of packaging in Denmark in 1997, DTI, 1999*, the supply of wood for packaging in Denmark was 55,143 tonnes in 1997 and approx. 85% of the wood is used for pallets. Some companies such as Danpal A/S, collect and repair old pallets of wood and sell them for reuse.

Incineration/Energy from Waste

42) The most common waste treatment method in Denmark is incineration. In 1998, 22% of the total amount of waste in Denmark was incinerated *(Waste statistic of Denmark for 1998, DEPA, 2000)* including construction waste and other waste types that do not contain packaging waste. The amount of incinerated household waste is approx. 11% of the total amount of waste in Denmark in 1998. In the table below are further data for selected waste types that contain packaging waste:

Table 3: Quantity of waste being incinerated

Type of waste	Total amount (in tonnes)	Percentage of total amount	Amount for incineration (in tonnes)	Percentage for incineration for the specific waste type
Garbage from households	1,702,000	14%	1,324,000	78%
Waste from public institutions, trade and offices	955,000	8%	438,000	46%
Production waste	2,783,000	23%	425,000	15%
Others	6,793,000	55%	553,000	8%
Total	12,233,000	100%	2,740,000	22%

43) Therefore, much of the packaging waste is incinerated. The incineration plants are owned by the inter-municipal waste companies. Combustible waste is prohibited on landfills and therefore the amount of waste for incineration is increasing and incineration capacities are currently being extended. At the waste incineration facilities, electricity and/or heat is produced from the waste. The national taxes *(law no. 380 of 1999 regarding taxes on waste and raw materials)* are lowest for waste that is incinerated at facilities with both electricity and heat generation (min. 10% of the energy production must be electricity).

2.5 Financing of the system

44) The municipal authorities are responsible for financing of collection systems. Every citizen has to pay a tariff for collection of household waste. This tariff is different in the municipalities and depends on the type of collection system. Most often the tariff is a fixed annual tariff but in some municipalities the citizens pay a tariff depending on the weight of the waste from each household. The development in these tariffs is that they increase every year and it is very likely that they will increase even more in the future.

45) Municipal collection of paper and glass via bring-systems is financed by the municipalities through the above mentioned tariffs. Generally private companies pay the costs for the waste handling of their own company.

46) The taxes on primary and secondary packaging law no. 726 of 1998 regarding taxes on certain packaging mentioned in para 15) are government income. The national waste taxes on waste for landfilling or incineration mentioned in para. 19) are also government income. These national waste taxes have increased much since they were introduced and it is very likely that they will increase further in the future.

47) R&D projects regarding packaging waste are often financed by DEPA such as the project Life Cycle Assessment of Packaging Systems for Beer and Soft Drinks, 1998, and Survey of the Content of Heavy Metal in Packaging on the Danish Market, 1997.

2.6 Monitoring and control

48) Waste transportation companies are obligated to be registered at the municipality (statutory order no. 299 on waste). Waste treatment facilities shall keep a register of the type, origin, and quantity of waste, including recyclable materials which are recycled, incinerated for energy recovery, or disposed of. The registration system is called ISAG (Information System for Waste and Recycling) and the data must be registered in a computer standard table. The

data of the register must be sent to DEPA annually. In relation to packaging wastes the treatment facilities must register data in ISAG on recycling/sorting etc. of the following fractions (among other fractions):

- Paper and cardboard
- Bottles and glass
- Plastics
- Iron and metals

49) According to law no. 726 regarding taxes on certain packaging companies that produce or use packaging which is taxed shall every month inform the authorities of amounts of packaging delivered from the companies. According to statutory order no. 298 on certain requirements for packaging all producers, exporters, or importers of empty packaging or packaging containing products (filled packaging) shall, at the request of DEPA, submit information on:

- the number of product units
- the materials and substances used in each component of the packaging
- the weight of each material used in the packaging per product unit

50) Anyone putting recyclable packaging into circulation shall, at the request of DEPA, submit information on:

- total units put into circulation
- materials and substances used in each component of the packaging
- the weight of each material used in the packaging per product unit
- type of packaging

51) In relation to this the difference between packaging in general and recyclable packaging is not further explained.

3 Current situation

52) A lot of the packaging waste for example in household waste is mixed with other wastes that is incinerated (energy recovery) in Denmark. For example 78% of garbage from households was incinerated in 1998 according to Waste statistic of Denmark for 1998, DEPA, January 2000. Therefore a lot of the packaging waste such as paper and cardboard and plastics is used for energy recovery and these amounts are not included in the above table.

53) The Table 4 below provides an overview on treatment of packaging waste in Denmark. The supply and recycling of packaging in closed return systems for example for beer- and mineral bottles of glass and PET, beer crates, plastic rollers, casks etc. is not included.

54) Approx. 340 million returnable glass bottles from beer, carbonated soft drinks and water are circulated in Denmark. Each bottle is reused in average 35 times, and consumers return 99% of all bottles. Approx. 1.7 billions beer and mineral water bottles were rinsed and refilled in 1998. If these bottles were included in Table 4 the percentage of collected glass will increase from 68% to 91% (statistic on glass, bottles and cullet, DTI, 1998).

Table 4: Treatment rates of packaging waste (percentages compared to total supply for 1998).

Waste fraction	Part of fraction of total	Total supply	Collected in source separation system	Part of collected in a source separation system					Not collected in source separation system/ other treatment
				Reused	Recycled	Export	Import	Waste disposal/ storage	
Glass	20%	100%	68%	16%	28%	19%	-	5%	32%
Paper and cardboard	46%	100%	min. 57%						43%
- corrugated cardboard	34%	100%	77%	-	69%	39%	-10%	2%	23%
Plastics	18%	100%	7%		78%	22%	(-119%)		93%
Metals	6%	100%							100%
Wood	9%	100%							100%
Textile	1%	100%							100%
Total	100%	100%	41%	8%	25%	35%	-7%	4%	59%
				Nettoexport (export-import):		28%			

Notes:

- The supply and recycling of packaging part of a closed return systems is not included
- The amount “not collected in source separation system/other treatment” is 59% of the total amount of packaging waste. A substantial part of this amount is incinerated as part of household waste or industrial waste.
- The data for the corrugated cardboard is from the statistic of paper waste handling including both packaging paper/cardboard and other paper. But it is assumed that all corrugated cardboard is used for packaging.
- For other paper and cardboard materials there are no data available of the waste handling.

55) In evaluating the present situation in Denmark the recycling and recovery results for 1998 are compared with the Danish recycling targets for 2001 stipulating:

- recovery of minimum 50% of packaging waste
- recycling of minimum 25% of packaging waste and a minimum of 15% of each packaging material

Table 5: Recovery and recycling in Denmark in 1998

Waste fraction	Recycling	Energy recovery (estimated to be incinerated in mixed waste)	Total estimated recovery	Danish recycling targets for 2001
Glass	75 %	-	75 %	65%
Paper and cardboard	58 %	40 %	98 %	55%
Plastics	7 %	87 %	94 %	15%
Metals	42 %		42 %	15%
Wood				-
Textile				-
Total	51 %		89 %	approx. 45%

56) As mentioned above, a lot of the packaging materials are not collected separately, but together with household or industrial waste which is incinerated. According to the waste management plan from 1999 in 1996 in household waste there was 90.000 tonne of plastic packaging waste which was incinerated. Therefore it is reasonable to estimate that most of the paper and cardboard and plastics that is not separately collected is transported to incineration. This amount for energy recovery can be estimated to be 275,000 tonnes (approx. 185,000 tonnes paper and cardboard and approx. 90,000 tonnes plastics).

57) According to the information in the above table the total estimated recovery of packaging materials in Denmark in 1998 was 56%. This rate can increase if information of metals, wood and textile show high rates of recovery for these materials also. Therefore Denmark fulfils target 1.

58) Approx. 300,000 tonne of the packaging waste is reused or recycled including the amount of exported glass (wine bottles) of which ¾ is reused and ¼ is recycled. Therefore approx. 32% of the packaging waste is reused or recycled and the target of minimum 25% recycling of packaging waste is fulfilled for Denmark. Furthermore maybe some of the metals and wood are recycled.

59) The achievement of minimum 15% recycling per packaging material is outlined on a material basis.

Glass:

60) Recycling of glass in Denmark in 1998 was 109,287 tonnes which equals a recycling rate of 64%. Target 3 of the Directive is fulfilled in Denmark in 1998 for glass. In addition to the

amounts in Table 4 and Table 5 the market share of reuse beer and carbonated soft drinks bottles is between 96% and 98% of the consumption ("Reuse of primary packaging", Andreas Golding). Approx. 1/3 of the wine imported to Denmark is imported in bulk and 80% of this is filled on reuse bottles because of the economic advantage those bottles provide.

Paper and cardboard

61) Paper and cardboard packaging includes 74% corrugated cardboard, 13% other cardboard and 13% paper. Approx. 70% of the corrugated cardboard is recycled and the rest is exported. Therefore min. 40% of the paper and cardboard is recycled and therefore target 3 of the Directive is fulfilled in Denmark in 1998.

Plastics

62) Approx. 5% of the packaging plastic were recycled in 1998. Reuse of refillable bottles is not included in the recycling rate for 1998. Therefore target 3 of the Directive is not fulfilled in Denmark in 1998 for plastics.

4 Further development

Glass

63) In order to increase the rate it is necessary to improve the collection rate of the glass because only 68% of the glass packaging is collected (beer and carbonated soft drinks bottles are not included in this assessment). Treatment of the collected glass seems reasonable because almost all the collected glass is recycled, recovered or exported. The capacity at glass treatment facilities seems limited because there is only one glasswork in Denmark and therefore the recycling possibilities also depends on export and the capacity in other countries.

64) Other future national initiatives regarding glass, outlined in the waste management plan 1999, are:

- a more efficient collection of glass by an information campaign to households and relevant companies
- DEPA will investigate the market for recycling of bottles in Denmark and evaluate the environmental effects by export of bottles for recycling outside Denmark
- in order to decrease the amount of broken glass a project for development of collection equipment will be started
- in 2000 information will be sent to the municipalities regarding the opportunities of colour separation in order to decrease the discarding of collected glass

Paper and Cardboard

65) It can be estimated that approx. 43% of paper and cardboard is collected in mixed waste and then incinerated. Recycling can be increased if the source separation is increased. According to the waste management plan, 1999, one strategy is to establish separate collection of paper from households in municipalities, which is assumed to double the source separated collection of paper from households. This strategy is discussed a lot lately in Denmark and the present situation is stated in the new waste law (no. 619 of 27 June 2000) as described below.

66) Incineration of household waste is very common in Denmark. Large investments have been made in incineration plants and new incineration facilities are planned to be constructed during the next years. Therefore it is very likely that paper and cardboard packaging in household waste continuously will be incinerated in the next years.

67) Other future national initiatives regarding paper and cardboard, outlined in the waste management plan 1999, are:

- increase recycling of cardboard by giving citizens the opportunity to deliver cardboard at recycling stations
- in the latest Danish waste law (no. 619 of 27 June 2000) it is stated that municipalities must establish collection systems for paper and cardboard (including cardboard packaging and excl. newspaper, magazines etc.)
- in order to increase the sorting of paper and cardboard from industrial waste the municipalities responsibility for this sorting will be emphasised
- in order to increase the possibilities of recycling the problems with glue and colours will be further evaluated.

Plastics

68) Incineration of household waste is very common in Denmark. Large investments have been made in incineration plants and new incineration facilities are planned to be constructed during the next years. Therefore it is very likely that plastics packaging in household waste continuously will be incinerated in the next years. Other future initiatives regarding plastic, outlined in the waste management plan 1999, are:

- investigation of the opportunities for recycling of plastic “bottles” from households
- regarding plastic bottles and cans it will be investigated in 1999-2000 how an environmental sustainable recycling can be carried out in relation to sorting, collection and treatment.

Metals

69) A representative of the Danish metal packaging industry (Steen Havstrup) said that he did not know of prognosis for supply of metal packaging. There are few collection systems for packaging metal waste. An example of an existing system is the reuse of aluminium plates for food for old people. Most of the metal packaging waste ends up in household waste and is mixed with other materials and is finally incinerated. There is no plans of establishing collection systems with source separation of metal packaging from household waste.

Taxes

70) Danish Environmental Protection Agency (EPA) has proposed differentiating existing taxes on packaging materials by their environmental impacts. Based on a new life-cycle assessment relatively low taxes should apply to paper, cardboard and glass, and much higher ones to aluminium, expanded polystyrene and PVC, these taxes go till 19 times the glass tax per Kg.

71) The Danish government has indicated that it wants in principle to differentiate packaging taxes depending on environmental impacts and stresses that its proposal would continue to favour lower overall use of packaging, but would also incentives use of greener alternative packaging materials where feasible. (AMDPress-Euronews nº 4 (07/09/00)

5 References

Law no. 726 of 7 October 1998 regarding taxes on certain packaging and certain bags of paper or plastic etc. as amended by law no. 912 of 16 December 1998 and law no. 380 of 2 June 1999

Environmental Protection Act 698 of 22 September 1998

Statutory Order no. 298 of 30 April 1997 on certain requirements for packaging, DEPA

Statutory Order no. 299 of 30 April 1997 on waste, DEPA

Statutory Order no. 124 of February 27, 1989 on packaging for beer and soft drinks as amended by statutory order no. 540 of 1991 and no. 583 of 1996 and no. 300 of 30 April 1997, DEPA

Statutory Order no. 600 of September 18 1987, on labelling of recyclable packaging, DEPA

Law no. 570 of 3 August 1998 regarding taxes on waste and raw materials as amended by law no. 1034 of 23 December 1998 and law no. 380 of 2 June 1999.

Voluntary agreement on PET, DEPA, 14. September 1994

Voluntary agreement on recovery of transport packaging, DEPA, 16 August 1994

Declaration of intent to recycle 80% non-refillable glass, DEPA, 10 December 1992

Voluntary agreement of 3 April 1991 on the use of PVC, DEPA

Proposal regarding taxes on PVC and phthalates no. L69 of 27 October 1999.

Waste Management Plan 1998-2004, Affald 21 (Waste 21), DEPA, 1999

Statistic on glass, bottles and cullet, 1996, Danish Waste Management Information Centre, DTI

Statistic on return paper, 1996, Danish Waste Management Information Centre, DTI

Waste statistic of Denmark for 1998, DEPA, January 2000

Statistic on packaging of plastic 1998, Danish Waste Management Information Centre, DTI, December 1999

Statistic on supply of packaging in Denmark in 1997, Danish Waste Management Information Centre, DTI, June 1999

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Golding, Andreas: Reuse of primary packaging, Report for DG 11, 1999

Finland

Contents

1 Legislation and Voluntary Agreements 1
1.1 Responsibilities of operators 1
1.2 Targets and Instruments 2
1.3 Further Provisions 3
2 Packaging Waste Management System 4
2.1 Compliance scheme 4
2.2 Collection and sorting 5
2.3 Treatment systems and outlet of recycling activity 6
2.4 Financing of the system 7
2.5 Monitoring and control 8
2.6 Quantities of circulated packaging and recovered packaging waste 8
3 Further development 10
4 References 11

List of tables

Table 1: Taxes on waste 3
Table 2: Packaging waste collection modalities 5
Table 3: The PYR's basis for fees 2000 7
Table 4: Recovery fees 2000 8
Table 5: Packaging consumption and packaging waste recovery in 1997 9
Table 6: Quantities of packaging waste arising and recovered in 1998 9
Table 7: Monitored quantities of packaging waste exported and imported for recycling in 1998 9
Table 8: Development of reuse of packaging as percentages of total use from 1994-1998 10

1 Legislation and Voluntary Agreements

Legislation

Government Decision on packaging and packaging waste, no. 962/1997, 23rd October 1997.

Waste Tax Act, no. 495 of 28th June 1996 as amended by law no. 1157 of 30th December 1998

Ministry of the Environment Decision on the list of the most common wastes and hazardous waste, no. 867 of 14th November 1996

Law on Alcohol Excise, No. 1471 of 29th December 1994

Law on Soft Drinks Excise, No. 1474 of 29th December 1994

Law on Health Care, no. 763 of 19th August 1994

Ministry of the Environment Decision regarding approval of a system for reuse of sales packaging for Soft Drinks and Alcoholic Drinks, No, 569 of 28th June 1994.

Government decision on landfills, no. 861 of 4th September 1997 as amended by decision no. 1049 of 18th November 1999

Waste Act, 1993, No. 1072 of 3rd December 1993 as amended by law no. 1413 of 29th December 1994, law no. 1419 of 29th December 1994, law no. 63 of 24th January 1995, law no. 605 of 19th June 1997, law no. 883 of 25th November 1998, law no. 147 of 5th February 1999, law no. 554 of 30th April 1999 and law no. 614 of 21st May 1999.

Waste Decree, No. 1390 of 22nd December 1993 as amended by decree no. 1414 of 29th December 1994, law no. 775 of 15th August 1997 and decree no. 614 of 21st May 1999.

Ministry of the Environment Decision on some exceptions from the contents on the concentration of heavy metals in packaging, no. 273 of 29th February 2000.

Voluntary agreements

Agreement for better recovery and utilisation of packaging and packaging materials in Finland, 14th March 1995

Strategies

The National Waste Plan until 2005, 1998

1.1 Responsibilities of operators

1) Packers and importers of packed products are receiving greater responsibility for the environment. In accordance with this, firms are required to assume responsibility for the recovery of packaging that they have put on domestic markets. A packer or importer of ready packed products whose ready packed products have taxable sales of a value of at least 5 million FIM in a calendar year are required by law to inform the Finnish Environment Institute about statistics on packaging for the previous year. Firms can be released from this by joining a producer by registering with the PYR (The Environmental Register of Packaging PYR Ltd) which will collect data on packaging put on the market by the respective firms.

2) According to the *waste act* the waste producers shall organize the collection of waste. Property holders shall, however, organize the collection of waste covered by a waste transport scheme. Waste producers shall deliver such waste to a collection site provided by the property holder. The municipality can designate the collection site to which the waste shall be delivered for the waste transport scheme. The waste holder shall organize waste management for improving waste recovery or any other organization of waste management,

or for prevention of combating the hazard or harm arising from waste if the Government has not decided otherwise.

3) A system has been created to help firms whereby the responsibility for the recovery of different packaging materials can be transferred to relevant organisations, the Environmental Register of Packaging PYR Ltd. Local authorities and, in a contractual waste transport scheme, the transporter of packaging waste must handle waste in their possession in such a way that the minimum targets of packaging waste recovery as stated in the *Government Decision on packaging and packaging waste*, section 4, are met and as well as the other duties laid down are fulfilled.

4) According to the *Ministry of the Environment Decision regarding approval of a system for reuse of sales* p*ackaging for Soft Drinks and Alcoholic Drinks, 1994*, packers (producers and importers) must prevent the generation of packaging waste and see to the reuse of packaging and recovery of packaging waste and carry the costs thereof in proportion to the volume and type of packaging they place on the market, so that the minimum targets (*Government Decision on packaging and packaging waste*, section 4) are attained and that the other duties of packers laid down are fulfilled.

5) By setting up and maintaining producer corporations or by other cooperation, economic operators must see to the fulfilment of their duties concerning waste management as laid down above. A firm can be released from the responsibility concerning recycling and recovery by entering into a contract with a producer corporation. The producer organisations, established for the recovery of packaging materials, will undertake to operate in such a way that the targets set for their respective materials are met. Environmental Register of Packaging PYR Ltd. acts as a coordinating body for the producer corporations.

6) Both the Environmental Register of Packaging PYR Ltd, and the producer organisations have been established to fulfil the EU packaging directive and new legal obligations. The law entitles packers and importers of ready packed products to transfer responsibility for the recycling and recovery of packaging to the producer organisations. In practice it is most rare that a firm is able to take care of packaging delivered to end-users itself without help from the producer organisations.

1.2 Targets and Instruments

7) In the Government Decision minimum targets are set for packaging materials. The aim is that by June 30, 2001:

- At least 6% less packaging waste than in 1995 is generated per year relative to the volume of packed products consumed in Finland;
- At least a total of 82% by weight of all used packaging is reused, and of all packaging waste is recycled or otherwise recovered, per year;
- At least 61% by weight of all packaging waste is recovered per year, so that at least 42% of the total packaging waste and at least 15% by weight of each waste material is recycled:
- 75% of fibre-packaging waste is recovered and 53 % recycled, and 48% of glass-packaging waste is recycled, and 25% of metal-packaging waste is recycled, and 45% of plastic-packaging waste is recovered.

8) A tax system to encourage the re-use of disposable drink containers has been in effective use since the 1970's. According to the present provisions (acts on the taxation of alcoholic drinks - 1471/1994 and on the taxation of sweets and beverages - 1474/1994), a supplementary tax must be paid for beverages, beer and other alcoholic drinks, depending on the type of packaging used, as follows:

- when no recovery of packaging waste, 4 Finnish marks/litre;
- when material recovery of packaging waste, 1 Finnish mark/litre;
- when reuse of packaging, no supplementary tax.

9) *The National Waste Plan Until 2005* is the national plan of the Finnish Government. The plan sets recovery levels of e.g. packaging materials in order to reach the recovery targets in the Waste Plan described above. The National Waste Plan refers to targets of the Government Decision. The levels should be reached by the year 2005.

Waste type	Recovery level percentages	Means of recovery
Packaging waste	70	Use as secondary raw material, recovery of energy

10) The Environmental Register of Packaging PYR Ltd works in close co-operation with the producer organisations in producing statistics and collecting recovery fees for the various materials. The PYR is a non-profit company.

1.3 Further Provisions

11) There is a national waste tax on waste for landfilling of 90 FIM/tonne in municipal landfills *(Waste Tax Act 1998)*. Other landfills do not have such tax. If the weight of the delivered waste is unknown, the tax is calculated by multiplication of the volume of the waste with a coefficient for the waste fraction as described below. There is no tax for waste for recycling.

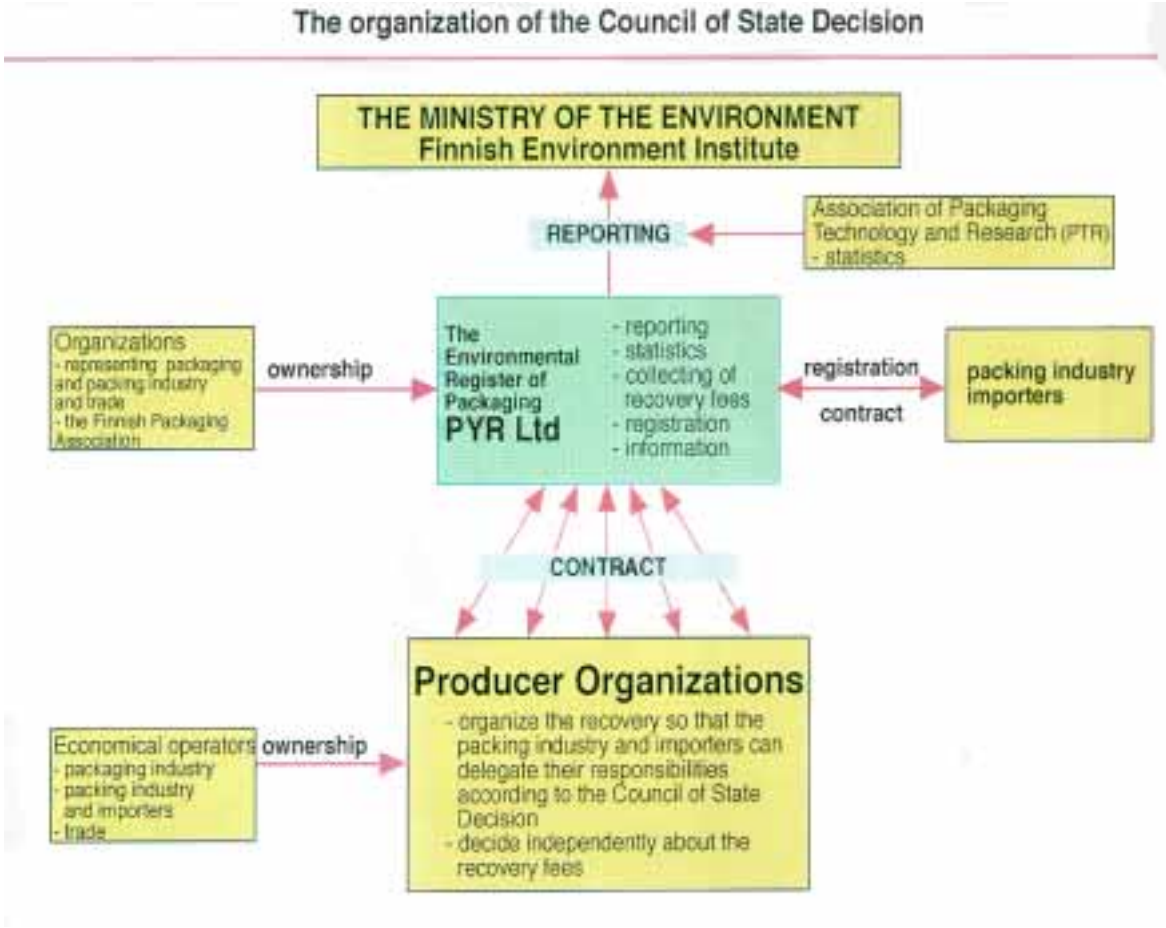
Table 1: Taxes on waste

Type of waste	Tonne/m^3
Solid waste from municipalities and industries brought to depots:	
• With vans	0,35
	0,10
• Waste from municipalities	0,18
• Industrial waste	0,30
Sewage sludge from municipalities and sludge from the industry:	
• From metal industry	2,00
Sludge from other sources:	
• Drained sludge	1,30
• Others	1,10
Ash and slags	1,30
Building and construction waste	0,60
Unsorted soil and gravel materials	1,30
	0,70

2 Packaging Waste Management System

2.1 Compliance scheme

12) In Finland the Environmental Register of Packaging PYR Ltd. is the centralised organisation that takes care of contacts with the packers and importers of ready packed products on behalf of the producer organisations. The PYR maintains the producer register, provides reliable statistics on packaging and informs and reports on the implementation of recycling and recovery of packaging.



13) The producer organisations are incorporated, non-profit companies formed at the beginning of 1998 in compliance with the law. Their objective is to avoid overlapping organisations and any ensuing unnecessary costs.

14) The founders and in many cases shareholders of the producer organisations consist of the entire packaging chain: the packaging industry, the packing industry, importers and the wholesale-retail trade together with manufacturers of packaging raw materials and recovery firms for packaging waste. Each producer organisation has been entered in the waste file kept by the Regional Environmental Administration in its own area.

15) The producer organisations organise the recovery of packaging waste in Finland. Materials-based recovery fees were introduced in 1998 for financing purposes. Joining a producer organisation is essential, as only in exceptional cases a packer or importer of ready packed products can keep track of packaging that they have put on the market or take care of attaining recovery targets or of the obligation to provide the necessary information and

reports. Firms can join the producer organisations by making a contract with the Environmental Register of Packaging PYR Ltd.

16) In Finland there are producer organizations covering the following packaging materials:

- Corrugated board
- Glass
- Paperboard boxes
- Metals
- Industrial fibre based packages
- Beer and beverage
- Milk and juice cartons
- Plastics

2.2 Collection and sorting

17) Packers, fillers and importers are responsible for the recovery of packaging waste while local authorities are responsible for the collection of household packaging waste.

18) When the Government Decision on packaging and packaging waste came into force in December 1997, the packaging sector set up and ran the necessary producer organisations, eight in all, and the umbrella organisation, The Environmental Register of Packaging PYR Ltd, was established. The producer organisations handle local collection and transportation of the material either through their own companies or together with local firms, depending on the material collected. Paper, cardboard and corrugated board are recycled, glass is recycled, some plastics are incinerated and the rest goes to landfill.

19) There are several local systems where households are required to separate their waste: paper, bio-waste for organic recovery, combustibles for energy, in some areas also some recyclables, the rest for landfill.

20) For the time being packaging waste systems concentrate more on trade, industry and institutional packaging waste. Collection from consumers has been started in the largest cities. The situation by material is as follows:

Table 2: Packaging waste collection modalities

corrugated board	from trade and industry (over 80 % collected), some bring system collection sites for consumers
paper and cardboard	bring systems for consumers (blue bins), LPB is collected separately in yellow bins
glass	general collection points by the streets and deposit system (60 % collected), deposit system is in operation for the refillables (over 90 % returned)
metals	only starting with consumers
plastics	only starting, several trials during the last 10 years.

2.3 Treatment systems and outlet of recycling activity

Glass

21) The producer organisation for glass is Suomen Keräyslasi py (The Finnish Glass Collection Association).

22) The deposit systems are used to guide people to return their glass bottles. Over 90 % of beer and beverages are sold in returnable, refillable bottles: glass for beer, and PET for beverages. Glass is also used for wines and liqueurs, with a 70 % reuse rate in the Alko system. The average life-time of a glass bottle is 5-10 years, with 5 fillings a year. Approximately 25,000 tonnes of glass for cullet is recycled every year through these systems. The systems are used for bottles of bear, soft drinks and alcoholic beverages. Alko Ltd. has a similar system for their imported disposable bottles.

23) A-Pullo Ltd., the subsidiary of Primalco, has the main responsibility for the refillable alcoholic beverage bottles. The company purchases, receives and leases out bottles to the beverage industry. A-Pullo Ltd. handles over 80 million refillable bottles every year. The investments on the collection automates, the case and bottle systems, the sorting machines and the washing machines are approximately 1.2 billion marks in Finland.

24) Finland has a well-organised municipal collection system which mainly handles the kind of glass containers that are not returned via deposit systems. The waste glass collected by the municipalities is washed and sorted out according to colours in the plants in Jokioinen for recycling.

25) In the long term, there has been a balance between the collected and recycled glass. One problem is the colour distribution of the collected glass. The glass imported to Finland is mainly green whereas the glass produced here is clear. Occasionally, there is a surplus of green glass, which cannot be recycled completely. Members of Finnish Glass Collection Association:

- Alko Ltd (the refill system of Alko Ltd.)
- Food Industry Association (the glass containers of alcoholic beverage industry, juice and jam industry, and canned goods industry)
- Brewery Association (the glass containers of breweries and soft drink industry)
- Retailers Association (imported glass containers, the refill and collection systems)
- Karhulan Lasi Oy (Owens-Illinois) (the manufacturing and utilization of glass containers)
- Isover Oy (Saint-Gobain) (the manufacturing of glass wool)

26) Isover Oy uses recycled glass as the primary raw material for its insulating products. The products contain up to 80 % of recycled glass. The manufacture of insulating products is an important element in Finland's glass recycling system. Using recycled glass as a raw material for glass wool also reduces energy consumption in the manufacturing process. Isover has used recycled glass as a raw material since 1983, and has over the last five years used over 132,000 tonnes of recycled glass in the manufacture of its products.

Paper and cardboard

27) The organisation for:

- corrugated board is: Suomen Aaltopahviyhdistys ry.
- paperboard boxes is: Suomen Kulutttajakuito Oy
- industrial fibre based packages is Suomen Teollisuuskuito Oy.
- milk and juice cartons is Suomen NP-kierrätys Oy.

Plastics

- The organisation for plastics is Suomen Uusiomuovi Oy.

Metals

28) According to www.mepak-kierratys.fi the metal packaging recovery organization, Mepak-Kierrätys Oy, was founded in October 1997 and registered by the authorities in February 1998. Typical metal packaging includes food cans, paint pails, drums, crown caps, closures, aluminium trays, aerosols and steel bands. Suomen Palautuspakkaus Oy stands for deposite based beverage cans. The shareholders are metal packaging manufacturers, the packing industry and retail-wholesale trade organizations in Finland, amounting to 12 shareholders in all.

29) Mepak coordinates the collection of metal packaging and carries out different kinds of studies and research to find out the best possible solutions for the recovery of packaging in Finland. Mepak-Kierrätys Oy has made a contract with Kuusakoski Oy, the largest scrap metal company in Finland, to ensure the reuse of the tinplate scrap. The registered supplier will get a compensation for tinplate and aluminium packages delivered to Kuusakoski plants or collection centers.

30) Package made of tinplate must be crushed before being despatched to melting plants abroad. Pure steel packaging can be sold directly to scrap firms. Steel drums are reused after reconditioning in special plants. Steel packages can be sorted by magnetic extraction and also aluminium packages mechanically. By use of recycled steel the saving in energy is 75 - 95 % compared to virgin raw material. Each steel can contains more than 25 % of recycled metal.

2.4 Financing of the system

31) The PYR's membership fees and annual fees finance the system. The basis of the fees is presented in the following table:

Table 3: The PYR's basis for fees 2000

Fee class	Turnover of firm's location	By location	
		Membership fee	Annual fee
A	Over FIM 100m	FIM 1,000 + VAT	FIM 2,700 + VAT
B	FIM 10-100m	FIM 700 + VAT	FIM 1,800 + VAT
C	FIM 5-10m	FIM 300 + VAT	FIM 900 + VAT
D	FIM 1-5m	FIM 200 + VAT	FIM 0
E	Under FIM 1	FIM 100 + VAT	FIM 0

32) The funding needed for recovery is collected from packers and importers of ready packed products in the form of recovery fees. The PYR and the respective producer organisations take care that these fees are fair. The fees are collected virtually by the PYR.

Table 4: Recovery fees 2000 and 2001

Material	FIM/1000 kg + VAT	
	2000	2001
Corrugated cardboard packaging (fibre)	20	20
Industrial wrapping/sacks (fibre)	50	50
Rolls (fibre)	50	50
Consumer packaging/wrapping (fibre)	25	25
Liquid packaging (fibre)	100	100
Plastic packaging	80	80
Aluminium packaging	70	80
Tinplate packaging	70	80
Steel packaging	5	5
Deposit beverage cans (aluminium and tinplate)	0	0
Glass packaging	0	50
Wooden packaging	0	0
Other	0	0

2.5 Monitoring and control

33) The wholesale retail trade itself monitors registration by packers and importers. The ultimate responsibility for such monitoring lies with the Ministry of the Environment aided by the Finnish Environment Institute and its regional environment centres. The Ministry of the Environment in conjunction with the Finnish Environment Institute monitors the operations of the producer organisations and has the authority to issue more specific regulations and instructions.

34) In cases, where the producer of packaging, the producer organisation or producer of packaging waste does not comply with the decision of the Government, coercive means or other consequences shall be applied, as prescribed in chapter 10 of the Waste Act.

2.6 Quantities of circulated packaging and recovered packaging waste

Total packaging consumption and packaging waste recovery

35) The quantity of packaging placed on the market and recovered in Finland in 1997 as reported to the European Commission according to article 12 of the Directive are shown in Table 5. The figures on recovery include the quantities of packaging waste which have been arisen in Finland and were exported for recovery. Total packaging consumption in 1997 amounted to 416.5 ktonnes which corresponds to 81.2 kg per inhabitant and year. According to the reported data Finland achieved a recovery rate of 54.1%, mainly by recycling (41.8%). The highest recycling rate was achieved for paper and cardboard with 56.5%, the lowest for metal packaging (8.4 %).

Table 5: Packaging consumption and packaging waste recovery in 1997

Material	total	recycling	energy recovery	total recovery	recycling	energy recovery	total recovery
	kt	kt	kt	kt	%	%	%
Glass	52,000	24,900		24,400	47.9%		47.9%
Plastic	90,000	9,200	11,000	20,200	10.2%	12.2%	22.4%
Paper and Cardboard	243,500	137,600	40,000	177,600	56.5%	16.4%	72.9%
Metals	31,000	2,600		2,600	8.4%		8.4%
Total	416,500	174,300	51,000	225,300	41.8%	12.2%	54.1%

36) Statistics of quantities of packaging waste handled in Finland in 1998 have been collected by PYR (see www.pyr.fi). In Table 6 recycling results for 1998 are presented. The figures provided in table 7 includes packaging waste amounts which have been exported for recycling. Exports and imports for recycling are shown in table 8. From 1997 to 1998 the recycling was intensified for all packaging materials and the minimum recycling target per material of 15% is even for plastic packaging almost achieved.

Table 6: Quantities of packaging waste arising and recovered in 1998

Material	Total	Recycling		Recovery	
		tonnes	%	tonnes	%
Glass	55,700	41,400	74.3%	41,400	74.3%
Plastic	89,400	12,700	14.2%	21,700	24.3%
Paper/cardboard	246,000	150,400	61.1%	187,400	76.2%
Metals	32,000	6,200	19.4%	6,200	19.4%
Total	423,100	210,700	49.8%	256,700	60.7%

Table 7: Monitored quantities of packaging waste exported and imported for recycling in 1998 (in tonnes)

Material	Exported quantities for recycling	Imported quantities for recycling
Glass	6,800	
Plastics	3,500	
Paper and cardboard	10,000	50,000
Metals	1,200	
Total	21,500	50,000

37) Finland is one of the leading countries in Europe in the reuse of packaging. Table 8 shows the development of reuse as percentages of total use from 1994-1998. The large positive change in the reuse of metal packaging is mainly due to a change in the types of packaging included in the statistics. The figures for 1997 include certain items required by EU regulations, such as dairy containers, wire trolleys and beer packaging. These were not included in the statistics for 1994.

Table 8: Development of reuse of packaging as percentages of total use from 1994-1998

Year	Total	Paper fibre	Glass	Metals	Plastics
1994	56%	-	87%	14%	59%
1997	64%	5%	87%	86%	69%
1998	66%	5%	85%	90%	70%
Change % 1998-1994	+10%	+5%	-2%	+76%	+11%

3 Further development

Glass

38) The glass consumption (new packaging) per inhabitant in Finland is very low because of the refillable glass packaging system. Taxation has a strong influence on reuse and recycling of glass as well as on the amount of glass waste in Finland. The use of glass, if refillables are included, is 63.6 kg/person, far from low (dispoasable glass packaging: 10.1 kg/person). The treatment capacity is sufficient for the present amount of collected glass packaging waste, but if there is a substantial increase in the amount, there will not be sufficient capacity to recycle it. Even now, some of the glass cullet is exported to countries outside EU and, in the long run, most problematic will be the markets for the recycled material.

Paper/cardboard

39) In 1998, the recycling rate for paper/cardboard was rather high amounting to 61% and the paper mills in Finland do have sufficient capacity to recycle all the material collected.

Plastics

40) There is no feedstock recycling capacity in Finland, and there are no plans to build it in the foreseeable future, either. The consumption of one-way plastics (17.5 kg/person) is low because of the well-working refillable plastic packaging systems. More refillables are expected especially in the soft-drinks business. It is likely that there will not be enough treatment and convertion capacity for collected plastic packaging waste exceeding 20 % recycling level. At least for the time being mixed consumer plastics waste cannot be recycled. Generally, more outlets are needed for the recycled material. Collection and recycling of plastic packaging is hindered by the low material flow in combination with the low population density.

Collection and recycling

41) The extension of separate collection from households for some packaging materials is envisaged. The main limiting factor is the fact that more than 90 % of the country has a population density less than 5 persons/ sqkm. Establishing new collection systems will result in a considerable increase of costs due to long distances and rather low amount of packaging materials. This also effects the recycling of plastics and aluminium in particular. The limited flows of plastic and metal packaging waste hinders the establishing of sorting plants and specific recycling plants. Almost all collected PET and aluminium packaging is exported, because the waste flow is much too low to be recycled within Finland

4 References

The Environmental Register of Packaging PYR Ltd (www.pyr.fi)

Mepak-Kierrätys Oy, www.mepak-kierratys.fi

The National Waste Plan until 2005, 1998

France

Contents

1 Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 1
1.2 Responsibilities of economic operators 1
1.3 Targets and Instruments 3
1.4 Further Provisions 4
2 Packaging Waste Management System 5
2.1 Compliance scheme 5
2.2 Interactions between Eco-Emballages and local authorities 8
2.3 Collection and sorting 10
2.4 Treatment systems and outlet of recycling activity 11
2.5 Financing of the system 12
2.5.1 Calculation of the financial support to Local authorities 14
2.5.2 Support tariffs for energy recovery 16
2.5.3 Other financial supports 17
2.6 Monitoring and control 18
2.6.1 Control performed by authorities 18
2.6.2 The compliance with the packaging regulation. 18
2.6.3 The annual control of the accredited organisations activities. 18
2.7 Quantities of circulated packaging and recovered packaging waste 19
2.8 Import/Export of Packaging waste 22
2.9 The recycling and recovery capacities in France 23
3 Perspectives 26
4 References 28

List of tables

Table 1: Tariff overview 13
Table 2: Tariff overview (continued) 13
Table 3: Fee by weight of material 14
Table 4: Guaranteed prices according to material (indicative price 1998) 15
Table 5: Subsidies according to material 16
Table 6: according to material from slags or compost 16
Table 7: Amount of packaging waste recycled and recycling rate in 1997 (in kt) 20
Table 8: Amount of packaging waste recycled and recycling rate in 1998 (in kt) 21
Table 9: Amount of packaging entrusted to Eco-Emballages and recycled in 1997 21
Table 10: Amount of packaging entrusted to Eco-Emballages and recycled in 1998 21
Table 11: Amount of packaging entrusted to Eco-Emballages and recycled in 1999 22
Table 12: Imports and exports of packaging waste for recovery in 1997 22
Table 13: Imports and exports of packaging waste for recovery in 1998 22
Table 14: Distribution of the Plastic market in France 24
Table 15: Plastic packaging recovery in 1997 (in tonnes) 24
Table 16: Recycling targets for household packaging waste 27

1 Legislation and Voluntary Agreements

1) In France the management of packaging waste is defined by two main ordinances:

- **the Household Packaging Waste Decree (Lalonde Decree) N° 92-377** of April 1st, 1992, applying to waste arising from abandoned packaging (implementing Law n° 75-633 of 15 July 1975 regarding the disposal of waste and recovery of materials)
- **the Decree n° 94-609 of 13 July 1994** implementing Law n° 75-633 of 15 July 1975 concerning waste disposal and material recovery and in particular concerning packaging waste for which the holders are not households.

2) French packaging legislation also consists of:

- **The Decree (N° 96-1008) on waste management plans for household waste**. This defines the minimum content of plans to be drawn up by each Department, in view to co-ordinate the actions needed by both public and private bodies to ensure the disposal of waste and any other waste which , because of its "nature", can be treated in the same plants as household waste. This Decree includes the quotas set by the European Packaging Directive
- **The Decree (N° 98-638) of 20 July 1998** concerning consideration for environmental requirements in the design and manufacture of packaging

3) Let's also mention the Act n° 75-633 of 15 July 1975 on the disposal of waste and the recovery of materials, amended on 13 July 1992 and 2 February 1995. This essentially deals with the methods of waste "disposal" . According to this, "disposal" includes "*collection, transport, storage, sorting and necessary treatment for recovery of reusable materials and elements or energy, as well as the dumping or disposal into the natural environment of any other products under conditions appropriate to avoiding nuisances*". This act introduces a minimum "priority order" between the waste treatment methods which can be interpreted as follows:

- Prevention
- Recovery by reuse, recycling or energy applications
- Dumping final waste.

4) According to the Act 75-633, any person who produces or holds waste is bound to take care of its disposal, or have it taken care of by a third party, in an "environmentally adequate way"(art. 2). The 1992 amendment to the Act introduced the concept of "final waste" which means "waste which is no longer suitable for treatment under the technical and economic circumstances of the time". Article 2-1 states that the dumping will be prohibited as from July 2002 except for final waste.

1.1 Objectives, Definitions and Field of Application

5) The article 2 of the Lalonde Decree defines packaging[19] as "*any type of container or auxiliary item intended to hold a product, to facilitate its transport or its presentation for sale*".

1.2 Responsibilities of economic operators

6) French legislation introduces a fundamental distinction between packaging waste generated by households and that which originates from commerce and industry.

[19] The Lalonde Decree and so, this definition, only applies to packaging waste produced by households.

A) The Lalonde Decree N° 92-377 of April 1 1992 – The case of household packaging waste

7) The Decree n° 92-377 of April 1st, 1992 defines the main organisational axes of the whole management system for household packaging waste in France. It has been in force since January 1993. It covers the disposal in the sense of the 1975 Act (see above), of waste resulting from abandoned packaging used for distributing products consumed or used by households (art. 1) and defines the responsibilities of the different players.

8) The producer means "any person who, for professional purposes, packages or causes to be packaged products with a view to placing them on the market (art. 2)".

9) Any producer or any importer whose products are marketed in packaging (serving the purpose of marketing products consumed or used by households) shall be required to contribute to or to provide for the disposal of all this packaging waste. If the producer or importer cannot be identified, the person responsible for first placing these products on the market will have the same obligations than the producer (art. 4). To fulfil their obligations, the packaging producers (or importers) have two possibilities (art. 4, 5 and 10):

- either they provide by themselves via a deposit system or the organisation of specific areas, for the disposal of the waste arising from the abandoned packaging they use,
- or they use the services of an accredited organisation which will take on the disposal of their used packaging on their behalf. The packaging producers have then the obligation to identify the packaging which they entrust to the accredited organisation.

10) The producers (or importers) who intend to comply by themselves for the disposal of their waste arising, must [20]:

- either establish a deposit arrangement for their packaging ,
- or organise sites specifically intended for depositing this packaging.

11) In the latter case, they must first obtain the approval by a joint order of the Ministers of the Environment, of Industry and Agriculture of the arrangements for supervising the disposal system which will enable them to measure the proportion of packaging disposed of in relation to packaging sold. The packaging waste disposal remains competence of the municipalities and producers (or importers) must respect the provisions of the Municipal Code (art 4). Those thus keep the operational control of the collection, sorting and the disposal of packaging waste.

B) The Decree N° 94-609 of 13 July 1994 on packaging waste in which the holders are not households – The case of commercial and industrial packaging

12) This Decree came into effect in September 1994 for paper/cardboard and in July 1995 for other materials. The Decree governs the disposal, in the sense of the 1975 Act, of "waste resulting from the discarding of packaging of a product at all stages of manufacture or sale, other than through the consumption or use by households" (art. 1). The only methods of disposal authorised for the packaging waste are recovery by re-use, recycling or any other action intended to obtain re-usable materials or energy (art. 2). The regulation defines no hierarchy between those different recovery methods. To this end, the holders of packaging waste must (art. 2):

In 1999, only two « individual »take back systems had been approved by public authorities in France (Amorce, 1999)

- either organise its recovery by themselves in approved facilities
- or hand it over under contract to the operator of an approved facility
- or hand it over to an intermediary offering a transport, trade brokerage service for waste.

13) Exemption: Holders of packaging waste who produce a weekly volume of less than 1,100 litres and who confide this to a municipal collection and treatment service are exempted from the obligation to recover their packaging waste.

The co-ordination between systems for household and non household packaging

14) The difference between a household and a non household packaging is based on the characteristics of the final holder and not on the nature of the waste. It is thus not easy for the producer to know where its packaging will end when it is placed on the market and a same packaging can become a household waste or not according to the circumstances of its consumption. But the designation of a packaging as meant for household consumption or not defines the financial conditions of the management of its waste. If the product's packaging will end in households, its producer will have to subscribe with an accredited body. Some producers, whose a part of packaging will end up in households are reluctant to declare these to the compliance schemes. In the case the producers cannot define the exact final destination of his products, Eco-Emballages agrees, after negotiations on the basis on statistical repartition, on a contribution for a defined portion of the packaging (Eco-Emballages, personal communication).

1.3 Targets and Instruments

Prevention

15) The Decree 98-638 of 20 July 1998 related to "the environmental requirements in the design and manufacture process" transposes the essential requirements of the Directive 94/62 on the composition, the reusable and recoverable nature of packaging (art. 3). It also adapts the maximum concentration levels of heavy metals fixed in the article 11 of the Directive (art. 4). This Decree applies to any packaging manufactured, imported or hold with a view to sell it or distribute it for free (art. 1) with exception of packaging used for specified products before 31 December 1994 (art. 5).

16) The responsible person is the packaging manufacturer (or his representative established in the European Community or in another State from the European Economic area[21]) (art. 8). The public administration can ask the packaging manufacturer to provide a technical documentation relative to the conception and manufacture of the packaging (art. 9). The packaging meeting harmonised European Standards of which the references have been published in the Official Bulletin of the French Republic are considered to correspond to the requirements of the Decree (art. 8).

17) According to their accreditation acts, Eco-Emballages or Adelphe may undertake actions aiming at the prevention of the household packaging waste production. The accreditation act also mentions that the calculation basis of the fees must encourage, for each material, the reduction at source of the weight and volume of household packaging waste.

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1) [21] In case the packaging manufacturer or his representative are not established in those countries, these obligations are incumbent on the person who places this packaging on the market.

18) Eco-Emballages has taken the initiative to publish a catalogue compiling examples of prevention initiatives for packaging. This kind of initiative is also taken by the “Conseil National de l’Emballage” (National Council on Packaging) which published a “Methodological Guidebook on prevention in the packaging conception and design” . ADEME also launches calls for projects and finances various initiatives in the field of packaging prevention.

Reuse

19) No specific target is defined in the French legislation for reuse of packaging. The Decree N° 92-377 provides the opportunity for producers or importers to organise a deposit system. Actually, no packaging producer has chosen this option (Amorce 1999). According to estimates made by Adelphe in 1993, most re-usable household packaging In France are used in the Wine sector. In 1993, the re-usable rate in this sector was estimated to about 29% (Amorce 1999).

20) According to ADEME, there are also important initiatives developed in the reuse of industrial packaging waste notably for transport packaging (crates, pallets, boxes,…) even though those fluxes are not quantified at the national level.

Recycling

21) The two Decrees (92-377 and 94-609) on Packaging waste define no specific objectives. These objectives are set in the Decree N° 96-1008 on waste management plans for household waste. This transposes for 30 June 2001, the minimum and maximum targets, as they appear in the Directive 94/62/CE that is:

- 50% -65% recovery
- 25% -45% recycling
- 15 % recycling of each material.

22) In practice, the corresponding targets are stated in the approval granted to the systems by the government. According to this, the new accreditation act, granted to Eco-Emballages and valid since 1999, reproduces the same objectives as those defined in the Directive. Those objectives are to be achieved before the 30th of June 2001. Besides, a total recovery target of 75% of household packaging waste contributing to the accredited organism has to be achieved at the end of 2002.

1.4 Further Provisions

23) The Decree 92-377 provides that in every case, the producers (or importers) of packaged products have to communicate to the ADEME (Agence de l’Environnement et de la Maîtrise de l’Energie) statistical information relating to the quantities of packaging placed on the market as well as the quantities of packaging waste actually recuperated and recovered (art. 11).

2 Packaging Waste Management System

2.1 Compliance scheme

The case of industrial packaging waste

24) According to the Decree 94-609, the holders of industrial packaging waste who produce a weekly volume of more than 1,100 litres must provide for their recovery or reuse and :

- either organise its recovery by themselves in approved facilities
- or hand it over under contract to the operator of an approved facility
- or hand it over to an intermediary offering a transport, trade brokerage service for waste.

25) Several organisations such as Recyfilm for plastic films, Ecofut, Recyclacier for steel packaging , Eco-Bois and Ecopse for wood packaging, Revipac for paper and cardboard or CSVMF are active in this field and provide for the recovery of industrial packaging waste.

The case of household packaging waste

26) When the producers (or importers) do not intend to comply by themselves with the recovery requirements for their waste arising , they must conclude a contract with an accredited organism. This contract must lay down the type of packaging, the anticipated volume of the waste to be taken back each year as well as the fee due to this organisation or company (Decree 92-377, art. 5). Companies and/or organisations are accredited by a joint decision of the Ministers of the Environment, Economy, Industry, Agriculture and Local Authorities for a period of six years. The candidate accredited company must mention the objectives it intends to meet (Decree 92-377, art. 6).

27) Three organisations have been accredited to date: Eco-Emballages which covers the largest part of the households packaging waste and Adelphe, created in January 1993, who was during the first three years of its activities, assigned with the task of taking back glass bottles from wine and spirits before extending its activities to all packaging materials. Cyclamed is a voluntary system aiming at treating expired medicines and their packaging. It was accredited for the first time in 1993.

The accreditation commission

28) The demand of approval is first examined by the “Commission consultative relative à l’agrément des organismes au titre du décret du 1er avril 1992 ” (The Consultative Commission). The composition of this Commission is fixed by ministerial order. The commission was until mid 2000 composed of 33 members and 33 substitutes. A new ministerial order of 20 April 2000, fixes this Commission composition to 37 members, distributed as follows:

- 8 representatives of local communities
- 7 representatives of professional organisations of product producers for household consumption
- 5 representatives of packaging and packaging materials producers
- 2 representatives the retail sector

- 2 representatives of the waste management and recycling industry
- 4 representatives of NGO's for Environmental protection
- 4 representatives of consumers organisations
- 5 representatives (1 each) of various ministries (Environment, Competition and Consumption, local communities, Economy, Industry).

29) The Consultative Commission is consulted for demand of accreditation of organisations or in case of withdrawing due to disrespect of the conditions of approval. Since mid 2000, the Commission has also to give its opinion about the annual reports of the accredited bodies. The Chairman is appointed by the Minister of Environment. Initially, the Commission was only implied in the approval of the organisation but the day by day experience has shown that a consultation structure was necessary and the Commission is committed to this function. The specifications of the accredited organisation are adapted in accordance with the Commission comments.

30) After having received an approval from the Consultative Commission, the candidate accredited organisation are accredited by Ministerial order for a period of 6 years. Let's mention anyway that the role of the "Consultative Commission" is only consultative. The Ministry is not obliged to follow the Commission's opinion. In addition, a National Packaging Council (Conseil National de l'Emballage) which was founded in 1997 gives representatives from politics and industry the chance to come together and work out long-term plans for the handling of packaging waste.

The accredited organisations

31) In France, there are two concurrent accredited organisms active in the household packaging waste collection and recovery. The main one – Eco-Emballages – will be described in detail below. We will now focus on Adelphe, the smaller accredited organism which was, at first, focused on glass containers before extending its activities to all materials.

32) Let's also mention Cyclamed which is the answer of professionals from Pharmacy and Medicine sector to the Decree 92-377. The sector has developed a collection circuit for old medicines and their packaging functioning through the chemists retail sector. Cyclamed was accredited by the Consultative Commission for the first time on 1993 (for its activities related with packaging waste). However, only 2 percent of the waste collected are completely empty packaging. Most waste is incinerated. Recoverable medicines are used for humanitarian purpose.

Adelphe

33) Reacting to the 92/377 Decree , the wine and spirits sector decided on 11th September 1992 (St Adelphe's day) to assume by themselves their take-back obligation and created Adelphe. Adelphe was accredited for the first time on 5 th February 1993. This agreement was renewed for six years by the Consultative Commission in 1996 and 2000. Adelphe (as well as Eco-Emballages) actually aimed at valorising the acquired experience in selective collection and recycling of glass containers acquired since 1976 first by the Recycling Commission then by Verre Avenir. These structures created by CSVMF - Chambre Syndicale des Verreries mécaniques de France - (French Federation of Glass Manufacturers) had already established close contacts with municipalities for glass recycling. In 1991, in France, 46,000 bottle banks allowed the collection of more than half of glass containers put on the market that is 1.1 million

tonnes per year (Amorce 1999). Since the beginning of its activities, Adelphe allowed in 1999, the settlement of 21,000 new bottle banks[22].

34) During the first three years of its activities, Adelphe focused exclusively on glass. Since 1996, according to its accreditation conditions, Adelphe has extended its activities to all materials[23]. This was justified by the fact that contributions from Adelphe's members concerned all materials. Adelphe helps local authorities for the collection and recovery of household waste by concluding 6 years contracts which provide for financial supports. This contract includes various components that is:

- support for sorted materials
- temporary support for specific types of housing (high rise and scattered rural housing)
- support to investment (for bottle banks)
- support for the starting of operations
- support for communication and youth employment

35) Adelphe offers two types of contracts to local authorities:

- **A mono-material contract** only for glass including a support to investment (for bottle banks) and a support for sorted materials
- **A multi-material contract** which provides for the same clauses as the ones of the Eco-Emballages in terms of minimum technical prescriptions or support scales.

36) Adelphe offers also a take-back guarantee to local authorities. For this, it concluded agreements with the following guarantors: CSVMF - Chambre Syndicale des Verreries Mécaniques de France for glass, Revipac for cardboard, Usinor Packaging for steel, France Aluminium Recyclage for aluminium and Valorplast for plastics. In 1999, Adelphe had concluded 1.500 mono-material contracts with local authorities covering a total population of 12 million inhabitants. The multi-material contracts, developed since 1997, had been in 1999 concluded with 41 "communities" covering 400,000 inhabitants.

37) In 1998, the Adelphe's members contributions amounted to 36.4 million FF of which 26.6 Millions FF for glass and 9.8 Millions FF for other materials. The same years the total amount of Adelphe's expenses were distributed as follows:

Posts	Support (in thousand FF)
Glass	
➢ support for sorted materials	15,000
➢ support to investment (for bottle banks)	6,600
➢ support for communication	1,100
Multi-materials	
➢ support for communication	2,400
➢ support for sorted materials	1,100
➢ support to investment (for bottle banks)	600
➢ studies	200
Total	**27,000**

[22] The total number of bottle banks installed by Eco-Emballages since the beginning of its activities amount to 45,000 (Eco-Emballages, personal communication)

[23] According to the accreditation act, Adelphe's activities for other materials cannot exceed the total members'contribution for these materials.

Eco-Emballages

38) The foundation of Eco-Emballages as a limited company on August 12, 1992 laid the basis of the integrated collection system for household packaging required by the Decree 92-377. Officially recognised by the French authorities on 22 November 1992 for a period of six years, this approval was renewed in 1996 with more favourable reimbursement conditions for the local authorities costs. Eco-Emballages has introduced in advance a new accreditation demand in 1998. This new accreditation conditions are valid for six years since January, 1st 1999.

39) Eco-Emballages has 240 shareholders. 70 percent of the shares are hold by packaging manufacturers and importers (gathered in Ecopar), 20 percent by the five guarantors and 10 percent by the retail chains. Eco-Emballages is a multi-product, multi-material recovery organisation active only for household packaging waste. Its role is to arrange for an efficient transfer of funds from the producers of packaged consumer goods to local authorities in order to support selective collection and sorting of packaging waste.

Interactions between Eco-Emballages and adhering companies

40) The membership to Eco-Emballages gives rise to a six years contract. This enables producers to discharge their legal obligation to dispose of household packaging waste generated in the course of their activities (Eco-Emballages contract , art. 1). In return, the member must make a financial contribution to Eco-Emballages, calculated on each packaging and outer packaging.

41) The contract grants the members the right to affix the “Green Dot” symbol on the packaging of their products, as a symbol of their membership. The marking of all packaging participating in the Eco-Emballages system is mandatory (contract, art. 8). The contract is extended to all goods manufactured, imported, sold and/or distributed in France, intended for household used or liable to be used by households. Optionally, commercial packaging equivalent to household packaging but used in establishments such as hotels and restaurants, other commercial activities,… may also be brought within the scope of the contract (explanatory notes to the contract) . Among the contractual obligations of the parties, there are particularly:

- For Eco-Emballages, to respect the obligations laid down in the Decree and by public authorities, the obligation to maintain confidentiality as regards financial and commercial information communicated by the contracting party, the obligation to draw up and make available to its members a detailed annual financial statement.
- For the contracting party, the obligation to affix the logo on packaging of goods, the obligation to keep a special set of accounting records relating to the contributions due in respect of the contract, the providing, on request from Eco-Emballages, of samples of packaging.

2.2 Interactions between Eco-Emballages and local authorities

42) In France, the local authorities are responsible for collecting and treating household waste. On the 28th of April 1998, the Minister of Country planing and Environment published a circular recommending a selective collection national objective of 50% of the household waste. This circular also recommends the revision of the Departmental waste plans in the view of increasing recycling and composting targets. As incentive for municipalities, the Finance Law for 1999 ratified a decrease in the VAT rate from 20.6% to 5.5% for “selective collection services” undertaken as part of a contract concluded between a local authority and an accredited organisation. (Eco-Emballages, annual report 1998).

43) Eco-Emballages is concluding 6 years programme contracts with interested local authorities but these last have the opportunity to denounce contracts annually. The programme contract (contrat programme de durée) is made of two parts:

- the title 1 defines general conditions and describes the responsibilities of both parties
- the title 2 defines in detail the programme of the project settled by the municipalities as well as their recovery programme.

44) The municipalities have the choice to operate the collection by themselves or to entrust it to one or several operators. They have also the choice to opt for their own collection and/or recycling/recovery pattern. In the contract with Eco-Emballages, local authorities commit themselves to set up a selective collection programme for at least 3[24] of the 5 different materials defined in the contract (Paper and cardboard, glass, plastic, metals and aluminium). Materials collected and sorted must comply with minimal technical prescriptions (PTM) defined for each material to benefit from the Eco-Emballages' take-back guarantee . If sorted waste does not fit with these PTM, the municipality does not receive contributions offered by Eco-Emballages and must bear the disposal costs. Eco-Emballages guarantees[25] that the sorted materials will be taken back by the reprocessing companies and contributes in different ways in the settlement of selective collection schemes notably by :

- paying a financial support per ton of sorted material which aims compensating selective collection and sorting costs
- offering take-back guarantee for the materials in accordance with the PTM
- financially supporting communication and awareness campaigns towards citizens
- technical assistance in the management of pilot projects.

45) Let's mention that in their contract with Eco-Emballages, municipalities may opt for their own outlets for recycling and recovery. They must in this case provide Eco-Emballages with the recycling/recovery certificates and they loose the advantage of the take-back guarantee (contrat programme art. 4).

Recourse to the Council of State

46) The "Cercle National du Recyclage" (National Circle for Recycling) an association of about 60 French local communities and municipalities introduced an application to the administrative court of Paris asking for the rewriting of the accreditation act of Eco-Emballages[26] and notably of the articles defining the share of responsibility between local authorities and Eco-Emballages[27]. According to the "Cercle National du Recyclage" (Propositions d'amélioration du dispositif français d'élimination des DEM - http://www.cercle-recyclage.asso.fr) this recourse aims at:

- clarifying actors responsibilities
- specifying local authorities obligations in recovery activities
- make effective the application of "pay-as-you-throw" principle through the introduction of a system where producers should be partially responsible for disposal costs.

[24] This is a provisional provision: at the end of the contract, selective collection schemes must cover all the 5 materials (contrat programme, art. 2).
[25] The municipality is free to accept or not for each material the take back guarantee offered by Eco-Emballages.
[26] Le Cercle National du recyclage also introduced an application against the accreditation act of Adelphe.
[27] Other litigation's between Eco-Emballages and municipalities are pending, notably about the obligation to respect the minimal technical prescription (PTM) and the nature of waste covered and refunded (Amorce, personal communication)

2.3 Collection and sorting

47) Negotiations occur between the local authorities and Eco-Emballages for the choice of the collection system and the subsequent treatment of the packaging collected but the final choice is always the competency of the municipality. The representatives of one of the five regional branches of Eco-Emballages discuss logistics and organisational aspects on the spot. The organisation of collection may vary quite a lot between municipalities according to:

- the collection pattern (for instance kerbside collection system with bins or bags, bring systems with neighbourhood containers or container parks or a mix of both.)
- the number and nature of waste streams they want to collect selectively for instance:
    - separation between hollow containers (bottles and flasks, metallic boxes) and the flat containers (cardboard and newspapers)
    - combined collection of the metallic packaging, on the one hand, and of plastic and paper packaging in an other hand
    - separation between packaging and newspaper-magazines
    - sorting by users of each of materials, which are then collected separately (Amorce 1999).

48) On basis of contracts concluded by Eco-Emballages in 1997/1998, the typology and frequency of selective collection schemes shared at this date as follows:

Number of flux	Glass treatment	Composition	Frequency
1 flux said " monoflux "	Mixed glass	All materials	
2 flux said " bi flux plats "	Mixed glass	paper/carboard others	3 %
2 flux said " bi flux verre "	Separated glass	Glass others	25 %
3 flux said " tri flux légers "	Separated glass	Glass Newspapers/magazines Others	42 %
3 flux said " tri flux plats "	Separated glass	Glass paper/carboard others	22 %
4 flux said " 4 flux "	Separated glass	Glass paper/cardboard plastics metals	3 %

Source: French Senate Report 415-98.

49) Types of packaging allowed or not in selective collection schemes are described in the table below:

Materials	Selectively collected	Non selectively collected
Glass	Empty bottles and glass jars	Stoneware, earthenware, porcelain, ceramic, flowerpots, lamps and bulbs, ..
Paper-cardboard	Non soiled paper-cardboard, magazines, newspapers, advertising folders	Dirty or greasy paper, paper with plastic film
Plastics (PVC, PET, PEHD)	Empty plastic bottles and flasks used for kitchen (cleansing product and food), washing and bathroom, bags, plastic sheets or films [28]	Butter pots, yoghurt pots, chips sachets,
Metals	Empty metallic packaging (cans, tins, aluminium dishes, boxes and flasks aerosols	Aluminium foils, synthetic resins, gas bottles..
Tetrabrick	Tetrabrick for milk, fruit juices, wineboxes….	

(Source: Eco-Emballages Web site: http://www.ecoemballages.fr/)

50) At the end of 1999, Eco-Emballages estimated that 26 million people in France sorted their packaging waste out of the 19,487 municipalities which had concluded a contract with Eco-Emballages. These municipalities represented 39 millions people (http://www.ecoemballages.fr/).

2.4 Treatment systems and outlet of recycling activity

51) In order to guarantee the take-back to local authorities, the "Green Dot" organisms have concluded agreements with five main take-back "guarantor" organisations which have been formed for glass, steel, aluminium, paper-cardboard and plastics. Each organisation also look after the composites whose main constituent it represents. These guarantors are:

- for glass – the French federation of glass manufacturers – Chambre Syndicale des Verriers Mécaniques de France (CSVMF) which has been operating its own network of containers and glaswork since 1972
- for paper-cardboard and beverage cartons – Revipac, a network of seven paper manufacturers founded in 1992
- for tinplate – Usinor Packaging, the last major steel manufacturer in France
- for aluminium, France Aluminium Recyclage, a network consisting of the packaging manufacturers Pechiney, Alcan, VAW and Alusuisse-Lonza
- for plastics – Valorplast a network consisting of the main actors of the channels in plastics

52) "Green Dot" organisations negotiate with these organisations agreements establishing take back conditions and prices of sorted materials from local authorities. These organisations give a financial and logistic commitment to accept the materials sorted by local authorities at a minimum guaranteed price. Eco-Emballages also financially supports the transportation costs of the materials.

53) The take-back guarantee only concerns sorted materials which conform with minimum technical specifications. These define notably the characteristics, nature, composition of the materials, their packaging, minimum quantities accepted and the minimum frequency of

[28] Bags, plastic sheets or films are collected in some municipalities

removal. Technical minimal prescriptions also define sampling and analysis procedures. Technical minimal prescriptions exist for following materials:

- steel from selective collection
- steel from composting plants
- steel from incineration slag's
- aluminium from selective collection
- aluminium from incineration slag's
- paper-cardboard
- glass
- PET
- PEHD
- PVC
- specific plastics containers

54) Eco-Emballages can check the conformity of sorted waste bales leaving the sorting centre or entering the recycling operator. Besides, in case of disagreement between parties about the respect of minimal technical prescriptions, a contradictory procedure is implemented eventually with the intervention of an independent expert. The party at fault will have to proceed and pay for the disposal of the concerned batch.

2.5 Financing of the system

The system in use before April 1st 2000

55) Since 1993, most packaging participating in Eco-Emballages have been paying approximately 1 centime irrespective of the material or weight. Indeed, the licence fee paid by the subscriber, was calculated on the basis of the number of packages put onto the French market in one year. Licensees could choose between weight and volume, irrespective of material. In the case of rigid hollow containers such as glass or plastic bottles, for instance, the Green Dot fee was calculated solely on the basis of volume. Companies with a turnover of less than two million francs paid a lump sum. The table below gives the tariff overview of the Eco-Emballages Licence fee before April 1st 2000:

Table 1: Tariff overview

General rule	Fee based on unit/volume
>30,001 cm3	10 F cts 0.015 €
3,001 to 30,000 cm3	2.50 F cts 0.004 €
201 to 3,000 cm3	1 F ct 0.002 €
151 to 200 cm	0.50 F ct 0.0008 €
101 to 150 cm3	0.25 F ct 0.0004 €
50 to 100 cm3	0.10 F ct 0.0002 €
< 50 cm3	Based on the material quantity but max. 0.10 F ct (0.015 € ct) /unit.

Table 2: Tariff overview (continued)

Deviation	Fee based on material weight/kg
Glass	5.0 cts 0.008 €
Steel	10.0 cts 0.015 €
Plastic	50.0 cts 0.076 €
Aluminium	50.0 cts 0.076 €
Paper and cardboard	30.0 cts 0.046 €
Wood	30.0 cts 0.046 €
Others	30.0 cts 0.046 €
For all packaging classified as “rigid hollow containers” there is one possibility: Fee based on unit per volume For all other packaging: Choice of fee based on unit per volume or on material quantity.	

The system in use after April the 1st 2000

56) In its accreditation demand of 1998, Eco-Emballages expressed the wish to revise its fee calculation basis in order to keep in balance the amounts paid by Eco-Emballages to the local authorities for each material and the amount of fees charges for that material. Other reasons were simplifying the calculation method and incorporating the prevention requirements[29]. This last purpose was reflected in the new fee structure in three ways:

- rewarding efforts to lightweight packaging
- not penalising a packaging made heavier because of its recycled content
- penalising rigid packaging which used to be recycled but are no longer.

[29] Indeed, Eco-Emballages have noticed a significant increase of the number of small packaging units.

57) The fee structure comprises two elements:

- a fixed fee per unit (of 0.65 ct)
- a fee by weight of packaging material, defined with regard to the need of financing for each material.

Table 3: Fee by weight of material

Material	2000 (in Fct/kg)	2000 (in €/kg)
Steel	4.6	0.007
Aluminium	9.9	0.015
Paper-cardboard	48.6	0.074
Plastics	54.2	0.083
Glass	0.7	0.001
Other materials	48.6	0.074

Exceptions: - Where the fee by weight of material is < 0.65 Fct (0.001 €), the total fee is equal to the double of the fee by weight.

- Weight-based fee for packs of > 1kg will be capped at 1kg in 2000

- The total fee paid by a member in 2000 cannot exceed 3.5 times the amount due in 1999 (assuming no change in packaging quantity, types,…)

58) 9,419 licensees were registered with Eco-Emballages at the end of 1999. Together they paid licence fees estimated at 600 million FF (92 million €). The main contributor was the agro-alimentary chain industry with about 69 percent of contributions. In this sector, the producers of drinks and spring waters plus the fresh products sector represented 60% of the contributions. Together, distribution, mail order business and import/export represented about 23% of the contributions. In 1999, the Eco-Emballages membership has declared 68 thousand millions packaging sell units (PSU) to the consumers and 119 thousand millions of packaging elements. The number of PSU declared to Eco-Emballages by its members was approximately divided up as follows:

- plastics 44%
- paper and cardboard 36%
- glass 10%
- ferrous metal 7%
- aluminium 3%

2.5.1 Calculation of the financial support to Local authorities

59) During the first accreditation of the “Green Dot” organisation, there were disagreements about the scales of financial support for selective collection schemes. In the light of the gained experience, it appeared that the collection and sorting costs had been underestimated. This is why, ADEME decided in 1997 to call on SOFRES CONSEIL to evaluate the total household waste management costs including packaging, according to various scenarios. Following this study, Eco-Emballages financed a study focusing on the management costs for packaging waste on the basis of which it defined a new scale of contribution for separate collection schemes.

60) This new scale was included in the demand of approval to the "Consultative Commission". The new support payments for local authorities were approved on the 15 December 1998 by the Consultative Commission[30]. These had to be paid retroactively from 1 January 1998. The support paid by Eco-Emballages includes various components:

- take back guarantee
- support for sorted materials
- support for energy recovery
- support for composting
- support for the starting of operations
- temporary support for specific types of housing (high rise and scattered rural housing)
- communication support

61) We will not give the exact details of the tariffs and their calculation methods of each support but the reader will find here below, some examples of the scales of specific supports.

The take-back guarantee

62) They insure the local authorities to find outlets for sorted products. These must comply with the specifications (minimal technical prescriptions) annexed to the contract. If the sorted material do not fit with these specifications, they are sent back to the municipality and are not subsidised by Eco-Emballages. If the municipality chooses for the take-back guarantee, it gets during the period of the contract, a guaranteed price paid by the recycling channels (the guarantors) for materials in accordance with PTM. These guaranteed price depend on the type and quality of material:

Table 4: Guaranteed prices according to material (indicative price 1998)

	Price paid by "guarantors"	
	FF/t	€/t
Plastic	0	0
Paper and cardboard	0	0
Glass	150	22.87
Steel from selective collection (according to density)	50 – 200	7.62 – 30.49
Steel from slags or compost (according to quality)	0-50	0 – 7.62
Aluminium from selective collection (according to quality)	1,100 - 2,200	167.68 – 335.37
Aluminium from slags (according to quality)	750-1,300	11

The support for sorted materials

63) Responding a demand from municipalities, Eco-Emballages has adapted its new payment modalities in order to provide for a better link with the sorting achievements for all materials. So, the new support is indexed to yield expressed in quantity of packaging material waste collected per inhabitant per year. This means that the more household packaging that local

[30] This has not completely stopped the controversy with the "Cercle National du recyclage »: the association of municipalities, estimates in a study titled "Note relative à la rénovation des barèmes de soutiens aux collectivités locales " (http://www.cercle-recyclage.asso.fr/publi/dossiers/frdossiers.htm) , that Eco-Emballages financial support to collection and sorting represents in average between 34% for steel and 86% for plastics of the mobilisation costs for those materials in household waste.

residents sort, the higher the support per ton sorted. The table below gives the range of subsidies for each material:

Table 5: Subsidies according to material

Material	Scale	
	in FF/ton	in €/ton
Steel from selective collection	300-500	45.73–76.22
Aluminium from selective collection	1,500-2,220	228.66–338.41
Paper and cardboard	750-1,950	114.32–297.26
Plastic bottles	1,500-6,050	228.66–922.26
Glass from kerbside collection	20-75	3.05–11.43
Glass from bring systems	20-30	3.05–4.57

64) The subsidies for steel and aluminium from slags or compost are independent from the performances:

Table 6: Subsidies according to material from slags or compost

Material	Scale	
	in FF/ton	In €/ton
Steel from slags or compost	75	11.43
Steel from compost (quality comparable to selective collection)	300	45.73
Aluminium from slags or compost	500	76.22
Aluminium from compost (quality comparable to selective collection)	1,500	228.66

2.5.2 Support tariffs for energy recovery

65) The support is granted only if some conditions are respected:

- Collection and recycling of 5 materials and global rate of recycling of at least 25%
- Energy recovery plants conform to standards and regulation
- Significant production of energy (> 250KWh/t for electricity production and > 400 kWh/t for heat production or co-generation)

66) This support also depends on the performances of the selective collection and ranges between 100 and 500 FF (15.24 and 76.22 €) /incinerated ton.

2.5.3 Other financial supports

67) Eco-Emballages also provides for other financial support and notably:

- 50% of the acquisition cost of new glass containers
- a financial support for composting of paper-cardboard (500FF – 76.22 € /tonne)
- the temporary support for starting projects (various non cumulative adaptation modalities exist for the reimbursement of new projects costs)
- the specific support for municipalities with a large proportion of high-rise buildings or for rural municipalities with low population density
- the support for communication and awareness campaigns (these include time decreasing financial support per inhabitant as well as a support for the appointment of "recycling ambassadors" (ambassadeurs du tri).

68) In 1997, 1998 and 1999 Eco-Emballages expenses were composed as follows (Cercle national du Recyclage, 1999):

	1997		1998		1999	
Support to local authorities (Support to sorted ton and composting + energy recovery + investments for containers	347,811,206 FF 53,006,428 €	66.1%	579,321,457 FF 88,288,590 €	74.8%	736,203,564 FF 112,197,423 €	71.7%
Support to guarantors (Local communication + support for transportation + sorting of plastics)	68,911,090 FF 10,502,050 €	13.1%	64,286,177 FF 9,797,213 €	8.3%	111,143,982 FF 16,938,343 €	10.8%
R&D	19,592,532 FF 2,985,902 €	3.7%	16,521,084 FF 2,517,813 €	2.1%	18,600,562 FF 2,834,726 €	1.8%
Studies	6,959,708 FF 1,060,659 €	1.3%	5,336,805 FF 813,329 €	0.7%	6,212,471 FF 946,781 €	0.6%
National Communication	11,661,420 FF 1,777,200 €	2.2%	14,295,894 FF 2,178,694 €	1.8%	48,583,509 FF 7,404,127 €	4.7%
Functioning costs	71,121,612 FF 10,838,934 €	13.5%	85,362,303 FF 13,009,215 €	11.0%	105,369,168 FF 16,058,261 €	10.3%
Corporate tax	13,736,710 FF 2,093,475 €	2.6%	18,926,090 FF 2,884,336 €	2.4%	14,973,629 FF 2,281,981 €	1.5%
TOTAL	**526,031,414 FF 80,167,188 €**	**100%**	**774,577,613 FF 118,045,628 €**	**100%**	**1,026,141,189 FF 156,383,917 €**	**100%**

2.6 Monitoring and control

2.6.1 Control performed by authorities

69) Public control concerns following aspects:

- the compliance with the packaging regulation and the achievement by packaging producers of their mandatory recycling and recovery targets for waste of packaging they put on the market
- the annual control of the accredited organisations activities and verification of the fulfilment of the clauses of their accreditation act

2.6.2 The compliance with the packaging regulation.

70) The decree 92/377 holds that producers of packaging deemed for final use in households have to communicate to the “Agency for the environment and the control of Energy” (Agence de l'environnement et de la maîtrise de l'énergie – Ademe), the statistical data concerning the quantity of packaging waste put on the market and the quantity of packaging waste effectively collected and recovered.

71) Moreover, different controls, led at retailers by the “ General Direction for competition, consumption and fraud suppression” (Direction générale de la concurrence, de la consommation et de la répression des fraudes (DGCCRF)), allowed the identification of goods for household consumption without the “Green dot” logo. Since these were not products put on the market by producers complying by themselves to the take-back obligations, DGCCRF has started legal proceeding against producers of these litigious packaging, in order to force them to normalise their situation.

2.6.3 The annual control of the accredited organisations activities.

72) Chapter Five of the Accreditation Act of Eco-Emballages provides for the obligation for the accredited organisation to supply each year the Government with a report giving a detailed description of:

- its financial situation (receipts and expenditures)
- the accounts balance per material
- the fulfilment of contracts with members, local authorities and guarantors
- the progress in its activities and results
- the efforts in sensitisation and awareness campaigns for citizens
- the financial parameters of the system
- the technical solutions
- the R&D activities
- the functioning of the various dialogue structures

73) This report is sent to the “Commission Consultative” by the Government and must be published by Eco-Emballages. The Decree 92/377 provides for the opportunity for the authorities which approved the “Green Dot” organisms to withdraw the approval in case these fail to observe the clauses laid down in their accreditation act (art. 9).

Control performed by Eco-Emballages

74) In its membership contracts, Eco-Emballages provides for the obligation for adhering companies to keep a special set of accounting records relating to the contributions due in respect of the contract. Eco-Emballages is allowed, at most twice a year, either itself or through its authorised agents, to make the audits necessary to ensure that the correct amount of contribution is paid (art. 6).

75) Besides, in this contract, the adhering company undertakes to supply Eco-Emballages, on written demand, samples of its packaging carrying the logo (which is mandatory) and/or secondary packaging bearing the logo or intended to do so. Infringements to these provision may lead to the cancellation of the contract (art. 8). Moreover, the adhering company undertakes to advise Eco-Emballages immediately of any instance of infringement of or of unauthorised use of the logo of which he may become aware during the execution of the contract (contract, art. 11). Controls by Eco-Emballages highlighted an incorrect use of the "Green Dot" logo by several packaging producers who had not paid the corresponding contributions to "Green Dot organisms".

The controls realised by the local authorities

76) The local authorities do not have the possibility to control the "Green Dot" organisations, task which is only the responsibility of the State. However, Eco-Emballages and the "Association des Maires de France" set up a committee of dialogue, which can be seized for all the problems encountered at the time of the implementation of the programmes for packaging waste recovery.

External audits

77) During the first accreditation of the "Green Dot" organisms, there was only one small number of experiments of selective collections. It was thus difficult to assess with accuracy the scales of financial support for selective collection schemes. In the light of the gained experience, it appeared that the costs of collection and sorting had been underestimated. This is why, it was decided to call on an external consultant to evaluate the total household waste management costs including packaging, according to various scenarios. This study was financed by ADEME and realised by SOFRES CONSEIL in 1997 and 1998. The results of the study are available on the ADEME web site on the following page (http://www.ademe.fr/collectivites/Dechets/couts/cou00.htm)

2.7 Quantities of circulated packaging and recovered packaging waste

78) ADEME estimated the household waste production in France in 1998 to 22 million tonnes (this corresponds to 365 kg/inh/year[31)]. The average composition range as follows (ADEME: http://www.ademe.fr/collectivites/Dechets/chiffres/dec01.htm):

[31] More recent figures range between 400 and 424 Kg/inh/year.

Material	Percent
Organics	29
Paper/cardboard	25
Glass	13
Plastics	11
Metals	4
Others	18

79) Treatment methods for these waste in 1998 ranged as follows:

Treatment method	Percent
Recycling	29
Composting (and biomethanisation)	7
Energy recovery	11
Incineration (including energy recovery)	35
Landfilling	50

80) Packaging waste production in France in 1998 distributed as follows:

Type	Quantities (in kt)
Total packaging waste	13,000
Household and similar waste	8,500
Household packaging waste	5,400
Household packaging waste contributing to Eco-Emballages	3,900

81) The recycling and recovery results for packaging waste in 1997 and 1998 ranged as follows:

Table 7: Amount of packaging waste recycled and recycling rate in 1997 (in kt)

Material	Quantities put on the market	Recycling (in Kt)	Energy Recovery (in Kt)	Total Recovery (in Kt)	Recycling (in %)	Total Recovery (in %)
Paper-cardboard	4,808	2,276	888	3,164	47.3	65.8
Glass	3,396	1,388		1,388	40.9	40.9
Plastics	1,968	102	534	636	5.2	32.3
Metals	745	331	4	335	44.4	45.0
Wood	711	300	258	558	42.2	78.5
TOTAL	**11,628**	**4,397**	**1,684**	**6,081**	**37.8**	**52.3**

(Source:notification to the European Commission according to the article 12 of the Directive)

Table 8: Amount of packaging waste recycled and recycling rate in 1998 (in kt)

Material	Quantities put on the market	Recycling (in Kt)	Energy Recovery (in Kt)	Total Recovery (in Kt)	Recycling (in %)	Total Recovery (in %)
Paper-cardboard	4,123	2,515	885	3,400	61.0	82.5
Glass	3,513	1,576		1,576	44.9	44.9
Plastics	1,628	131	541	672	8.0	41.3
Metals	681	308	4	312	45.2	45.8
Wood	1,696	305	251	556	18.0	32.8
TOTAL	**11,641**	**4,835**	**1,681**	**6,516**	**41.5**	**56.0**

(Source:notification to the European Commission according to the article 12 of the Directive)

Table 9: Amount of packaging entrusted to Eco-Emballages and recycled in 1997

Material	Put on the market (x 1,000 t)	Recycling (x 1,000 t)	Recycling (in %)
Paper-cardboard	885.7	75	8.1
Glass	1,283.4	462	36.0
Plastics	777.1	31.4	4.0
Metals	396.8	175	44.2
Total	**3,343**	**744**	**22.2**
Glass (contracts glass industry)**	(1,283.4)	600	46.7
Total (contracts with glass industry included)	**3,343**	**1344**	**40.1**

(source: Eco-emballages – personal communication + ADEME – Tableau de bord déchets d'emballages ménagers – actualisation Juin 2000)
**: the recycled quantities correspond to glass collected by glass industries in execution of contracts they conclude directly with municipalities

Table 10: Amount of packaging entrusted to Eco-Emballages and recycled in 1998

Material	Quantities put on the market (x 1,000 t)	Recycled (x 1,000 t)	Recycling (in %)	Recovered (x 1,000 t)	Recovery (in %)
Paper-cardboard	880	121	13.8	373	42.4
Glass	1,370	568	41.4	568	41.4
Plastics	790	45	5.7	334	42.3
Steel*	315	171	54.3	171	54.3
Aluminium*	40	5	12.5	10	24.0
Total	**3,395**	**909**	**26.8**	**1455**	**42.8**
Glass (contracts glass industry)**	(1,370)	550	40.1	550	40.1
Total (incl. contracts with glass industry)	**3,395**	**1459**	**43.0**	**2,005**	**59.0**

(source: Eco-emballages – personal communication + ADEME – Tableau de bord déchets d'emballages ménagers – actualisation Juin 2000)
*: coating of ashes included (ratio ashes/metal: 1/1)
**: the recycled quantities correspond to glass collected by glass industries in execution of contracts they conclude directly with municipalities

Table 11: Amount of packaging entrusted to Eco-Emballages and recycled in 1999

Material	Quantities put on the market (x 1,000 t)	Recycled (x 1,000 t)	Recycling (in %)	Recovered (x 1,000 t)	Recovery (in %)
Paper-cardboard	880	162	18.4	433	49.1
Glass	1,370	926	67.6	926	67.6
Plastics	790	50	6.3	358	45.5
Steel*	315	162	51.4	162	51.4
Aluminium*	40	4	10.0	9	22.0
Total	**3,395**	**1,304**	**38.4**	**1888**	**55.6**
Glass (contracts glass industry)**	(1,370)	320	23.4	320	23.4
Total (incl. contracts with glass industry)	**3,395**	**1624**	**47.8**	**2.208**	**65.0**

(source: Eco-emballages – personal communication + ADEME – Tableau de bord déchets d'emballages ménagers – actualisation Juin 2000)
*: coating of ashes included (ratio ashes/metal: 1/1)
**: the recycled quantities correspond to glass collected by glass industries in execution of contracts they conclude directly with municipalities

2.8 Import/Export of Packaging waste

82) The packaging waste produced in Spain and recovered abroad, and the packaging produced abroad and recovered in Spain in 1997 and 1998 is depicted in the following tables (in kt):

Table 12: Imports and exports of packaging waste for recovery in 1997

	Export		Import	
Material	Recycled	Recovered	Recycled	Recovered
Paper-cardboard	373	373	478	478
Glass	n.a	n.a	n.a	n.a
Plastics	n.a	n.a	n.a	n.a
Metals	n.a	n.a	n.a	n.a
Total	n.a	n.a	n.a	n.a

Source: notification to the European Commission according to the article 12 of the Directive 94/62/CE

Table 13: Imports and exports of packaging waste for recovery in 1998

	Export		Import	
Material	Recycled	Recovered	Recycled	Recovered
Paper-cardboard	431	431	542	542
Glass	n.a	n.a	n.a	n.a
Plastics	30	30	12	12
Metals	n.a	n.a	n.a	n.a
Total	461	461	554	554

Source: notification to the European Commission according to the article 12 of the Directive 94/62/CE

2.9 The recycling and recovery capacities in France

Note: The figures presented below originate mainly from a report to the French Senate 98-415 – Recycling and Recovery of household waste, Gérard Miquel 1998. This is available on the French Senate Internet site (http://www.senat.fr/rap/o98-415/o98-415_mono.html) . These were completed by information from ADEME, CEPI, Valorplast, Eco-Emballages, Petcore, Eurofer and France Aluminium Recyclage.

Glass

83) In 1997, the amount of glass packaging waste placed on the market was estimated to 3,396,000 (but the apparent consumption was about 3,000,000 tonnes – 50kg/inh/year). 2,300,000 tonnes were used by households. In 1998, 1,650,000 tonnes were collected from households and fillers but achieving the recycling rate target of 75% (objective Eco-emballages –Adelphe for 2002) means collecting more than 2.1 million tonnes glass packaging waste. The recycling capacities in the green glass production process range from 1.8 to 1.9 millions tonnes, this means a lacking capacity between 200,000 and 300,000 tonnes for achieving this target intra-borders. However, the selective collection of glass is currently realised for a mix of all colours of glass. The settlement of selective collection schemes for different colours of glass should allow the collection of 200,000 to 300,000 tons of white glass which could be recycled as such. Besides, according to the French senate report, other recycling outlets (or about 100,000 tons) could be further developed in construction, or civil engineering for instance (building material, reflective paints, cobblestone,…).

Paper and cardboard

84) In 1997, the paper consumption in France was estimated to 10.3 millions tonnes. More than 4.8 millions tonnes of these were packaging. At this date, 4.3 millions tonnes paper waste were recovered (41%) and about 179,000 tonnes of paper and cardboard packaging were sent to organic recovery treatment.

85) The recycling capacities have significantly increased during the last years and around one hundred plants can recycle about 5 million tonnes/year (an increase capacity of 1 million tonnes in 5 years). The collection of used paper is not sufficient to satisfy the needs of the recycling sector. About 1 to 1.2 million tonnes were imported in 1997 compared to about 900,000 tonnes exported.

86) In 1998, the consumption of recovered paper and cardboard was about 4,931,000 tonnes and the utilisation rate (proportion of old papers in the amount of paper produced) increased from 49% in 1997 to 53.8% in 1998. REVIPAC foresees increasing the consumption of recovered paper-cardboard up to 7,000,000 tonnes in 2005 (Revipac, evolution of recovered paper-cardboard).

Beverage cartons

87) The collection and recovery of beverage cartons raise technical and economical problems. The difficulty of treatment (because of the necessity of special installations to separate the different elements) was compensated for a long time by a good quality of the used cardboard, made with long fibres. However, this quality started to decrease fifteen years ago, due to the multi-jets process, which use short fibres, less interesting to recover. In France, there are currently 3 plants which recycle Tetra Pak packaging (Tetra Pak, personal communication):

- DHP, near Lille (59) capacity of about 6,000 tonnes
- Papeterid de Bègles (33) about 6,000 tonnes
- Matussière et Forest (88) about 10,000 tonnes
- Total 22,000 tonnes

88) Professionals of paper-cardboard recycling announce in the same time that they can use up to 5% of packs without specific equipment, that is a minimal capacity of (5,000,000*0.05) = 250,000 tonnes. (Source: Tetra-Pack Europe – personal communication)

Plastics

89) Packaging are the most important outlet for the plastics with 39% of the total plastic consumption in France. The annual increasing rate of plastic packaging consumption is estimated to 4.5% .

Table 14: Distribution of the Plastic market in France

Distribution according the material any application - total: 4.9 million tonnes		Distribution for the packaging total: 1.9 million tonnes	
PVC	18%	Bags	38%
PEBD	17%	Bottles	23%
PEHD	11%	Boxes, crates,..	14%
PET	5%	tarpaulin	10%
PP	16%	Others	15
Others	33%		
Total	100	Total	100%

Source: French Senate Report 415-98.

90) Except industrial endings or offcuts, the only collection of plastic waste organised at this date in France concerns a fraction of household packaging waste (60% of the total amount of packaging).

Table 15: Plastic packaging recovery in 1997 (in tonnes)

	Household packaging	Industrial and commercial packaging	Total	Total in %
Production	900,000	400,000	1,300,000	100%
Energy recovery	315,000	20,000	335,000	26%
Recycling	29,000	70,000	99,000	8%
Total recovery	344,000	90,000	434,000	33%
Percentage recovery	38%	22.5%	33%	33%

Source: SPMP/CSEMP, mars 1999

91) Of the 900,000 tonnes household packaging waste, only hollow containers of a minimum volume are selectively collected which represent between 225,000 and 300,000 tonnes. This means that today in France, selective collection only concerns 15% of the total amount of plastic waste.

92) The market evolution leads towards a rapid growth in PET production[32] which is deemed to replace PVC in packaging. According to this, the French Senate report concludes that plastic waste will strive to standardisation and that conditions are gathered to new treatment solutions and extension of selective collection schemes to new plastic packaging waste streams (as plastics from agriculture which represent 170,000 tonnes/year).

93) According to the French Senate report, recycling capacities are already exceeding the collected quantities. Moreover, emerging technologies especially in the field of mixed plastic recycling could create new outlets for plastic waste. Studies commissioned by the "Plastic Processing Federation" ("Fédération de la Plasturgie") has identified a potential new national market for 49,000 tonnes plastics waste.

Steel

94) The recycling activities in the metals sectors are well developed and recycling capacities for ferrous and non ferrous metals are sufficient. Moreover, the amounts of ferrous and non ferrous materials in packaging represent a small percentage of the total production of metals. For example, in France the amount of ferrous metals in packaging represents less than 2 percent of the total metal production. For steel as well as for aluminium, the main limiting factor is collection of materials were progress are still foreseeable. For ferrous metals, it is estimated in France that about 30% of the 5 to 600,000 tonnes of packaging were taken back in 1993. In 1996, this ratio was estimated to 40-50%. Due to the progress of separate collection schemes, 75% recovery is considered as a realistic objective for 2002.

Aluminium

95) The French market for packaging whose main constituent is aluminium is about 40,000 tonnes. These share as follows:

Type	Consumption (in tonnes)	Share of the market (in %)
Supple and semi-rigid packaging	11,000	27
Aerosols	9,000	23
Drink cans	8,700	22
Cans	7,100	18
Tubes and cartridges	4,100	10

(Source: France Aluminium Recyclage)

96) French aluminium industry produced about 640,000tonnes in 1997 for a total consumption of 1,080,000 tonnes (this means total net import of 440,000 tonnes). At this date, about 240,000 tonnes of this production was 2nd smelting aluminium. Packaging waste represent a minimal part of these figures since 4,000 tonnes household packaging waste recycled in 1999 (France Aluminium Recyclage). Recovery of aluminium packaging waste is now in a development phase and recycling capacities will not be problematic for these. Eco-Emballages and the concerned "guarantor" foresee the recycling of 10-12,000 tonnes aluminium packaging in 2002 of which 2-3,000 from selective collection schemes.

[32] PET production raised from 90.000 tons in 1990 to 210.000 tonnes in 1993. 250.000 tonnes are expected in 2002 (French Senate report, 1998).

3 Perspectives

97) Among targets for waste policy development the Government defined following targets:

- 75% recovery of household packaging waste at the end 2002
- 50% of municipal waste collected in view of recycling or organic recovery (no term defined)
- dumping of final waste[33] only , from 1 July 2002.

98) The means to achieve this targets are notably:

- the revision of the waste management plans
- financial support for investment (new infrastructures, R&D)
- reduced VAT rate for waste management operations where selective collection schemes for packaging waste exist
- functioning support from Green-Dot organisms

99) The renewal of the accreditation act of Eco-Emballages in August 1996 was linked with conditions which will affect the work of the organisation up to the year 2002. For instance, priority is to be given to recycling and this will lead to higher financial support for the local authorities.

100) Co-operation among the municipalities is also to be promoted, with the aid of higher financial support, for instance to enable them to realise the planned programme for the purchase of low –noise underground containers. In addition greater efforts have to be made in respect of advertising and public relations in order to increase public willingness to participate in collection and sorting. Multi-storey housing developments were mentioned explicitly. The target to be achieved in this way, is recovery of at least 75 percent of all household packaging in the year 2002.

[33] The ultimate waste notion has been defined by the law 92-377. This means « *waste resulting or not from a waste treatment that is no more likely to be treated in the technical and economic conditions of the moment, notably by extracting of the recoverable part or by reducing its polluting or hazardous character* ».

The interpretation of this definition has been specified for the household waste in a circular of April 1998 from the Ministry of the town and country planning and of the Environment: " *The ultimate waste are waste of which was extracted the recoverable part as well as various polluting elements as batteries or accumulators* " (Ademe Web site: http://www.ademe.fr/collectivites/Dechets/Definitions/Dechet-Ultime.htm.)

101) The recycling forecasts for household packaging materials presented in the accreditation act of Eco-Emballages for 2002 range as follows:

Table 16: Recycling targets for household packaging waste contributing to the Eco-Emballage system

	Target 2002	
Material	Recycling (in %)	Total recovery (in %)
Paper and cardboard	35	69
Glass	107[34]	107
Plastics	16	58
Steel	88	88
Aluminium	34	59
Total	**63**	**82**

(Source: Eco-Emballages – accreditation act)

[34] Such a recycling target can be explained for two reasons: 1) the recycling rate is calculated on the basis of packaging waste (including stain, dirt and humidity) compared to clean packaging put on the market. 2) The geographical extension of collection activities of Adelphe and Eco-Emballages is not exactly proportional with their respective membership contribution. The geographical extension and network of bottle banks of Eco-Emballages is greater than those of Adelphe.

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Contents

1 Legislation and Voluntary Agreements ... 1
1.1 Definitions and field of application ... 1
1.2 Responsibilities of operators ... 1
1.3 Targets and Instruments ... 2
1.4 Further Provisions ... 3
2 Packaging Waste Management System ... 4
2.1 Compliance schemes ... 4
2.2 Duales System Deutschland ... 4
2.3 Self-compliers and systems for self- compliance ... 14
2.4 Compliance schemes for commercial and industrial packaging ... 14
2.5 Monitoring and control ... 15
2.6 Quantities of packaging and packaging waste recovery ... 17
3 Current situation ... 19
3.1 Packaging Prevention ... 19
3.2 Packaging Recycling ... 20
3.3 Re-use quota and mandatory deposits on one-way packaging ... 21
3.4 Recycling of small plastic sales packaging ... 22
3.5 Monopolistic nature of the DSD ... 23
3.6 Innovation ... 24
4 Future Development ... 24
5 References ... 26

List of tables

Table 1: Recycling requirements for sales packaging ... 3
Table 2: Sorting, treatment and recycling plants for the lightweight fraction ... 5
Table 3: Guarantors for recovery of sales packaging ... 7
Table 4: Products of plastic packaging recycling according to sorting fractions in kt ... 10
Table 5: Weight based fees (Euro/kg) ... 12
Table 6: Surface based fee per item (Cent/item) ... 12
Table 7: Volume based fee per item (Cent/item) ... 12
Table 8: Breakdown of the total costs of DSD in 1999 ... 13
Table 9: Compliance schemes for commercial and industrial packaging ... 15
Table 10: Material losses in reprocessing of packaging materials ... 16
Table 11: Packaging consumption and packaging waste recovery in 1997 ... 22
Table 12: Imports and exports of packaging waste for recovery ... 18
Table 13: Total sales packaging consumption and recovery in 1997 ... 18
Table 14: Quantities of licensed sales packaging, recycled amounts and recycling rates of the DSD in 1999 ... 19
Table 15: Development of packaging consumption from 1991 to 1995 (in percentages) ... 20

1 Legislation and Voluntary Agreements

1) The EC Packaging Directive is implemented into German law by the Ordinance on the Avoidance and Recovery of Packaging Waste (Packaging Ordinance) of 21 August 1998. The previous Ordinance on the Avoidance of Packaging Waste dated 12 June 1991, which was adopted before the EU-Directive came into force, was amended with the aim:

- to harmonise with the EC Packaging Directive
- to strengthen competitive structures
- to reduce the number of “free-riders”

1.1 Definitions and field of application

2) In the course of the amendment the field of application of the Packaging Ordinance was enlarged to comply with the EU Packaging Directive. The definitions of sales, grouped and transport packaging as well as the recovery targets are in line with those of the Directive. In addition the Packaging Ordinance specifies the term of packaging for pollutant-containing products and includes definitions for composite and long-life packaging:

- composite packaging is regarded as packaging made of different materials which cannot be separated manually and none of which exceeds a share of 95 % by weight.
- long-life packaging shall be packaging that serves the purpose of long-term use of a product which on statistical average has a lifetime of at least five years.

1.2 Responsibilities of operators

Sales packaging

3) Distributors are obliged to take back sales packaging from the final consumer free of charge at the point of sale or in the immediate vicinity. The distributors themselves are entitled to return the collected sales packaging along the packaging chain to the manufacturers (i.e. consumer goods manufacturer, packaging manufacturer). Distributors and manufacturers have to recover fixed quantities of sales packaging they circulate (Art. 6 paras. 1 and 2). The individual take-back-obligation for sales packaging does not apply if the manufacturers and distributors take part in a system which guarantees regular collection of used sales packaging from the final consumer (Art. 6 para. 3). Manufacturers and distributors therefore have established the “Duales System Deutschland AG”. The system is approved and monitored by the German Bundesländer.

4) The established system has to fulfil the recovery targets stipulated in Annex of the Ordinance. The targets valid since January 1999 are given in Table 1. If the established system doesn’t meet these requirements the competent authority may revoke their approval to the system. In the case of manufacturers and distributors not participating in a system pursuant Art 6 para. 3 (self-compliers) the recovery requirements for 1999 shall be deemed to be met if at least 50 % of the relevant quotas is reached. From the year 2000 they have to fulfil the same requirements as the approved systems. Every year the approved system as well as self-compliers are obliged to provide proof of the quantity of packaging put on the market and those quantities being collected and recovered.

5) Packaging made of materials for which no definite recovery quotas are specified have to be recycled where this is technically possible and economically feasible. In case of packaging made from renewable materials, energy recovery is regarded to be equivalent to recycling.

6) Manufacturers and distributors of sales packaging of pollutant-containing products shall be obliged to take by 1 January 2000 suitable measures to ensure that used and emptied packaging can be returned by the final user free of charge within a reasonable distance. The returned packaging shall be consigned to reuse or recovery.

Secondary packaging

7) Distributors providing goods in secondary packaging are obliged to remove such packaging upon delivery to the final consumer or to give the opportunity to remove and return the secondary packaging free of charge on the premises of the point of sale. If the final consumer desires the goods to be handed over in the secondary packaging the provisions for sales packaging apply accordingly. The secondary packaging taken back shall be reused or recycled.

Transport packaging

8) Manufacturers and distributors are obliged to accept returned transport packaging after use. In the context of repeated deliveries, such acceptance may take place at one of the next deliveries. Returned transport packaging shall be reused or recycled. The Ordinance allows that manufacturers and distributors call upon third parties to fulfil theses obligations.

1.3 Targets and Instruments

Reuse

9) As reusable drinks packaging is regarded as ecologically advantageous the Packaging Ordinance stipulates a minimum proportion of reusable packaging of 72 % for the categories beer, mineral water, carbonated soft drinks, fruit juices and wine, which reflects the market shares of the year 1991. However, if the combined proportion of drinks packaged in reusable packaging falls below 72 %, a deposit has to be levied for these sorts of drinks packaging falling below the provided quota. These provisions apply to pasteurised milk accordingly if the share of reusable packaging and polyethylene bag packaging falls below 20 %.

Recovery

10) In accordance with the EU Packaging Directive, the Ordinance stipulates that by June 2001 the share of all packaging waste being recovered shall be 65 % by weight and the share being recycled be 45 %.

Sales Packaging

11) Special recovery targets apply to sales packaging. From 1 January 1999 the approved system on behalf of the manufacturers and distributors must ensure that the recycling targets given in Table 1 are being met. Self-compliers have to achieve 50 % of these targets in 1999. From 2000 they have to meet the full targets. This recycling targets do not apply to long-life sales packaging and sales packaging of pollutant-containing products.

Table 1: Recycling requirements for sales packaging

Packaging material	Recycling target
glass	75 %
tinplate	70 %
aluminium	60 %
paper, cardboard	70 %
composite	60 %
plastic	60 %[1)]

[1)] At least 60 % of plastics packaging must be consigned for recovery; at least 60 % of this quota shall be ensured by materials-oriented processes (recycling or feedstock processes)

Transport and Secondary Packaging

12) Returned transport and secondary packaging has to be reused or recycled insofar as is technically possible and economically reasonable. In the case of packaging manufactured directly from renewable materials, energy recovery is deemed equivalent to recycling. Specific targets for reuse and recycling of transport and secondary packaging don't exist.

1.4 Further Provisions

13) The Packaging Ordinance lays down that special attention has to be paid to the interests of the public waste management services. Therefore the established system has to be co-ordinated with the existing collection and recovery systems run by the public authorities responsible for waste management in the area. The requirements resulting from this provision are described in chapter 2.2.1.

14) The Ordinance provides for a deposit on non-reusable drinks packaging and on non-reusable packaging for detergents and cleaners unless the manufacturers and distributors take part in a compliance scheme for sales packaging.

15) The Technische Anleitung Siedlungsabfall (Technical instructions on waste from human settlements) from May 1993 stipulates that residual waste shall no longer be dumped without pre-treatment. The instructions aim to reduce the volume and the risk potential of the waste to be landfilled by transforming it into an inert and thus biologically inactive state. At latest in 2005 municipal solid waste may only be landfilled if the content of organic substance falls below 5 % by weight (determined as ignition loss).

2 Packaging Waste Management System

2.1 Compliance schemes

16) As there apply special provisions to sales packaging it has to be distinguished between compliance schemes for sales packaging and compliance schemes for other packaging. The requirements for sales packaging can either be met by participation in an approved system of by self-compliance. While the DSD is the only approved system for sales packaging several different systems for commercial and industrial packaging are established.

2.2 Duales System Deutschland

17) In September 1990, the “Duales System Deutschland GmbH” was founded by retailers, consumer, goods industry and packaging industry. DSD operates as a public limited company (Aktiengesellschaft) with about 600 shareholders which comprise companies of trade, consumer goods industry and packaging industry.

18) The DSD organises the collection and sorting of sales packaging. Collection and sorting is carried out by contractors which may be local authorities of private waste management companies. The recovery of the collected and sorted sales packaging is guaranteed mainly by associations of packaging producers and material converters.

19) The system is financed by “Der Grüne Punkt” (green dot) which is stamped on non-reusable packaging if the licence fee has been paid. The amount of the licence fee depends on the material, weight and on the volume or surface of the packaging. The revenues from licence fees cover the collection, the sorting and, in case of plastics, the recycling and recovery of the packaging. The DSD is the only organisation which has established a nation-wide system for the collection of sales packaging. There are efforts to establish alternative systems working less expensive than the DSD. However, such system are not yet approved by the Bundesländer.

2.2.1 Interactions between DSD and local authorities

20) To ensure that the interests of the public waste management are taken into consideration the DSD has to meet the following obligations as shown below laid down in the Packaging Ordinance. The Ordinance stresses that the required co-ordination shall not conflict with the awarding of contracts for waste management services on a competitive basis.

- the system shall be co-ordinated with existing collection and recovery systems run by the public authority
- the public waste management authorities may demand the take-over or joint use, for a suitable fee, of facilities required for collecting and sorting materials
- the system has to bear a share of the costs for waste consultancy and for the creation, provision, maintenance and cleaning of areas for the siting of large containers
- the system has to be set up on a full-coverage basis

2.2.2 Collection and sorting

21) As mentioned above collection and sorting is carried out by contractors of the DSD which may be public or private waste management enterprises or joint working groups. The DSD has 537 contractors of whom 104 are local authorities, 76 private companies with the participation of local authorities and the remainder being private companies. Every contractor is responsible for the collection and sorting of all sales packaging materials in his contract

area (districts or cities). The contractor has to collect the packaging material according to the quantities given in the Packaging Ordinance. The sorted materials have to comply with the technical specifications given by the DSD. The contracted waste management services may sub-contract collection and sorting to other companies.

22) Collection systems for glass and paper/cardboard were already established in most of the municipalities before the Packaging Ordinance came into force. As the Packaging Ordinance demands the co-ordination with the existing systems the DSD integrated and enlarged these systems. In Germany therefore a uniform collection scheme doesn't exist. A combination of kerbside collection and bring systems is most widespread:

- More than 95 % of glass packaging is collected by bring systems (or combinations of bring system and kerbside collection) with conveniently located containers. In 1999 89 % of the glass waste were collected according to colours (white, green and brown), 11 % were collected as mixed glass. (GGA, 2000)
- For paper/cardboard kerbside systems (bundle collection, blue bins) as well as bring systems and combinations of both are established. Paper and cardboard packaging is collected together with printing paper. It is assumed that the share of packaging paper/cardboard amounts to 25 % of the collected quantity. Accordingly, the DSD bears one quarter of the collection and sorting costs.
- Packaging made of plastic, composites, aluminium and tin plate - the so-called lightweight fraction - is mainly collected in yellow bags and bins in a door-to door-system and mixed systems (combinations of door-to-door and bring systems). Especially in some Bundesländer in southern Germany bring systems still predominate. In contrast to the glass and paper/cardboard collection the yellow bag/bin for lightweight packaging was established by the DSD.

23) Following the collection, light packaging, glass and paper/cardboard has to be sorted. Sorting fractions and quality requirements are prescribed by the DSD in agreement with the guarantors. Sorting of light packaging is currently performed in 250 sorting plants, mainly by manual sorting. Light packaging is sorted into the fractions tin-plate, aluminium, plastics, beverage cartons and other composites. For plastics a further sorting is done according to the product-related fractions bottles, foils, jars and mixed plastics. Paper/cardboard is sorted according to four standard grades.

Table 2: Sorting, treatment and recycling plants for the lightweight fraction

Packaging material	Sorting plants	Treatment plants	Recycling plants
Aluminium		7	21
Tinplate		29	60
Plastic		40	101
Beverage cartons			12
other composites			4
Lightweight fraction total	250	101	198

The DSD-contract and its amendments

24) The relationship between the DSD and their contractors is laid down in performance contracts (Leistungsvertrag), which were agreed in the beginning of the DSD. Contents of the contract are e.g.:

- requirements for collection and sorting of packaging (collection systems, sorting fractions, quality specifications, minimal recovery quantities etc.)
- reimbursement of collection and sorting
- provision of data on sorting input and output

25) Subsequently the regulations of the DSD-contract were amended several times by modification contracts (Änderungsvertäge) without a new tendering. In 1998 the fourth amendment was brought into force. Among others the amendments aimed at:

- modifications of the reimbursement to provide incentives for higher collection quantities and a better quality of the collected materials
- a more flexible way of marketing of secondary materials
- standardisation of the collection systems

26) The repeated amendment of existing contracts without a new call for tender over a long period was criticised by the European Commission as a competition restriction. It therefore was agreed with the Commission that the current contracts will run out at the end of 2003, followed by a new invitation to tender by the DSD for all contract areas.

2.2.3 Treatment systems and outlet of recycling

27) To guarantee the recycling and recovery of the collected packaging materials according to the targets of the Packaging Ordinance, the DSD contracted several so-called guarantors who have committed themselves to recycle fixed amounts of packaging materials. Guarantors are either companies of the material-producing industry, waste management companies or associations of both groups. Guarantors of the DSD and the materials they guarantee for are listed in Table 3.

28) According to the DSD-contracts the contractors responsible for collection and sorting are obliged to transfer the sorted materials to the guarantors free of charge. The sorted materials have to comply with the product specification of the DSD. In the 3. amendment of the DSD-contract the fractions glass, paper/cardboard, tin-plate and aluminium were exempted from this regulation. The contractors now may decide whether they market their secondary materials by themselves or leave them to the guarantors. Plastics and composites still have to be transferred to the guarantors.

Table 3: Guarantors for recovery of sales packaging

Materials	Guarantors
glass (clear, green and brown)	• Gesellschaft für Glasrecycling und Abfallvermeidung mbH (GGA)
paper and cardboard	• Gesellschaft für Papierrecycling mbH (GesPaRec) • Interseroh AG • Papier- und Kunststoffverwertungs GmbH (IPK) • Recostra S.A. • Vereinigung für Wertstoffrecycling GmbH (VfW) • Deutsche Gesellschaft für Wertstoff-Verwertung mbH (DGW) • ZENTEK - Gesellschaft für Kreislaufwirtschaftssysteme in Deutschland mbh & Co. KG
tinplate	• Interseroh AG • Entsorgungs- und Beratungsgesellschaft für die deutsche Recyclingwirtschaft mbH & Co.KG (GEBR) • Hansa Recycling GmbH • Rasselstein Hoesch GmbH • Papier- und Kunststoffverwertungs GmbH (IPK) • Thyssen Sonnenberg Metallrecycling GmbH & Co. KG • Vereinigung für Wertstoffrecycling GmbH (VfW) • Deutsche Gesellschaft für Wertstoff-Verwertung mbH (DGW) • ZENTEK - Gesellschaft für Kreislaufwirtschaftssysteme in Deutschland mbh & Co. KG
aluminium	• Deutsche Aluminium Verpackung Recycling GmbH (DAVR) • Interseroh AG • Papier- und Kunststoffverwertungs GmbH (IPK) • Vereinigung für Wertstoffrecycling GmbH (VfW) • Deutsche Gesellschaft für Wertstoff-Verwertung mbH (DGW) • ZENTEK - Gesellschaft für Kreislaufwirtschaftssysteme in Deutschland mbh & Co. KG
plastics (films, cups, bottles, EPS, mixed fraction)	• Deutsche Gesellschaft für Kunststoff-Recycling mbH (DKR)
beverage cardboards	• Gesellschaft für Wertstoffgewinnung aus Getränkekartons mbH (ReCarton)
composites other than beverage cardboards	• Interseroh AG

(http://www.gruener-punkt.de, 2000)

Glass

29) The “Gesellschaft für Glasrecycling und Abfallvermeidung mbH” (GGA), guarantor for glass recycling, is an association of all German glass producers. GGA undertakes the central allocation of the collected packaging glass waste to the glass producers unless the sorted glass is marketed by the DSD-contractors themselves.

30) The collected glass waste is reprocessed mainly in the production of new glass packaging. In 1997 the total glass packaging put on the market (reusable and non-reusable) in Germany amounted to 3.75 mio. t of which 2.8 mio. t (75 %) were recycled in Germany and 350,000 t (9 %) were exported for recycling. 99 % of the glass waste recycled in Germany was reprocessed for the production of new glass, 1 % was used as construction material or for similar applications. (GGA, 2000)

31) Germany not only exports but also imports packaging glass waste. In 1997 the imports of glass waste amounted to 127,000 t. Import and export are driven by quality and market prices

of the glass waste. The exported glass waste consists mainly of mixed glass waste not collected according to colours. (GVM, 1999; GGA, 2000).

32) The proportion of cullets in new glass production amounted in 1999 to 68.6 % for green glass, 50.2 % for brown glass and 57.2 % for white glass. The average proportion of cullets in new glass production for all colours amounts to 59.3 %. According to GGA and the Fachvereinigung Behälterglasindustrie (German Container Glass Manufacturers Association) a further increase of the recycling quota is possible provided that a high collection quality (colour separation, small percentage of impurities) can be achieved. (GGA, 2000; BV Glas, 2000)

Paper/cardboard

33) After being sorted in up to four standard grades paper/cardboard is reprocessed by the paper industry. The extension of the paper/cardboard collection by the DSD has lead both to an increase of collection quantities and to a change of composition and quality of the collected paper/cardboard materials. The development of new applications couldn't keep up with this qualitative and quantitative changes. While in the beginning of the nineties the amount of reprocessed waste paper/cardboard used for the production of new paper lay above the collected quantities. This relation has reversed through DSD-collection. In 1998 the collection rate amounted to 70 % and, thus, exceeded the utilisation rate of about 61 %. Therefore, in Germany a clear surplus of waste paper exists which resulted in paper/cardboard net exports of about 2 million tonnes in 1998. (CEPI, 1999; Staudt, 1997)

34) Waste paper/cardboard is mainly used for the production of packaging products and of tissue and toilet rolls. The proportion of waste paper in these products lies between 70 % and 90 % (DSD, 1998). For technical reasons a considerable further increase is hardly possible. Other possibilities for the use of waste paper exist in the production of graphic papers where the waste paper proportion lies at about 30 %. Of this the major part is used for newspaper production while only 9 % waste paper are used for the production of other graphic papers. However, the quality of the collected materials is inadequate for this product group. As a result, there is a "quality gap" between supply and demand of waste paper that at present is closed by export of waste paper. (Staudt, 1997)

Aluminium

35) Aluminium packaging usually is painted, coated or used in composites and must therefore be separated from other materials (the paint, plastic or paper) in a preparation step. The aluminium content of packaging sorted out automatically by eddy current separators averages 45 to 50 %.

36) Treatment of aluminium packaging can either be done by pyrolysis, by mechanical processes or by combination of both processes. Pyrolysis, which is the prevalent process, converts coatings and adhering products into gases by way of low temperature carbonisation at around 500°C. The aluminium can be smelted down directly or be processed to granules. Gas and solid pyrolysis residues (pyrolysis coke) are used energetically. Mechanical treatment produces fractions of different aluminium content and quality. Products of high aluminium content are smelted down or used for non-smelting applications. Products of low aluminium content are further processed by pyrolysis.

37) Quality of the treatment outlet as well as market prices for secondary aluminium from sales packaging depend on the quality of collection and sorting of aluminium packaging. In general post-user aluminium is in great demand, market prices ranging between 50.- EURO and about 700.- EURO. In Germany there is a clear surplus of recycling capacity for

aluminium. Most of the aluminium packaging collected by the DSD therefore is within Germany. Due to market prices in 1997 about 5,000 tonnes were recycled outside Germany, mainly in Italy. (DAVR, 2000; DSD, 1998)

Steel

38) The recycling of tinplate is well developed. As there is sufficient demand for scrap tinplate the guarantors have given a recovery guarantee which is unlimited with regard to time and quantity.

Plastics

39) While the first Packaging Ordinance from 12 June 1991 required that the recovery targets for plastics had to be achieved exclusively by material recycling or feedstock processes the amended Ordinance from 21 August 1998 allows for a combination of recycling and energy recovery. From 1 January 1999 60 % of the total plastic packaging has to be recovered. At least 60 % of this quota (corresponding to 36 % of plastic sales packaging) shall be achieved by processes in which new material of the same substance is replaced or the plastic remains available for further use as a substance (mechanical or feedstock recycling).

40) In the beginning of the DSD high amounts of the collected plastic packaging waste were exported (about 75 % in 1993) because of lacking recycling capacities in Germany. Recycling was largely done in Asia, especially in China. Plastic packaging waste was also sent to Eastern European Countries and to EU Member States. The massive quantities being exported as well as illegal recycling practices lead to enormous public pressure on the DSD

41) Because of the missing guarantees for plastic recycling, the DSD itself, together with the Beteiligungs- und Kunststoffverwertungsgesellschaft, founded a new guarantor association for plastic packaging, the Deutsche Gesellschaft für Kunststoff-Recycling mbH (DKR). The DKR, which is still the only guarantor for plastic sales packaging, tried to build up sufficient recovery capacities in the following years.

42) In 1998 93 % of plastic sales packaging collected by the DSD have been recycled in Germany. 7 % were exported to EU-Member States, to other European States and to Japan. Although the Packaging Ordinance allows energy recovery of plastics to a certain degree, the required recovery rate is realised exclusively by a combination of mechanical recycling and feedstock processes. To rule out illegal actions of plastic recycling companies, the DKR demands from their contractors a regular certification by an auditor as well as a quality management according to ISO 9002. The contracted recyclers are not allowed to sub-contract the recycling of plastic waste.

43) In 1998 a total of 600,000 tonnes of plastic sales packaged were recycled. About 43 % (261,000 tonnes) percent were recycled mechanically while 56 % (337,000 tonnes) were consigned to feedstock processes. 2,000 tonnes were used for experimental purposes in a new feedstock process for foil recycling (PARAK-process). (DKR, 1999). The breakdown of the sorted plastic sales packaging is shown below:

- mixed plastics 63 %
- foils 26 %
- bottles 9 %
- jars and EPS 2 %

44) Products of mechanical recycling can be classified according to the materials they substitute which can be primary plastic, wood or concrete. For substitution of virgin plastic

material plastic packaging material has to be treated by wet processes and is subsequently processed to granules by extrusion. Substitutes for concrete and wood (e.g. noise production walls, jetties, palisades) can be made from dryly processed plastic packaging by pressing or intrusion. While sorting fractions of high quality like bottles and jars are almost exclusively processed to regranulates mixed plastics are used mainly for concrete and wood substitutes. Figures on mechanical recycling of post-user plastic packaging are shown in Table 4.

Table 4: Products of plastic packaging recycling according to sorting fractions in kt

Product	Sorting fractions				Total	Portion [%]
	Foils	Bottles	Jars	Mixed plastics		
Regranulates (substitution of new material)	103	60	9	24	196	70
Substitutes for concrete and wood products	32	0	0	51	84	30
Total	135	60	9	75	280	100

45) Expanded Polystyrene (EPS is ground and used for brick production *(Porosierungsmittel)* and as insulation material in construction industry. Thus, about 80 % of the 3,000 t/a EPS collected by the DSD are recycled.

46) In Germany at present mixed plastics are recovered by two feedstock processes:

- use of mixed-plastic agglomerate as a substitute for heavy oil for the reduction of iron in the blast furnace
- production of synthesis gas and methanol in the course of fixed-bed gasification

47) Until the end of 1999 plastic packaging was also used in the Kohleöl-Anlage Bottrop to recover syncrude oil and gases for industrial use by means of a hydrogenation process. Since the Kohleöl-Anlage Bottrop couldn't compete with the other recovery processes in terms of costs the co-operation with the DSD was stopped. (Abfallwirtschaftlicher Informationsdienst, No. 4, 17.9.1999)

Composites / Beverage Cartons

48) According to the German Packaging Ordinance composite packaging is defined as packaging made of different materials which cannot be separated manually and none of which exceeds a share of 95 % by weight. Thus, composites consist of various types of packaging of which beverage cartons and tin plate cans with an aluminium lid are the most important ones in terms of quantity. A separate recycling route only exists for beverage cartons. Other types of composite packaging are recycled together with the predominant material. The following sections deal therefore only with beverage cartons.

49) Beverage cartons, which make up the largest group of composites sales packaging, consist to 75 % up to 80 % of paper or cardboard. As a result, this type of packaging travels along the paper recycling route after sorting. Their long paper and cardboard fibres are in demand as raw materials for toilet rolls and tissues, paper carrier bags, corrugated board or egg cartons. The plastic and aluminium layers can be recovered in cement works.

50) The only guarantor for beverage cartons is the "ReCarton Gesellschaft für Wertstoffgewinnung aus Getränkekartons mbH". ReCarton is a subsidiary of the

"Fachverband Kartonverpackungen für flüssige Nahrungsmittel" (trade association for liquid food) which is, in turn, an association of the beverage carton producers TetraPak (share of market 75 %), PKL (20 %) and Elopak (5 %). ReCarton undertakes the allocation of the sorted beverage packaging and makes contracts with the recycling companies on fixed quantities over periods of five years. (Staudt, 1997)

51) Consumption of beverage cartons in Germany amounts to about 210,000 tonnes per year (GVM, 1999). In 1999 about 135,000 tonnes were collected separately of which ca. 90,000 tonnes (67 %) were recycled in German while 35,000 tonnes were exported to Finland for recycling. (ReCarton, 2000)

52) Up to now sorting is mainly carried out by hand. New developments in sorting technique (near-infrared detection) allows beverage cartons to be sorted out mechanically. When exposed to near-infrared radiation the cartons reflect a specific spectrum. A detection unit locates the beverage cartons on the conveyor belt. Subsequently the identified cartons are thrown out by a blow-out device. At present at least two sorting plants in Germany are working with this technique (DSD, 1998 and 2000*)*

53) The sorted beverage cartons are pressed into bales and transported to paper mills where the materials are disintegrated in pulpers. In the last years normal pulpers have been replaced by drum pulpers, also known as fibre drums. Drum pulpers can be filled continuously, thus increasing the recycling capacity from 70 to a maximum of 170 tonnes per day. After separation of paper fibres a mixture of PE and aluminium is obtained coming up to 25 % of the input. Up to now this fraction is mainly used as an additive in cement works. (DSD, 1998 and 2000)

54) New technologies allow the separation and recycling of the aluminium and PE-residues:

- In Finland one paper mill will start this year to reclaim aluminium and to return it to the aluminium industry for recycling. PE will be used energetically.
- In a treatment plant in Thüringen, Germany, a new process is under development which allows material separation in a dry process, thus making all fractions feasible to recycling. The present capacity of the plant amounts to 26,000 tonnes/a but shall be enlarged to 62,000 t/a. It is assumed that the optimisation of the process will take some more years.

55) The recycling of beverage cartons is subsidised by the guarantor ReCarton (not by the DSD). The amount of subsidies depends on the prices of the world market for paper and aluminium. (ReCarton, 2000)

2.2.4 Financing of the system

56) The system is financed by the licence fee for the green dot ("Der Grüne Punkt") which is stamped on packaging if the licence fee has been paid. The amount of the licence fee depends on the material, weight and volume/surface of the packaging. The licence fee covers the collection, the sorting and, in case of plastics, the recycling of the packaging.

Licence fee

57) The green dot fee consists of a weight fee and an item fee. The item fee is calculated either according to the volume or surface of a piece of packaging. The material specific weight fees reflect the different collection, sorting and recycling costs for the various packaging materials. For instance, the costs for plastic are much higher than those for glass on account of the more expensive sorting process and the additional payment for recycling. The license

fees, valid since the third change in the fee structure in 1994, are given in the tables below. Since 1999 an overall price reduction of 9.5 % is granted on the total licence fee without having changed the structure of the license fees.

Table 5: Weight based fees (Euro/kg)

Materials	Fee [Euro/kg]
glass	0.08
paper / cardboard	0.20
tinplate	0.29
aluminium	0.77
plastics	1.51
beverage cartons	0.86
other composites	1.07
natural materials	0.10

Table 6: Surface based fee per item (Cent/item)

Surface	Fee according to unit [cent/item]
<150 cm² to 300 cm²	0.05 to 0.20
>300 cm² to 1,600 cm²	0.31
>1,600 cm²	0.46

Table 7: Volume based fee per item (Cent/item)

Volume	Fee according to unit [cent/item]
< 50 ml to 200 ml and > 3g	0.05 to 0.26
> 200 ml to 3 l	0.36 to 0.46
> 3 l	0.61

Reimbursement for collection and sorting

58) In the beginning of the DSD collection and sorting of the packaging materials were paid on the basis of the collected quantities, i.e. the sorting input. In addition the DSD paid for the disposal of the sorting residues. Thus, the terms of payment provided little incentive to improve the collection quality (proportion of impurities) e.g. by public relations work. (Staudt, 1997)

59) In the amendments of the DSD-contracts therefore a payment on the basis of the sorting output was agreed. The reimbursements now are based on material specific prices for the sorting output quantities per inhabitant of the respective area: the higher the output per inhabitant the higher the reimbursements of the DSD. *The disposal of the sorting residues is included in these payments.* Therefore, a strong financial incentive is given for the operators of the collection to get high collection results both in terms of quantities and of quality.

60) With the exception of plastics the DSD doesn't pay for the recovery of the packaging waste. The sorted materials are either marketed by the operators themselves or they are transferred to the guarantors free of charge. Because of the high sorting and reprocessing costs of the plastic packaging and the comparatively low prices for new plastic the DSD has to subsidise the recycling of the sorted plastics. The amount of the subsidies depends on the recovery process (mechanical, feedstock) and form the price of the substituted raw materials (e.g. naphtha) and products (e.g. methanol). At present the DSD pays on average some 354 Euro per tonne for plastic to be recycled. (DKR, 1999)

Total costs of the DSD

61) In 1999 the total costs of the DSD amounted to 3.7 billion DM which corresponds to about 45.- DM per capita and year. These costs include:

- collection and sorting of glass, paper/cardboard and light weight packaging
- subsidies for recycling of plastic packaging
- costs for public relations work in the contract areas
- costs for research and development

The breakdown of costs is shown in Table 8.

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Table 8: Breakdown of the total costs of DSD in 1999

Purpose/application	Total costs in Mio. DM	Costs in DM/ton
Collection and sorting of ..		
glass packaging	378	140
paper and cardboard packaging	389	250
light weight packaging	2,382	1,150
Recycling of ..		
plastic packaging	446	700
other composites packaging [1)]	8	100
Other costs [2)]	84	
Total	3,686	

1) Costs for recycling of composites based on paper/cardboard depend on the prices on the waste paper market

2) Costs for R & D and for public relations are included

62) During the last years the DSD could reduce its costs step by step from 4.1 billion DM (50.- DM/cap,a) in 1995 to 3.7 billion DM (45.- DM/cap,a) in 1999. These reductions are mainly due to the amendments of the DSD-contracts and subsequent reductions of collection and sorting costs as well as to cost reduction in the field of plastic packaging recycling. (Euwid No. 27, 04.07.2000; Eichstädt et al, 1999)

63) Further cost reductions are expected to be achieved in future. It is assumed that costs for collection and sorting will be reduced by about 20 % as a result of the invitation for tender of new waste management contracts in 2004. Additional reductions are expected especially in the field of sorting and recycling of plastic packaging through the introduction of fully automatic sorting technologies leading to lower sorting costs and higher quality of the sorting output. (Euwid Nr.26, 29.06.1999)

2.3 Self-compliers and systems for self- compliance

64) The first version of the Packaging Ordinance from 12. June 1991 contained no quantitative recycling targets and no documentation requirements for the so-called self-compliers or individual compliers (manufacturers and distributors not taking part in the DSD). Some manufacturers and distributors took advantage of this loophole by neither participating in the DSD nor building up own systems to fulfil their take-back obligation. This free-riding led to significant financial problems of the DSD, which collected and recycled packaging materials for which they received no license fees.

65) To close this gap the amended Packaging Ordinance from 21 August 1998 stipulates that as from 2000 individual compliers have to fulfil the same recovery requirements as the DSD. In 1998 and 1999 the requirements shall be deemed to be met if at least 50 % of the relevant quotas is reached. Furthermore self-compliers have to provide proof of compliance by a yearly documentation which has to be certified by an independent expert. On the basis of this regulation some waste management companies built up systems for individual compliers for particular branches (e.g. chemist's shops, hospitals, nurserys etc.) or for certain types of packaging (e.g. service packaging from retail trade) in competition to the DSD.

66) To assure that this regulation is applied in a uniform way in all German Bundesländer the Länderarbeitsgemeinschaft Abfall (LAGA), a working group of waste experts of the Bundesländer, worked out "Guidelines for mass flow verification of self-compliers". The draft guidelines, published in September 1999, led to heavy criticism from the Bundeskartellamt (Federal Cartel Office, an independent part of the Federal Ministry of Economics and Technology) and from waste management companies which had built up systems for self-compliers. The main point of criticism concerns the place of collection of packaging waste by self-compliers. The guidelines stipulate that self-compliers may only collect packaging at or in the immediate vicinity of the place of actual transfer but not at the households. The Federal Cartel Office argues that this regulation would prevent any competition to the DSD and therefore be contradictory to the objectives of the Packaging Ordinance which aims at strengthening competition in the field of packaging waste management.

2.4 Compliance schemes for commercial and industrial packaging

67) As described in chapter 1.2 manufacturers and distributors of transport packaging are obliged to accept returned transport packaging after use and to reuse or to recycle it. They may as well pass on this obligation to compliance schemes. On the basis of this regulation several compliance schemes have been formed, either founded by manufacturers of packaging materials or packed products or by waste management companies. While some schemes concentrate on particular packaging materials others provide specific systems for individual branches comprising all packaging materials arising in these branches. A selection of compliance schemes for commercial and industrial packaging is given in Table 9.

Table 9: Compliance schemes for commercial and industrial packaging

Compliance scheme	Sphere of activities
Interseroh AG	packaging from several branches (e.g. construction, electrical goods, furniture, office supplies)
RESY	transport packaging made of corrugated cardboard
Repasack	Kraft sacks
RIGK	commercial and industrial plastic packaging
KBS	commercial and industrial metal packaging
ESR	transport packaging for electrical household appliances and kitchen furniture
Pro-Pe	transport plastic packaging
VfW	medicine packaging; fibre drums
EPSY	expanded polystyrene packaging
Pamira	containers for pesticides, fertiliser packaging

68) The compliance schemes usually organise the collection of the packaging materials by contracting waste management companies all over the country to provide a dense collection network. Separately collected packaging materials can be delivered free of charge at the premises of the scheme's contractors. Costs for collection have to be negotiated with the scheme's contractors individually.

69) The schemes normally finance themselves by license fees paid by the contracted manufacturers and distributors. The license guarantees that the packaging materials are taken back and recovered in accordance with the regulations of the Packaging Ordinance.

2.5 Monitoring and control

Assessment of packaging consumption and recovery

70) The monitoring of packaging waste management and the national reports pursuant to Article 12 of the Packaging Directive is based on studies which are regularly performed by the GVM (Gesellschaft für Verpackungsmartkforschung) on behalf of the Federal Environment Agency. The calculation of packaging consumption is mainly based on the evaluation of official statistics (production, foreign trade) and on regular panel-based consumption analysis. As laid out in the study "Consumption and recovery of packaging in Germany 1997", the calculation of recovered quantities is based on the gross weight of the materials consigned for recovery. The net weight of recovered packaging may be lower because of water content, contaminants and other materials. A further reduction of recovered quantities takes place in the course of reprocessing. The figures therefore reflect the quantities consigned for recovery, not the really recovered amounts. Average material losses during reprocessing are shown below:

Table 10: Material losses in reprocessing of packaging materials

Materials	Material losses [%)
Glass	about 10 %
Paper / cardboard	15 - 25 %
Plastic	15 - 30 %
Tinplate	5 - 8 %
Aluminium	60 - 70 %
Beverage cartons	about 25 %

Source: GVM, 1999

Approval and monitoring of the DSD

71) The DSD is approved and monitored by the German Bundesländer. The approval depends on the fulfilment of the general requirements for systems pursuant to No. 3 of Annex I of the Packaging Ordinance. The competent authorities of the Länder may revoke their approval if the requirements of the Packaging Ordinance are not being met.

72) The DSD has to submit every year in verifiable form evidence of the quantity of licensed packaging and the quantities collected and consigned to recycling and recovery, broken down by packaging material (mass flow verification). At the request of the competent authority the mass flow verification has to be confirmed by an independent expert at the expense of the DSD.

73) To provide proof of the achieved recycling quota the DSD registers the amounts of sales packaging put on the market by their licensees as well as the collected, sorted and recovered quantities. The contractors of the DSD are obliged to register not only the sorting input but also the sorted quantities, stock-on-hand and sorting residues on a monthly basis and transfer these data to the DSD.

74) The sorted materials are either forwarded to the guarantors or marketed by the contractors themselves. In case of self-marketing the contractors have to provide proof to the guarantors that the materials have been forwarded for proper recycling. Together with the registered quantities of materials recycled by the guarantors these data are passed on to the DSD. From this the nation-wide recycling and recovery quota is calculated in relation to the licensed quantities.

75) The calculation of the recovery quota as described above was introduced with the amendment of the Packaging Ordinance in 1998. Before 1998, the quotas of the mass flow verification were calculated on the basis of sales packaging consumption, as determined by the Gesellschaft für Verpackungsmarktfoschung (GVM). Since 1998, the recycling and recovery quotas are calculated on the basis of the sales packaging licensed with the DSD. The purpose of this regulation is to keep the market open for potential competitors who would have no chance of fulfilling the necessary quotas with the old calculation method. Now, each system is only to be measured against the quantity of packaging licensed within this system. On account of this modification the quotas since 1998 are not comparable to those of previous years. Quota exceeding 100 % are attributed to the recovery of non-licensed packaging and thus reflects the extent of free-riding.

Monitoring of self-compliers and systems for self-compliance

76) Manufacturers and distributors who do not take part in compliance scheme have to document in verifiable form the sales packaging put into circulation and returned and recovered for every year. Compliance with the targets of the Ordinance have to be certified by an independent expert. The certificate has to be deposited with the body set up pursuant to Art. 32 of the Eco-Audit Act and has to be presented on demand to the competent authority.

2.6 Quantities of packaging and packaging waste recovery

Total packaging consumption and packaging waste recovery

77) The quantity of packaging placed on the market and recovered in Germany in 1997 as reported to the European Commission according to article 12 of the Directive are shown in Table 11. The figures on recovery include the quantities of packaging waste which have arisen in Germany and were exported for recovery. The figures on import and export of packaging waste are given in.

78) Total packaging consumption in 1997 amounted to 13,731 ktonnes which corresponds to 164.7 kg per inhabitant and year. According to the reported data Germany achieved a recovery rate of 80.5 %, mainly by recycling. Disregarding unknown quantities of plastic and paper/cardboard packaging only wood packaging was recovered energetically to a considerable extent. The highest recycling rate was achieved for paper/cardboard packaging with 85.5 %, the lowest for plastic packaging (48,6 %). Thus, the recovery targets of the Packaging Ordinance were exceeded for all materials by far.

Table 11: Packaging consumption and packaging waste recovery in 1997

Material	Quantity put on the market	Recycling [1,000 t]	Energy Recovery [1,000 t]	Total Recovery [1,000 t]	Recycling [%]	Energy recovery [%]	Total Recovery [%]
Glass	3.750	3.147		3.147	83,9%		83,9%
Plastics	1.502	731	n.a.	731	48,6%	n.a.	48,6%
Paper/cardb.	5.448	4.659	n.a.	4.659	85,5%	n.a.	85,5%
Metals	1.121	920	0	920	82,0%	0,0%	82,0%
Composites [1)]							
Wood	1.892	1.290	310	1.600	68,2%	16,4%	84,6%
Others	17	0	0	0	0,0%	0,0%	0,0%
Total	13.731	10.747	310	11.057	78,3%	2,3%	80,5%

1) included in predominant material
n.a.: data not available
Source: Notification to the Commission acc. to Art. 12 of the Packaging Directive

79) Recovery of packaging waste was mainly realised within Germany. About 2,100 ktonnes, corresponding to 16 % of total packaging consumption were exported, which can be attributed to high exports of paper and cardboard packaging.

Table 12: Imports and exports of packaging waste for recovery

Material	Exported for recovery			Imported for recovery		
	Recycling	Energy Recovery	Total Recovery	Recycling	Energy recovery	Total Recovery
	[1,000 t]	[1,000 t]	[1,000 t]	[1,000 t]	[1,000 t]	[1,000 t]
Glass	350		350	127		127
Plastics	55	0	55	neg	neg	neg
Paper/ cardboard	1.466	n.a.	1.466	291	n.a.	291
Metals	5	0	5	n.a.	0	n.a.
Composites [1)]						
Wood	250	50	300	n.a.	n.a.	n.a.
Others	neg	neg	neg	neg	neg	neg
Total	2.126	50	2.176	418	n.a.	418

1) included in predominant material
n.a.: data not available
neg.: neglectable quantity
Source: Notification to the Commission acc. to Art. 12 of the Packaging Directive

Sales packaging consumption and recovery

80) Sales packaging consumption and recycled quantities are shown in Table 13. Consumption amounted in 1997 to a total of 6,775 ktonnes corresponding to 49 % of total packaging consumption. 5,362 ktonnes were recycled, thus resulting in a total recycling rate of 79 %. The targets of the Packaging Ordinance were exceeded for all materials.

Table 13: Total sales packaging consumption and recovery in 1997

Materials[1)]	Packaging put on the market [kt]	Recycled quantity [kt]	Recycling rate [%]	Targets acc. to the Packaging Ordinance [2)]
Glass	3,266	2,721	83.3%	70%
Paper / cardboard	1,919	1,466	76.4%	60%
Plastic	887	591	66.6%	50%
Tinplate	635	532	83.7%	70%
Aluminium	68	53	77.4%	50%
Total	6,775	5,362	79.1%	

1) Composites are included in the predominant material
2) Targets valid until end of 1998
Source: BMU, 2000

Mass flow verification of the DSD for 1999

81) Table 14 shows the mass flow balance of the DSD for 1999. Altogether the DSD recycled about 5.5 mio. tonnes of sales packaging. This corresponds to about 68 kg/cap,a. The targets given by the Packaging Ordinance were exceeded significantly for all materials. Quota exceeding 100 % as achieved for paper/cardboard, plastics and tinplate are attributed to the recovery of non-licensed packaging and thus reflect the extent of free-riding.

Table 14: Quantities of licensed sales packaging, recycled amounts and recycling rates of the DSD in 1999

Materials	Licensed quantity [kt]	Recycled quantity [kt]	Recycling rate [%]	Targets acc. to the Packaging Ordinance
Glass	3,080	2,709	87.9%	75%
Paper / cardboard	879	1,485	168.9%	70%
Plastic	565	610	108.0%	60%
Composites [1)]	591	391	66.0%	60%
Tinplate	307	322	105.1%	70%
Aluminium	42	37	87.5%	60%
Total	5,465	5,554		

1) Drinks cans of tinplate with an aluminium lid are included

Grouped and transport packaging

82) Separate figures on consumption and recycling of transport and grouped packaging are only partially available. In terms of quantity paper/cardboard and wood are the predominant materials for transport packaging. According to GVM wood packaging is estimated at about 1,900 kt in 1997 of which 1,600 kt (84.6 %) were recycled. For paper/cardboard it is assumed that about 3,500 ktonnes are used for commercial and industrial purposes of which 90 % were collected separately and recycled (GVM, 1999). It is assumed that recycling rates for transport and grouped packaging lie in the same order of magnitude as those for sales packaging.

3 Current situation

3.1 Packaging Prevention

83) The first objective of the Packaging Ordinance is the prevention of packaging waste. Unlike the regulations for recycling and recovery, this objective is neither quantified nor provided with concrete measures. The Ordinance only stipulates in a rather vague form that packaging should be manufactured in such a way that volume and weight are reduced to the minimum which is necessary to guarantee the safety and the hygiene of the packed product (Art. 12).

84) As can be seen in Figure 2, packaging consumption in Germany has decreased significantly since 1991, when the Packaging Ordinance was adopted, up to 1996 by about 1.5 million tonnes (-11.6 %). However, the data show that the greatest reduction took place from 1991 to 1993 (-8 %), even before the Ordinance came into force. Although in 1993 the Ordinance applied only to sales packaging, the use of secondary and transport packaging decreased as well (see Table 15). The reassignment of license fees by material and the increase of license fees for almost all sorts of packaging, which took place in 1994, had no strong effect on packaging consumption. It seems as though the decrease of packaging consumption in the early years is mainly due to the uncertainty that existed among all actors with regard to the functioning of the so-called dual system. It appears that the announcing of the Packaging Ordinance had a stronger effect in terms of packaging prevention than the implementation of the dual system itself. (Eichstädt et al., 1999; SRU, 2000).

85) With regard to packaging prevention, the Packaging Ordinance showed the strongest effects on the use of grouped packaging. As described in chapter 1.2, distributors providing goods in secondary packaging are obliged to remove such packaging upon delivery to the final consumer or to give the opportunity to remove and return the secondary packaging free of charge on the premises of the point of sale. This obligation can not be passed on to third parties and thus constitutes a strong incentive to reduce the use of grouped packaging. It is estimated that as a result of the Packaging Ordinance up to 90 % of grouped packaging has disappeared from the market. (Staudt et al., 1997).

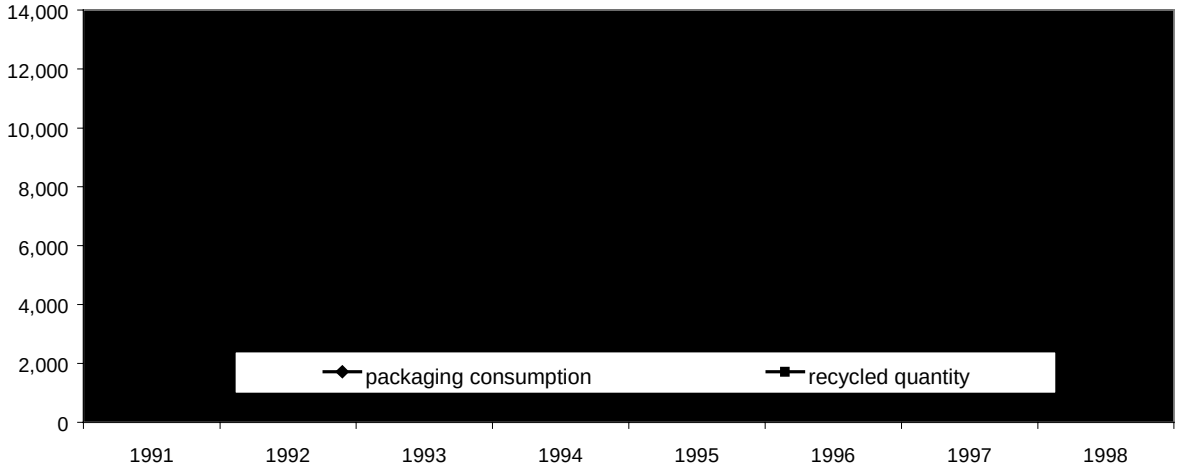

Figure 2: Total packaging consumption and recovery in Germany from 1991 to 1998 (without wood and other non-quoted materials)

Table 15: Development of packaging consumption from 1991 to 1995 (in percentages)

Years	Total packaging consumption	Sales packaging consumption	Transport pack. consumption	Secondary pack. consumption
1991	100	100	100	100
1992	96.5	96.6	96.7	82.4
1993	90.7	91.8	90.7	63.7
1994	91.1	90.9	93.0	59.8
1995	89.6	88.2	94.1	57.4

3.2 Packaging Recycling

86) As separate collection systems for the dominant packaging materials paper/cardboard and glass were established in most municipalities before the adoption of the Packaging Ordinance in 1991, Germany achieved already high recycling rates before mandatory recycling targets were introduced. In 1991 about 47 % of the packaging waste was recycled (wood packaging not included). When the Packaging Ordinance came into force the prevailing collection systems were extended and complemented by the separate collection of light weight packaging. Thus, the collection and recycling performance were improved continuously and reached recycling rates of about 80 % in 1997 and 1998, corresponding to 9,370 ktonnes recovered packaging material. It can be concluded that the Packaging Ordinance led to the recycling of additional 3 million tonnes of packaging waste compared to 1991. Although some of the applied recycling techniques, especially those for plastic packaging, are criticised to be

inefficient, both in terms of ecology and economy, the Öko-Institut acknowledged in a recent study, that despite several controversial aspects, the DSD shows an overall positive ecobalance (Eichstädt et al., 1999)

3.3 Re-use quota and mandatory deposits on one-way packaging

87) As described in chapter 1 the Packaging Ordinance stipulates a minimum proportion of reusable packaging of 72 % for the categories beer, mineral water, carbonated soft drinks, fruit juices and wine, which reflects the market shares of the year 1991. Should the fillers and distributors of beverages fail to meet this quota, a deposit is due on non-reusable packaging for those categories of beverages which have failed to meet the 1991 quota. While the volume of drinks filled in reusable bottles has increased since 1991, the re-use rate has decreased on account of the growth of the beverage market. In 1997, due to an increase of beer cans and non-reusable bottles for mineral water, the reuse quota fell for the first time below 72 % achieving 71.3 %. A further decrease took place in 1998 (70.1 %). Thus, a mandatory deposit on beer cans and non-reusable bottles for mineral water might be introduced in mid 2001, unless the Packaging Ordinance is amended in this respect.

88) However, there are strong objections from different parties against the reuse quota in general and the instrument of a mandatory deposit in particular. The essential viewpoints can be summarised as follows:

- The European Commission regards the reuse quota as trade barrier, arguing that the quota has the same effect as an import restriction to protect the internal beverage market. The Commission launched an infringement action against Germany which is still pending
- It is doubted by scientists, politicians and environmentalists, that a mandatory deposit will help to strengthen the reuse system. They rather expect that, once a mandatory deposit is introduced, the retail trade, especially small and medium-sized enterprises, will not keep up two different deposit systems (one for reusable and one for one-way packaging) but will perhaps concentrate on non-reusable packaging.
- It is doubted that reusable packaging in general can be regarded as ecologically advantageous. A life-cycle analysis on packaging for non-alcoholic beverages, published in August 2000 by the Federal Environmental Agency, essentially confirmed the ecological advantages of reuse systems. However, the authors also concluded that beverage cartons have proven to be ecologically comparable to reuse systems, provided they are collected and recycled.
- Parts of the industry reject the reuse quota in general as an unnecessary state intervention into the market. The retail trade in particular rejects a mandatory target because of the costs for putting up the necessary infrastructure which is estimated to amount to 4 billion DM.
- With regard to the consumers it seems difficult to communicate that a deposit will be levied on only a part of non-reusable beverage packaging (beer cans and mineral water bottles). Furthermore the difference between reusable and non-reusable packaging will no longer be recognisable if a deposit has to be paid for both sorts of packaging.

89) While the Ministry for Environment declares to be willing to discuss alternatives to the reuse quota and the mandatory deposit, it stands by its policy in favour of reusable packaging. The Ministry as well as environmentalists favour the introduction of a tax an all packaging which reflects the environmental impacts caused by the respective material. However, at present it seems unlikely to get this approach approved. In August 2000 the Ministry for Environment launched a proposal to introduce a mandatory deposit for all non-reusable beverage packaging no matter whether it is made of metal, plastics or glass. This solution would be easy to communicate to the consumers and prevent littering of drinks packaging.

90) The Ministry for Environment of Rheinland-Pfalz proposed to replace the reuse quota by a fixed volume of drinks to be filled in reusable bottles. It is suggested to fix the consumption of drinks in reusable bottles to at least 20 billion litres. In the reference year 1991 the reuse quota 72 % corresponded to a consumption 19 billion litres filled in reusable packaging. Although the quota fell to 70.1 % in 1998 the consumption corresponded to 22.5 billion litres filled in reusable packaging.

3.4 Recycling of small plastic sales packaging

91) In contrast to other packaging materials the recycling of plastics was fundamentally pushed by the Packaging Ordinance. While until the beginning of the nineties only waste from plastic production was recycled, the high recycling quota for plastic sales packaging of 64 % stipulated by the Packaging Ordinance, required the separate collection and recycling even of small plastic sales packaging like yoghurt pots. Small plastic packaging, characterised by its heterogeneity and a high portion of contaminants, ends up after sorting in the mixed plastic fraction which amounts to about 60 % of the output of sorted plastic packaging.

92) As up to the amendment in 1998 the Packaging Ordinance allowed no energy recovery, recycling and feedstock processes had to be developed and capacities had to be built up (see chapter 2.2.3). The development and use of these processes was only made possible by considerable subsidies of the DSD. These processes are very controversially discussed as they are expensive and the ecological benefit is doubted.

93) Although plastic packaging amounts only to about 11 % of the total of recycled sales packaging, in 1996 more than 2 billion DM, i.e. about the half of the total costs of the DSD, were spent for collection, sorting and recycling of plastic sales packaging. (Brandrup, 1998 citing SRU, 2000). About 40 % of theses costs are allocated to collection and sorting respectively while 20 % are used as subsidies for recycling.

94) To assess the cost-benefit-relation of plastic sales packaging recycling, several studies have been performed which compared the different recycling processes to the less cost-intensive energy recovery in municipal waste incineration plants under environmental aspects. The results can be summarised as follows:

- Mechanical recycling has greater environmental benefits than other forms of recycling and recovery, provided that the recycled material substitutes at least a proportion of virgin materials and losses during processes are low. Substitution of other materials like wood, concrete or steel shows smaller environmental benefits and may even deteriorate the environment. (Öko-Institut, 2000)
- Feedstock processes like the use in blast furnace or thermolyses are in general ecologically superior to energy recovery in incineration plants due to lower emissions of greenhouse gases. Other studies, which come to different results, are based on plant specific data, which are far from the average situation. (SRU, 2000; Öko-Institut, 2000)
- Today the costs for feedstock processes per ton are clearly above those of energy recovery in incineration plants. The difference is discussed controversially, estimates ranging between 1,000.- DM and 3.000.- DM per ton. (SRU, 2000)
- It is expected that the cost difference between feedstock processes and energy recovery will decrease significantly due to cost savings in collection and sorting and an improved quality of sorting output. However, costs for feedstock processes will exceed those of energy recovery even in future. (SRU, 2000; Öko-Institut, 2000)

95) To reduce costs of plastic sales packaging recycling the German Bundesland Rheinland-Pfalz and representatives of the Deutscher Städtetag (association of German municipalities) have launched proposals for an amendment of the Packaging Ordinance. They propose to restrict the separate collection to easy collectable and recyclable plastic sales packaging, e.g. bottles and big foils. Small plastic packaging shall be collected together with the residual

waste provided that the waste or the high caloric fraction of the waste is treated in incineration plants with energy recovery. It is estimated that the costs of the DSD could be reduced this way by about 1 billion DM.

96) The German Council of Environmental Advisors (SRU), which shares this position in principal, however recognises that some serious problems are connected with this option (SRU, 2000):

- to avoid landfilling of plastic packaging waste additional monitoring tasks on the level of the municipalities would be required
- to exclude some types of packaging from the separate collection the people are used to might be difficult to communicate and damage the environmental awareness of the population
- based on the Packaging Ordinance considerable private investments have been undertaken in the field of collection, sorting and treatment processes for packaging materials
- energy recovery of plastic packaging waste might conflict with an expected increase of recycling targets on the European level

97) The government has declared to review the cost-efficiency of the prevailing system, but has not yet indicated any concrete plans for an amendment in this respect.

3.5 Monopolistic nature of the DSD

98) One of the issues criticised most by opponents of the Packaging Ordinance is the quasi-monopoly, the DSD has built up for the collection of sales packaging. While it wasn't intended by the legislator to create such a monopoly, the Packaging Ordinance indirectly promoted it by requiring that compliance schemes have to cover the whole area of a Bundesland to get the permit (Freistellungserklärung) that releases retailers from their take-back obligation. To prevent the DSD form entering the transport packaging market, the Bundeskartellamt (Federal Cartel Office) intervened and restricted the activities of the DSD to sales packaging. The fear that the DSD could misuse his monopoly to levy excessive license fees can be ignored as the fillers themselves are members of the DSD board. (Eichstädt et al., 1999)

99) Since the amendment of the Packaging Ordinance in 1998 competition to the DSD is arising from a growing number of systems for self-compliance (s. chapter 2.3), which provide collection systems for particular branches or for certain types of packaging. Efforts of the DSD to take legal action against these systems failed. As these systems are not obliged to cover the whole area of a Bundesland but can concentrate on particular branches and packaging, they can offer their services much cheaper than the DSD. The DSD reacted to this development by announcing that they will reduce their tariffs for commercial clients to be able to compete with these systems.

100) Strong efforts to establish less cost-intensive systems are made by municipalities, districts and some of the Länder. The Lahn-Dill-Kreis (a district in the Bundesland Hessen) in co-operation with a private enterprise, the Landbell AG, started a pilot project in competition to the DSD. In the project region separate collection of packaging is restricted to paper and cardboard packaging and to a plastic mono-fraction, containing only bulky plastic packaging like bottles. Metal packaging and small plastic packaging are collected together with the residual waste, which subsequently is processed in a mechanical-biological treatment plant. Metal packaging is sorted out while small plastic packaging is used energetically together with the dried residual waste.

101) The DSD took legal action against the Lahn-Dill-Kreis claiming that the system is not in line with the Packaging Ordinance. In August 1999 the Hessen Administrative Court

essentially confirmed this point of view. The Court made clear that packaging waste should be definitely sorted and collected separately by the end-user. Methods which involve some of the packaging being sorted from the residual waste are not authorised by the Packaging Ordinance. Furthermore the Court stated that the Ordinance applies to all packaging. Therefore, exemptions or special regulation for specific types of packaging as small packaging are not in line with the requirements of the Packaging Ordinance. However, the DSD didn't succeed in reaching a temporary order against the system.

102) In return the Landbell AG tried to win other districts in Hessen to participate in the system and applied in January 2000 to the Ministry of Environment in Hessen for a permit (Freistellungsantrag) as an approved system according to the Packaging Ordinance (Art 6 para 3). The outcome of the proceedingmay have far reaching consequences for packaging waste management in Germany.

3.6 Innovation

103) The Packaging Ordinance and the introduction of the dual system has definitely driven innovation processes in the area of mechanically and automatically sorting. The fully automatic sorting and processing plant for light weight packaging SORTEChnology 3.0 has started operation in Hanover in 1999. The Trienekens Goup runs a similar sorting plant and announced to re-equip further plants with automatical sorting equipment. The most frequent plastic materials will be sorted according to plastic type, thus providing better quality of sorting output at lower costs.

104) With regard to packaging design a survey of various companies in the packaging industry has shown that the legal framework and the license fees only present a minor factor in their product innovation. It is assumed that fillers father change their marketing strategies than to substantially change products or their packaging (Eichstädt et al., 1999)

4 Future Development

Legislation

105) Nine years after the adoption of the Packaging Ordinance discussions on the ecological and economical benefit of the provisions of the Ordinance, especially with regard to sales and the DSD, are still going on. As described in chapter 3, the discussion focuses on:

- the reuse-quota and mandatory targets in case of non-compliance
- costs and benefits of the recycling of small plastic packaging
- the position of monopoly of the DSD

However, up to now the government hasn't announced concrete plans for the amendment of the Packaging Ordinance.

Collection

106) In German the extension of collection systems for packaging waste in the course of the Packaging Ordinance is essentially accomplished. With regard to sales packaging it is expected that only minor improvements remain to be realised (replacement of bring systems for paper/cardboard by kerbside systems; improvement of collection quality for light weight packaging). New developments could result from the collection of other consumer goods (e.g. electrical and electronic devices from households) together with packaging waste. In its "Berlin Declaration on the Development of Duales Sstem Deutschland AG" from May 2000 the

DSD pointed out that the political, economic and infrastructural perspectives of this option will be examined. (Brück, 2000)

Sorting

107) It is expected that manual sorting of light weight packaging will be replaced gradually by semi- or fully automatically processes. The number of sorting plants is assumed to decrease considerably from 250 to about 100 plants in future. It is predicted that automatically sorting will not only reduce sorting costs substantially but will improve the quality of the sorting output, thus facilitating marketing and reprocessing. Especially the type-specific sorting of plastics is expected to extend the possibilities to substitute virgin plastics.

Treatment and outlets

108) To raise the acceptance of recycling products from plastic sales packaging the DKR (guarantor for plastic recycling) aims to improve product quality. The following projects and measures are envisaged:

- introduction of new sorting technologies (e.g. near-infrared detection) to separate plastics according to plastic type (PE, PP, PS, PET transparent, PET coloured), independent of geometrical shape, to obtain high-quality recyclates. Two reprocessing plants with a capacity of 20 ktonnes /a respectively will start operation in the first quarter 2001.
- Step by step-reduction of dry refinement processes for plastics to be recycled mechanically
- Development and introduction of new processes for mechanical recycling as:
  - PRL-process (polymer-recycling by dissolution) for recovery of high-quality polyolefines
  - PET-Recycling by selective extraction: recovery of PET for reuse in bottle production
  - Chemical PET recycling by glycolysis for PET fractions which can not be mechanically recycled
  - new flotation processes for separation of PE and PP to obtain PE-HD regranulates (PP must be reduced to <3 %)
- Development of new applications with high proceeds:
  - use of particular plastic regranulates for waste water treatment
  - development of guidelines for packaging design, aiming at reduction and standardisation of packaging plastics, restriction to plastic types (PE, PP, PS and PET) and exclusion of copolymers and composites

(DKR, personal communication 2000)

109) A new treatment process for beverage cartons is under development which allows separation of paper fibres, aluminium and PE in a dry process, thus making all fractions feasible to recycling. The present capacity of the plant amounts to 26,000 tonnes/a but shall be enlarged to 62,000 t/a. It is assumed that the optimisation of the process will take some more years.

Costs

110) It is expected that costs of the DSD will decrease by about 20 % to 30 % in the coming years especially due to:

- new contracts on collection and sorting in 2004
- more efficient sorting plants
- decrease of subsidies for plastic recycling

111) The DKR aims to reduce the subsidies for plastic recycling to less than 400 DM up the year 2006. (Euwid No. 36, 5.9.2000).

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Greece

Contents

1 Legislation and Voluntary Agreements 1
1.1 Definitions and Field of Application 1
1.2 Responsibilities of economic operators 2
1.3 Targets and Instruments 2
1.4 Further Provisions 2
2 Packaging Waste Management's System 3
2.5 Compliance scheme 3
2.6 Interactions between operators and local authorities 3
2.7 Collection and sorting 4
2.8 Financing of the system 5
2.9 Monitoring and control 5
2.10 Quantities of circulated packaging and recovered packaging waste 6
3 Current state of PWMS 6

1 Legislation and Voluntary Agreements

1) The 94/62 ECD Packaging Directive has not been incorporated to the Greek legislation so far. A Draft Law titled «Measures and conditions for the alternative management of packaging and other waste products. Foundation of the National Organisation for the Alternative Management of Packaging and Other Waste (NOAMPOW)» has been formulated, but never reached the Parliament. As a result there are no regulations nor voluntary agreements in power concerning the management of packaging waste. Nevertheless within the existing legislation covering Municipal Solid Waste Management (MSWM) there are several references on packaging and packaging waste;

- Environment Act (Law 1650/86) in Article 13
- Common Ministerial Decision 69728/1996: Measures and conditions for solid waste management
- Common Ministerial Decision 113944/1997: National planning on waste management
- Common Ministerial Decision 114218/1997: Technical specifications framework and general programs on waste management
- Common Ministerial Decision 31784/1990: Types of liquid food packaging

1.1 Definitions and Field of Application

2) According to the Draft Law named above:

- Primary packaging: the packaging designed in such a way that - at sale point - it is a unit of product to be sold to the final user or consumer
- Secondary (grouped) packaging: the packaging designed in such a way that - at sale point - it is a group of several product units to be sold either as such to the end user or consumer or used only for display purposes at the sale point. Secondary packaging can be removed from the product without affecting its features and can be handed over to the vendor by the end user or consumer.
- Tertiary (transport) packaging: the packaging designed in such a way that it facilitates the distribution and transport of a number of products or grouped packaging aiming to avoid physical handling and damage during transport. Tertiary packaging does not include containers used for transportation by tracks, rail, sea and air.
- Composite packaging: no statutory definition is given

3) The Draft Law covers all packaging and all packaging waste resulting from industry, commerce, offices, stores, services or any other source no matter what the packaging material is. Municipal packaging is meant to include all household, commercial and industrial packaging apart from containers used for road, rail, ship or airplane transport of goods.

4) According to the Draft Law:

- **Reuse:** Any process whereby packaging of multiple use is refilled or used for the same purpose for which it was designed, with or without the support of other products circulating in the market, that may enable the refilling.
- **Recycling:** the reprocessing of packaging waste or other products in the production process in order to be used for their initial or other purposes, organic recycling being included. Energy recovery is not considered a recycling activity.
- **Energy recovery:** the use of combustible packaging waste or other products as means for energy generation through direct incineration with or without other products and without causing environmental pollution.

1.2 Responsibilities of economic operators

5) The producer responsibility, as described in the Draft Law, is shared between the packaging materials suppliers, the packaging producers, the fillers, the importers, the retailers and the distributors.

6) The obligations linked with the producer's responsibility, as described in the Draft Law, are:

- the suppliers and the producers have to take back secondary material (packaging waste) and to recycle it for the manufacturing of new products
- the fillers and the importers have to collect separated-at-source packaging waste and to look after its reuse or valorisation
- the retailers and the distributors have to collect packaging waste and to check for the compliance of the distributed products to the set legislation and standards

7) The obligations following the producer's responsibility for packaging waste are transferable to systems of collective alternative management, according to the Draft Law.

1.3 Targets and Instruments

8) The main types of packaging targeted by the national waste management strategy are: glass bottles, paper packaging, composite packaging, PET - PVC - PE packaging, aluminium cans, tin cans. The packaging materials are respectively glass, paper, aluminium, plastics and steel.

9) According to the Draft Law, prevention is the reduction of the waste generation and the waste harmful potential.

10) CMD 114218/97 sets the following targets regarding the packaging materials recovery:

- Until 2005 a minimum of 25% of the packaging waste should be recovered.
- Until 2010 a minimum of 50% (and a maximum of 65%) of the packaging waste should be recovered.
- Until 2010 a minimum of 25% (and a maximum of 45%) of the packaging waste should be recycled. However 15% w/w of each packaging material should be recycled.

11) The Draft Law for packaging waste management introduces deposit/refund systems as a management alternative for packaging waste.

1.4 Further Provisions

12) A target for solid waste prevention is set in CMD 114218/97 «National Planning for solid waste management»: the annual increase rate of waste generation should be gradually slowed down and in 2002 waste generation has to reach the level of 1985 (no quantitative data are given). No specific rules regarding prevention have been set.

13) The Environment Act (Law 1650/86) enables the authorities to restrict or ban the distribution of some packaging in case their management as waste or their recycling is cost-effective. The same Law enables the Authorities to impose special charges to companies producing or importing products, whose management as waste is problematic. These charges are to be deposited to a fund, which will cover the expenses for the construction and operation of waste management facilities or the implementation of environmental protection programs run by the Local Authorities. One has to stress that such regulation has never been activated so far.

14) No special taxation nor incentives have been introduced yet. There are no restrictions to landfill and there are no fines or other measures in case of falling below the recovery targets.

2 Packaging Waste Management's System

2.1 Compliance scheme

15) A company is allowed to fulfil the producer's responsibility either by running its own deposit/refund scheme or by entering an authorised collective system of alternative management of packaging waste. Such systems might be of any legal status but should stay open to the participation of any company interested. For the individual companies interested to join an organisation of alternative packaging waste management there are no special obligations such as quality management or audits according to the Draft Law. They only need to pay their contribution according to the volume (mainly), the weight, the quantities and the pollution potential of their waste generation. Special regulation has not been processed yet.

16) There are no organisations entrusted with the fulfilment of the producer's responsibility. Nevertheless a number of important companies from the packaging and food/beverages sector have already established a non-profit organisation named Hellenic Recovery and Recycling Association (HERRA), which will be the main body taking the industry's responsibility once the new legislative framework will be introduced. HERRA as an Association of packaging producers, fillers and distributors collaborates with five (5) Local Authorities (Marousi, Melissia, Pefki, Filothei, Vrilissia) in a packaging household waste recovery system.

17) The Draft Law does not restrict the legal status of these organisations. They might be companies of S.A or Ltd. type, non-profit organisations, co-operatives or of any other type. No provision is made to restrict the fields of activities of these organisations in order to avoid monopolisation. HERRA is a non-profit organisation.

18) According to the Draft Law there is a licensing process for these organisations. To get the license granted by the authorities (i.e. NOAMPOW) they have to fulfil the following requirements:

a) to submit a study to the NOAMPOW to:

- prove their technical and financial ability to implement and run the packaging waste management scheme
- state the criteria of the participation fee any member of the system should deposit to enter the system
- declare the targets of the system operation and the management methods selected
- state the deposit sum in case a deposit/refund system is selected

b) to guarantee the access to the system for any packaging waste manager who satisfies its terms and conditions and determine the conventional framework for their entry by shortly describing their conventional obligations

c) to guarantee their ability to contract with the local authorities

d) to deposit a participation fee to the NOAMPOW

2.2 Interactions between operators and local authorities

19) For the municipal packaging waste the Draft Law imposes the collaboration between the Local Authorities and the collective packaging waste management organisations.

20) According to CMD 69728/96 the Local Authorities are assigned the exclusive competency for municipal solid waste management. Municipal packaging waste is a part of municipal waste so the Local Authorities are the strong partner. According to the Draft Law the collective packaging waste management systems have to collaborate with the Local Authorities. The terms of this collaboration are set in 6 years long contracts, which have to be agreed between both sides. These contracts include the business plan of the packaging waste management (management duties, targets, secondary materials standards etc.), the detailed framework and the terms of the collaboration, the criteria for the determination of the producer's financial contribution and measures and terms for the case of breaches of the contract. The financial contribution due to be paid from the organisation is determined after considering the real cost of the municipal waste management from which reductions have been made depending on the cost of the packaging waste management.

21) Within the HERRA system the member - companies and the Local Authorities contribute to the cover of the losses of the recycling activity. The Local Authorities pay the collection cost. The member companies of HERRA cover all the rest operating cost. The amount of their contribution depends on the number of non returnable packaging items produced by each company and disposed of into the country. Normally they pay 0.1 (or 0.05) Drs per non returnable item disposed off into the country. From this charging system are excluded the refillable packaging and the packaging with a volume less than 100 ml or with a weight less than 5 gr. This levy is divided into two (2) parts and is charged 50% to the producer and 50% to the filler. No member companies are paid by HERRA. As a matter of fact the HERRA system seems to operate according to the French model of ECO-EMBALLAGES.

22) The operator's management is chosen by HERRA and the personnel by the Local Authorities. Communication campaigns are financed and technically supported by HERRA, but they are carried out as a joint task with the collaboration of the Local Authorities.

2.3 Collection and sorting

23) The HERRA system was launched in July 1994 and operates through an MRF (Materials Recovery Facility). The project is based on dry-fraction separation and sorting-at-source. Two (2) parallel streams of waste are formed at source; the recyclable and the biodegradable. The packaging wastes collected, sorted and recovered are: steel cans, aluminium cans, glass bottles, cardboard, composite packaging for liquid food, PET, PVC, HDPE, LDPE, PS. Apart from packaging also paper (white paper, newspaper, magazines etc.) is recovered.

24) Each household is supplied with a 33 l. blue reusable bag, where the targeted materials are temporarily stored. All targeted materials are collected together from the same blue bin. Over 2,200 blue wheeled bins of 1,100 l. each have been placed in the area, so that public has easy access. The blue bins are placed next to the green bins provided by the Local Authorities to receive the biodegradable fraction of waste.

25) The blue bins are collected by collection vehicles, which empty the designated blue bins and transport packaging waste to the Materials Recovery Facility, where they are separated into ten (10) streams: tin cans, aluminium cans, glass, PET bottles, PVC bottles, PE bottles, mixed plastics, paper packaging, cardboard and paper. About 4,000 tonnes of recyclable materials are recovered annually. Due to the lack of legislative framework HERRA is the only case of a packaging waste management system in operation in Greece.

26) The HERRA system operates in a region of the Greater Athens Area including five (5) Municipalities. It now serves 44,000 households and 140,000 inhabitants, although its capacity could serve 200,000 inhabitants. The project area consists of 80% high-rise multi-family dwellings and 20% low-rise single-family dwellings. There are no plans for the

extension of this system before the inactivation of the new legislative framework, which is about to come since 1996.

27) There are no compulsory deposit systems. Some beverage companies have launched since many years ago and operate voluntary deposit systems for glass bottles and lately for aluminium cans. The glass bottles are refilled and the aluminium cans are recycled. There is no quantitative information available.

2.4 Financing of the system

28) There are no organisations or collective packaging waste management systems operating in Greece at the moment. The only recovery activities are carried out by the Local Authorities *(apart from HERRA)* and refer to municipal waste only (paper and cardboard, aluminium cans, tin cans, glass bottles, plastic containers, used tyres). They operate in a pilot base aiming mainly at people sensitisation and the exploration of market opportunities. Their capital and operational cost are totally covered by the Local Authorities apart from HERRA which is separately described later on).

29) Concerning the HERRA system the fixed cost amounts to 650,000,000 Drs (base year 2000). The annual running costs amount to 240,000,000 Drs, from which 40% refers to collection, 45% to sorting - treatment, 10% communication and 5% management. Taking into consideration that the recovered quantities of materials are about 4,000 tonnes annually and the revenues from secondary materials sales are 15,000 Drs per tonne, the scheme operates with a cost of 60,000 Drs per tonne of recovered material and with losses of 45,000 Drs per tonne.

30) No contracts have been made to share the extra costs imposed by compliance with the Packaging Directive, but concerning the HERRA system the fixed capital, the sorting, treatment and communication costs are undertaken by HERRA and the collection cost by the Local Authorities. The land was a Local Authorities contribution.

31) There is a special source for such public financing. The State's responsible authority for financing R&D projects is the Ministry of Development - General Secretariat for Research & Technology.

2.5 Monitoring and control

32) The packaging waste management is controlled by the Public Authorities through the NOAMPOW.

33) According to the Draft Law the packaging waste management systems should report annually to the NOAMPOW on the packaging waste arisings and the recovered quantities. There is monitoring process for export and import of packaging waste. All data available are given by the respective recycling industries or industries associations.

34) It has to be stressed that even after the incorporation of the Packaging Directive to the Greek Law the tremendous lack of reliable data will be a great problem to the monitoring of its implementation.

2.6 Quantities of circulated packaging and recovered packaging waste

35) The most recent data (1998) for recycling results according to HERRA are for (these figures refer to data collected from the Ministry of the Environment and HERRA but cannot be confirmed - probably "ceiling statistics"):

cardboard: 48%

white paper: 35% (not a packaging material)

glass bottles: 26%

aluminium cans: 30%

plastics: 5%

36) All the above-mentioned material refer to municipal waste. For non municipal waste there are no data available. The recovery route is only schemes run and financed by Local Authorities.

37) There are no exports of packaging waste. Reportedly in 1996 20,000 tonnes of used white paper were imported mainly from Italy, Sweden and the USA and were recycled to produce cardboard. Another 18,500 tonnes of plastic packaging waste were imported from Germany and the Netherlands. There are no more recent data available but plastic packaging waste should be still imported according to unofficial interviews with industries - no official monitoring mechanism exists.

3 Current state

Aluminium

38) Practically the recycling and recovery capacities are unlimited due to the extent of the aluminium industry of the country. The market of secondary aluminium has no real problems. The absorption of all recovered quantities of aluminium cans is practically guaranteed.

Glass

39) The glass industry has limited recycling capacity because of its limited size. There are only two (2) glass industries in Greece: YIOULA S.A in Athens and VALAVANIS Bros S.A in Larisa with a recycling activity of 15,000 - 20,000 tonnes and 5,000 - 6,000 tonnes per year respectively. Nevertheless the recycling capacity of both companies amounts to 60,000 - 70,000 tonnes per year. Future trends in glass recycling capacities cannot be traced.

40) The main problems in the market of secondary glass are:

- low quality of the recovered glass fragments because of impurities included and because of the mixing of fragments of different colours
- restricted recycling capacity of the Greek industry

Paper/Cardboard

41) The present recycling activity of the paper and cardboard industries amounts to 130,000 tonnes of paper packaging per year, which could be increased to 200,000 tonnes. Future trends cannot be traced.

42) The main problems in the market of secondary paper are:

- the competition with imported secondary paper
- the restricted de-inkment capacity of the Greek industry
- the restricted flexibility of the Greek paper and pulp industries
- the lack in standards of the secondary paper collected
- the low quality of the recovered secondary paper (impurities)

Steel cans

43) The recycling capacity is hardly saturated. If more quantities could be recovered then they could all be absorbed by the local industries.

Plastics

44) The recycling capacity for plastics amounts to 4,000 tonnes annually, when only 150 tonnes are collected per year.

45) The market of secondary plastics has a special problem; although the recovered quantities are not enough to satisfy the demand, the manufacturers are not ready to admit they use secondary materials, when they do it, in order not to press the price of their products down.

Ireland

Contents

1 Legislation and voluntary agreement 1
1.1 Responsibilities of operators 1
1.2 Targets and instruments 3
1.3 Further provisions 4
2 Packaging waste management system 5
2.1 Compliance Schemes 5
2.2 Interactions between operators and local authorities 6
2.3 Collection and sorting 6
2.4 Treatment systems 7
2.5 Financing of the system 9
2.6 Outlet of recycling activity and marketing of secondary products 10
2.7 Monitoring and control 10
3 Current situation 12
3.1 Recycling results 12
4 Further development 12

List of tables

Table 1: Voluntary agreement on overall Recycling targets 3
Table 2: Voluntary agreement on material specific targets 3
Table 3: IFFPG targets 4
Table 4: Repak's member fees 9
Table 5: Fee structure according to economic actor 9
Table 6: Material specific fees 9
Table 7: Best estimate of recovery rates for packaging materials in the total waste stream in Ireland. 12

1 Legislation and voluntary agreement

Legislation:

- Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste
- Environmental Protection Act (EPA) 1992
- Waste Management Act 1996
- Waste Management (Packaging) Regulations 1997
- Waste Management (Farm Plastics) Regulations 1997
- Waste Management (Packaging Amendment) Regulations 1998
- Waste Management (Planning) Regulations 1997.
- Waste Management (Permit) Regulations 1998

Voluntary agreements:

- Irish Business and Employers Confederation (IBEC)
- Irish Farm Films Producers Group (IFFPG)

Proposed new legislation

- Waste Collection (Permit) Regulations
  These regulations would enable local authorities to instruct waste collectors which waste facility to use, making investment in infrastructure more viable.

Strategies:

- Recycling for Ireland 1994
- Waste Management - Changing Our Ways 1998

1.1 Responsibilities of operators

1) Under the Waste Management (Packaging) Regulations a “producer” means a person who, for purpose of trade or otherwise in the course of business, imports manufactures sells or otherwise supplies to other persons packaging material, packaging or packaged products. Packaging waste means glass, aluminium, steel, paper and fibreboard, plastics, wood and textiles or such categories as may be specified by the minister from time to time.

2) Under the Waste Management (Farm Plastic) Regulations a “producer” is a person who imports or manufactures farm plastic for the purpose of trade or otherwise in the course of business for supply to persons. Supply of farm plastics means by direct sale, as part of a service provided by a contractor or the supply of goods wrapped in plastic.

3) Under Waste Management (Packaging) Regulations producers are obliged to take steps to recover waste arising on their own premises. All producers are obliged to have such waste:

- taken back by a supplier, or
- recovered, or
- made available for recovery i.e. segregated, offered free of charge to recovers and held for at least four weeks pending collection by a recoverer.

4) It is an offence to dispose of packaging waste without first making it available for recovery. Producers must give waste collectors a declaration of compliance.

5) Additional obligations are placed on major producers of packaging who place more than 25 tonnes/per annum of packaging on the Irish market and have a turnover exceeding £1 million. These suppliers must:

- register with the local authority in which area they have premises,
- pay an annual fee currently ranging between £200 and £1,000,
- provide the local authority with regular statistics (which will be in the public domain) on amounts of packaging put into the market,
- provide adequate facilities at each premises for the removal of packaging by customers and for reception, segregation and storage of packaging waste,
- display a notice on each premises indicating that packaging waste of the type placed on the market by the producer will be accepted, free of charge
- accept from any person, waste packaging of the type supplied by that producer
- collect (upon request) packaging waste from any other producer to whom packaging or packaged products are supplied by the producer,
- arrange for the waste packaging so accepted/collected to be:-
  - taken back by a supplier of such packaging
  - recovered by the producer or bona fide recovery operator, or
  - made available for recovery i.e. segregated, offered free of charge to waste recoverers and held for at least four weeks pending collection.

6) Under the regulations targets are set for importers and packer/fillers only, these major producers must ensure that the amount of packaging waste accepted back or collected is not less than 40% by weight of the packaging they supplied. Retailers must provide in-store facilities for customers to deposit and return packaging. Under these regulations major producers are exempt if they are certified as participating in a packaging waste recovery scheme operated by an approved body.

7) Under the Waste Management (Farm Plastic) Regulations a producer must:

- register with local authorities and provide plans, reports and information to the authorities
- charge a refundable deposit of £200 per tonne to purchasers on the sale of farm plastic, to be refunded when the plastic waste is returned to the producer,
- collect or arrange for collection of waste plastics supplied by the producer on request from any person who holds the waste plastics within the state,
- provide a written statement to each purchaser hat the waster will be collected and the refundable deposit will be repaid
- arrange for collected waste to be recovered or make it available for recovery, this means to segregate and store the waste, inform waste recovery operators of its availability: waste can be disposed of after 4 weeks if not taken by a recovery operator,
- compile information as to the amount of farm plastic supplied, collected and recovered and submit such information to local authorities, maintain adequate records for at least three years to verify the accuracy of this information,

8) Under these regulations importers and manufacturers of farm plastic are exempt if they participate in a waste recovery scheme operated by an approved body.

1.2 Targets and instruments

Prevention

9) The Waste Management Act requires local authorities to make a waste management plan with respect to the prevention, minimisation, collection, recovery and disposal of waste within its functional area. Requirements regarding the contents of the plan are further outlined in the Waste Management (Planning) Regulations 1997. The Waste Management Act places an obligation on a person to take all reasonable steps to prevent or minimise the production of waste arising from any agricultural, commercial or industrial activity or from any product, including steps at the design stage of a product. The Waste Management (Packaging Amendment) Regulations require that the weight and volume is limited to the necessary level.

Reuse

10) Under the Waste Management (Packaging) Regulations for the purposes of determining whether or not a producer is a major producer, account shall not be taken of packaging destined for reuse.

Recovery

11) Under the EU packaging and Packaging Waste Directive, Ireland is required to recover 25% of its packaging waste by mid 2001. There are no material specific targets. By the end of 2005 the recovery target is set to rise to 50-65%, this includes a 25% - 45% recycling target with material specific targets set at 15%. Under the Waste Management (Packaging) Regulation the government entered into a voluntary agreement with IBEC, the industry body which set up Repak. The accepted targets for recycling for packaging waste and the industry proposal for material specific targets were as follows:

Table 1: Voluntary agreement on overall Recycling targets

Year	% of overall waste packaging collected
1997	17%
1998	19%
1999	21%
2000	24%
2001	27%

Table 2: Voluntary agreement on material specific targets

Material	for % of material specific collection target by 2001
glass	45%
paper	31%
aluminium	25%
plastics	10%
steel	5%
metals	10%
total	27%

12) This modified the Government's original target set out in the strategy document Recycling for Ireland (55% for glass and 25% for other materials) from 33% to 27%.

Table 3: IFFPG targets

Year	Plastic film delivered (tonnes)	Recycling target (tonnes)
1998	14,000	2,000
1999	14,000	3,000

1.3 Further provisions

Legislation

13) Under the Waste Management (Packaging) Regulations the local authority (county borough corporation and county council) are responsible for the enforcement in their delegated area. Under the Waste Management (Farm Plastic) Regulations the local authority are responsible for enforcement. Powers available to local authorities, under the Waste Management Act, include;

- Power of entry by authorised persons
- Serve notice or require information from a person
- Seek conviction, recover the costs of prosecution and payment of any fine

14) Under the Waste Management Act local authorities can implement bye laws covering segregation and prevention of waste for collection, bye-laws give local authorities the power to enforce legislation if they so wish. The Waste Management Act also provides for the possibility of adopting economic instruments (deposit and refund schemes, recycling credit schemes and mandatory charges for specific packaging)

Strategy

15) The requirement to remove packaging waste from the waste stream is reinforced by the governments strategy document Changing Our Ways. This places the following targets on Local Authorities to be achieved by 2013:

- Diversion of 50% of household waste from landfill
- Recycling of 35% of municipal solid waste
- The development of waste recovery facilities employing environmentally friendly technologies

2 Packaging waste management system

2.1 Compliance Schemes

Repak

16) Repak is a packaging waste recovery scheme open to all suppliers of primary, secondary and tertiary packaging. Repak collects funds from members to ensure that packaging waste is removed from the municipal waste stream. Repaks agreement with the DoE requires the scheme to meet 20% of its target by ensuring recycling of household waste in the municipal waste stream. The remaining 80% can come from non-municipal waste.

17) Repak is a non-profit making private company established under a voluntary agreement with the government. Repak members' activities include: packaging manufacturer, converter, brandholder/ importer, distributor/wholesaler, retailer. Repak members are required to:

- pay an annual fee based on assessment of packaging supplied,
- provide data on the weight of packaging put onto the market and the packaging waste arising internally
- deal with responsibly with internal waste i.e.
- separate into individual material groups,
- contract with waste collectors to have packaging placed into individual material groups,
- obtain and keep for a 5 year period copies of weigh bridge tickets and recycling certificates
- display a notice stating that they are not accepting packaging waste and that Repak is meeting targets on their behalf.

18) Repak provides a free uplift for it members and issues credits where packaging is reused. The Department of the Environment has requested that Repak audits 25% of its members in the year 2000. Repak will be audited for the first time in the year 2000.

IFFPG

19) The Irish Farm Films Producers Group (IFFPG) is a packaging waste recovery scheme open to all importers, manufacturers and suppliers of farm plastic. The IFFPG is administered by Repak. The IFFPG members are required to pay a joining fee, provide annual statistics and pay a levy based on plastic supplied. IFFPG pays Farm Relief Services to collect plastic waste from farm, bale it and send it to the UK. Members are audited by chartered accountants KPMG.

Restrictions

20) Under the Waste Management Act only a body approved by the Department of the Environment and local authorities can run compliance schemes. Under the Waste Management (Packaging) Regulations Repak is the sole approved body.

21) Under the Waste Management (Farm Plastic) Regulations The Irish Farm Films producers group (IFFPG) is the sole approved body.

2.2 Interactions between operators and local authorities

22) Under the voluntary agreement Repak must take 20% of its waste from the household waste stream.

23) Under the Waste Management Act local authorities are required to provide a waste collection service for household waste. The collection of packaging waste from the municipal waste stream is contracted out to collection or bring schemes. Local authorities pay for the services provided by collection and bring schemes. The schemes also receive funding from Repak (fixed rate per tonne) and profit from the sale of materials.

24) An improved collection scheme for Dublin will be launched in May 2000, this will be operated by a consortium which will include the four local authorities covering the Dublin. Collections will be co-ordinated with local authority collections of domestic waste. Initially collections will be monthly but the consortium may increase the number of collections if there is sufficient demand. Cans and card will be collected, glass will be collected through bring schemes.

25) The Waste Management (Permit) Regulations requires persons, other than the local authorities engaged in the collection of waste for the purposes of reward, to hold a waste collection permit granted by the local authority in whose functional area the waste is collected. Bring banks require a local authority permit

26) Under the Waste Management Act communication campaigns are promoted by local authorities, bring schemes and Repak also carry out their own promotions.

2.3 Collection and sorting

Municipal Waste Collection

27) Repak funds are used to subsidise the following collection and bring schemes for household waste.

28) Kerbside Dublin ceased to operate in March 2000, at this stage the collection service covered 26% of the population of Dublin. An improved collection scheme for Dublin is due to be launched in May 2000, it will use wheelie bins to collect beverage cans and card, glass will continue to be collected through Bring Banks. Initially the service will cover 40% of the population rising to 80% by 2001. The scheme will be privately operated, the local authority will require the companies operating this service to achieve progressively increasing performance targets for collecting and reprocessing.

29) A similar collection scheme will be launched in Galway in October 2000 and it is anticipated that most urban areas will have a collection scheme by 2006.

30) Nationally local authorities increased their stock of bring banks from 426 in 1995to 837 in 1998. Of these 649 have facilities for glass collection and 509 for cans. Rehab Recycling Partnerships operates a national agency for bring banks (igloos) collecting glass bottles and aluminium cans. They are currently operating over 900 igloos and are increasing at a rate of 130-150 igloos/year. Other bring schemes operate locally collecting aluminium cans.

31) There are 38 civic amenity sites run by local authorities, which contain bring banks serviced by bring schemes. The government targets for recovering household waste means that local authorities are increasing the number of sites, they are also increasing the number of waste streams collected at each site.

Non-municipal Waste Collection

32) Repak members collect cardboard, plastic and glass. As a condition of membership they are required to segregate in-house packaging waste and to ensure it enters the recycling chain. To assist this process Repak provides a free collection service and co-ordinates the collection of waste with licensed waste contractors.

33) Repak membership currently comprises of 350 parent companies. A survey conducted by Repak suggested that approximately 6,000 companies have a turnover exceeding £1,000,000, however not all of these will place more than 25 tonnes/annum of packaging materials on the Irish market. Only one retailer has registered with a number of local authorities under the Waste Management (Packaging) Regulations, as a result local authorities are now threatening to prosecute a number of companies who are not registered with either the authority or Repak. The introduction of the Green Dot indicating that the supplier has contributed toward the recovery of packaging will also help to identify those companies who are not contributing the recovery of packaging waste.

34) IFFPG funds Farm Recycling Services to collects plastic waste film direct from farm. The IFFPG is confident that all importers and manufacturers of farm plastic have joined the compliance scheme.

2.4 Treatment systems

Definitions

- Reuse – using a product or component of municipal solid waste in its original form more than once.
- Recycling – the subjection of waste to any process or treatment to make it reusable in whole or in part.
- Recovery – under the Waste Management Act, means any activity carried on for the purposes of reclaiming, recycling, or re-using, in whole or in part the waste and any activities related to such reclamation, recycling or re-use.

Capacity

35) Paper and glass account for 80% of the total estimated quantity recovered. The recovery industry in Ireland consists of a relatively small number of players with the bulk of paper recovery and glass recovery handled by single companies.

Glass

36) All glass cullet is recovered by Irish Glass Bottle Company (IGB Ltd). There are 2 glass processing plants, one in Dublin and one in Cork. IGB have the capacity to process 40,000 tonnes of glass and to handle 60,000 tonnes. There are approximately 100 glass cullet merchants in Ireland, of these 33 are based in Dublin. Funds from the Department of the Environment (DoE) Operational Programme for Environmental Services have been used by Rehab Recycling Partnerships to develop a large scale glass recycling facility in Co. Dublin.

Paper and cardboard

37) Smurfit Recycling based in Dublin, manufactures paperboard. The company has used funds from the DoE operational programme for Environmental Services to upgrade existing cardboard processing equipment to a higher capacity.

Plastic

38) There is no indigenous capacity to reprocess post-consumer plastic waste in Ireland. In 1999, 4,000 tonnes of farm plastics were recovered, a limited tonnage was collected from supermarkets. Waste plastic collected by Farm Recycling Services was baled and sent to PPI in Scotland. Shabra Recycling Ltd, based in Co. Monaghan, has used funds from the DoE operational programme for Environmental Services to collect and wash contaminated plastic from agriculture and other sources for recycling.

Aluminium

39) Aluminium beverage cans are sorted and baled and exported to British Alcan in Warrington, which has capacity to take all cans that can be collected.

Steel

40) Steel beverage cans are sorted and baled and sent to Irish Steel. Irish Steel will not accept tin-plated steel. Such material has to be exported to AMG Resources Ltd in the UK for de-tinning.

Incineration of waste

41) Ireland has no incineration facilities. However three feasibility studies of thermal options for waste treatment/recovery have been undertaken. These studies cover the North East region, the Mid West region and the Dublin region. Dublin local authorites propose to operate a thermal treatment plant by 2004.

Future Capacity

42) The capacity to recover packaging waste is reinforced by the governments strategy document Changing Our Ways. This places the following targets on Local Authorities to be achieved by 2013:

- Diversion of 50% of household waste from landfill
- Recycling of 35% of municipal solid waste
- The development of waste recovery facilities employing environmentally friendly technologies

Guarantors

43) The development of infrastructure for recycling, reuse and recovery in the municipal sector between 1995 and 1998 was mainly driven by funding made available to both public and private sector projects under the Waste Management sub-programme of the Operational Programme for Environmental Services 1994-1999. The Department of the Environment (DoE) funds this programme. By setting up contracts with recyclers and funding recycling Repak guarantee a source of material for these recyclers to confidently invest in the infrastructure and expansion. Economically, with exception of glass, card and steel increase in treatment capacity means sending recyclables outside Ireland.

2.5 Financing of the system

Repak

From 1997 to 1999 Repak operated a flat fee system for members based on turnover bands.

Table 4: Repak's member fees

Turnover	1997	1998	1999	2000
£1-5M	£1,000	£1,000	£2,000	Material specific and weight based
£5-10M	£2,000	£2,000	£4,000	
£10-20M	£5,000	£5,000	£10,000	
£20-50M	£10,000	£10,000	£30,000	
£50-100M	£15,000	£15,000	£55,000	
£100+M	£20,000	£20,000	£85,000	

44) In 2000 the following fee structure was set for three years, parties are charged on the tonnage of packaging waste they supply to the Irish market. Cost/tonne may vary from year to year:

Table 5: Fee structure according to economic actor

Activity in supply chain	Cost/tonne	Fee type
Packaging material manufacturer	£1	Participation fee
Converter	£1	Participation fee
Brandholder/Importer	*see below	Material specific fee
Distributor/Wholesaler	£1	Participation fee
Retailer	£1	Participation fee

45) Participation fees are charged at a flat fee per tonne in these categories, irrespective of materials types. Material specific fees depend on the material used. They are charged at the Brandholder/importer stage in the supply chain and will vary from year to year.

Table 6: Material specific fees

Material	Cost/tonne
Paper	£10.89
Glass	£4.40
Plastic	£36.31
Steel	£96.04
Aluminium	£61.56
Wood	£5.17
Composite A (paper/plastic)	£36.31
Composite B (steel/aluminium)	£96.04

46) Repak turnover amount to £6.4 million in 1999, for 2000 £12.4 million are predicted. Funds are used to subsidise:

- Collection – provide a free uplift service for members
- Collection and sorting – currently contributing to the funding of the following collection/bring schemes; Rehab Recycling (Dublin), Recoverable Resources (Dublin) and Green Dragon Recycling Ltd (Cork).
- Reprocessing - Repak state that they do not subsidise recycling but pay the market price for recycling to ensure members' recovery obligations are met. ?
- Local authorities pay for the services provided by collection and bring schemes. The schemes also receive funding from Repak (fixed rate per tonne) and profit from the sale of materials.

IFFPG

47) The IFFPG members are required to pay a joining fee of £500 and pay a levy of £100/tonne of plastic supplied. Membership costs are dependent on market forces.

R&D projects

48) Under the Environmental Monitoring R&D sub-programme of the Operational Programme for Environmental Services Coates Lorilleux took part in a Cleaner Production demonstration project. The project resulted in the reduction of 74 tonnes of packaging waste and established a framework and methodology which companies can follow to initiate their own investigations and save money.

2.6 Outlet of recycling activity and marketing of secondary products

Glass

Potential for recycling is directly related to the market for new glass containers. There is no restriction on colour since Ireland has a high level of brown glass bottled exports.

Paper

Potential for recycling is directly related to the market for recycled paper and card. Current capacity is 46,000 tonnes with raw materials being taken from Ireland and/or abroad.

2.7 Monitoring and control

Exports and Imports

49) Members of Repak must report statistics to compliance schemes. Payment of fees enables them to use a green dot to show they have met their obligation. Under the Waste Management (Packaging) Regulations Major Producers who are not members of Repak must provide the local authority with packaging waste management plans (including export/import figures).

The Local Authority is responsible for :

- Authorising commercial waste stream collections
- Authorising small waste treatment operations
- Supervising reuse and recovery of waste for all producers who are not members of Repak
- Ensuring that major producers who are not members of compliance schemes comply with their obligations

The Department of the Environment is responsible for :

- Ensuring compliance schemes meet recycling and recovery targets on behalf of its members
- Setting policy and adopting legislation to promote prevention , minimisation and recovery of waste
- Reporting to the EU

The Environmental Protection Agency is responsible for:

- Reporting waste figures to the department of the environment
- Authorising significant recovery operations

Audits

50) The Department of the Environment has requested that Repak audits 25% of its members in the year 2000. Repak will be audited for the first time in the year 2000. IFFPG members are audited by KPMG.

Data Collection

51) The Environmental Protection Agency is required to provide data on consumption, arisings and recycling/recovery rates. Data is collected from companies, local authorities, waste treatment operations and Repak

3 Current situation

3.1 Recycling results

52) Statistics of packaging waste are found in the National Waste Database Report for 1998 published by the Irish EPA and shown in the below table 7 and 8. Quantities recovered do not include energy production because there is no waste incineration facilities in Ireland.

Table 7: Best estimate of recovery rates for packaging materials in the total waste stream in Ireland.

Material	Quantity arising (tonnes/a)	Quantity recovered (tonnes/a)	Recovery rate (%)
Paper	300,174	44,654	15%
Glass	111,417	36,000	32%
Plastic	168,834	4,402	3%
Ferrous	27,472	1,115	4%
Aluminium	11,780	480	4%
Other metals	1,879	1,548	82%
Textiles	4,568	0	0%
Other	56,564	12,705	23%
Total	682,688	100,905	15%

53) Under the EU packaging waste directive Ireland is required to recover 25% of its packaging waste by mid 2001. According to Table 7 the recovery rate of packaging waste in Ireland in 1998 was 15%. Low levels of recovery in the household waste stream, estimated at 5.6% compared with 21% for the commercial waste stream and 52% for the industrial waste stream, resulting in a total recovery rate of 15% in 1998. If total estimated arisings remain at their current levels, then to meet the recovery target of 25%, the total tonnage recovered must be increased to over 170,000 tonnes per annum.

Possible reasons for the problems

54) The regulations require retailers to provide collection points for packaging waste and to offer the packaging collected for recycling for 1 month, after which the packaging can be disposed of to landfill. This means that materials are only collected when there is a market for recovered materials.

55) At present only glass, paper and possibly wood are to meet material specific targets. Increased collection/recycling capability for steel and plastic is required. The problem appears to be market demand for recycled materials, since this is the preferred option to achieve recovery targets, as a result of considerable resistance in Ireland to waste to energy incineration.

4 Further development

56) Repak claim to have ensured the recovery of 20,000 tonnes of packaging waste from the domestic waste stream (it is assumed this is for 1999, although this is not clearly stated in their response). Repak state they have aided recovery form the commercial/industrial waste stream as follows:

- Cardboard: 2,000 tonnes
- Plastic: 42.9 tonnes
- Glass: 217.8 tonnes

57) The Irish Department of Environment (DoE) is concerned that Repak recovery targets do not take account of the increase in packaging waste arisings. The recovery target based on 1994 packaging waste arisings was 100,000 tonnes which gave Repak a target of 20,000 tonnes for domestic waste. However the recovery target based on waste arisings in 1998 is now 170,000 tonnes.

58) Repak do not appear to have evidence that their members are ensuring the recovery of the remaining 80% of the recovery target, they simply ask their members to segregate waste so that it can be removed. As a result of their concerns the DoE recently appointed an Irish consultant to review their position and to suggest a strategy to ensure that Ireland meets their 2001 recovery target. The consultant has 10 weeks to produce their report and the DoE will take whatever steps are necessary, the report will also help to determine Ireland's strategy to meet recovery targets for 2005 and beyond.

59) The DoE has to report annual waste arisings to the EU, as a result the DoE will be receiving a draft report from the EPA for 1999 shortly. The report will give a clearer indication as to whether the recovery target for 2001 is likely to be met.

60) Repak have also appointed another consultant to audit 25% of their members, (requested by the DoE) to check that the figures they receive claiming that packaging has been recovered by members can be substantiated.

Collection

61) At present only one collection scheme is operational in Dublin. Local Authorities have to present Regional Waste Management Plans to the DoE by the end of July 2000. It is anticipated that these plans will include a number of collection schemes.

Recycling and marketing of secondary raw materials

62) Ireland has provision for glass, paper, card and steel. Paper and glass account for 80% of the packaging recovered. Plastic and aluminium must be exported. The EPA report states that recovery of aluminium packaging has dropped dramatically. According to the DoE more indigenous reprocessing is needed and the marketing of secondary raw materials still needs to be addressed.

Other developments

63) The DoE are considering setting up a state agency to meet waste minimisation targets (to cover hazardous waste, packaging etc.). This lead body will include representatives from EPA, local authorities, DoE, Repak and industry. Further research is needed regarding capacity for composting - government strategy is divert 50% of household waste from landfill by 2013 and to develop environmentally friendly waste recovery facilities.

Italy

Contents

1 Legislation and Voluntary Agreements 1
1.1 Responsibilities of operators 1
1.2 Targets 1
1.3 Further Provisions 2
2 Packaging Waste Management System 3
2.1 Compliance scheme 3
2.2 Interactions between operators and local authorities 3
2.3 Collection and sorting 3
2.4 Treatment systems and outlet of recycling activity 4
2.5 Financing of the system 5
2.6 Monitoring and control 7
2.7 Quantities of circulated packaging and recovered packaging waste 7
3 References 8

List of tables

Table 1: Extension of separate collection according to regions 4
Table 2: Separate collection in Italy (divided by the three main regional districts) regarding the main streams 4
Table 3: Prices for packaging waste collection 6
Table 4: Packaging consumption and packaging waste recovery in 1997 7
Table 5: Imports and exports of packaging waste for recovery in 1997 7
Table 6: Quantity of packaging placed on the market in Italy according to packaging type in 1998 8

1 Legislation and Voluntary Agreements

1) The Italian ordinance for implementation of the EC Packaging Directive came into force on 1 May 1997 (Decree No. 22 of 5 February 1997, Ronchi Decree). This new law also implements Directive 91/156 EC (Framework Directive on Waste) and Directive 91/689 EC (Hazardous Waste). Before, the Italian legislation in the field of packaging and packaging waste regulated the management of food and non-food liquid containers, polyethylene used for plastic film, and plastic bags.

1.1 Responsibilities of operators

2) Producers and users of packaging are responsible for the proper environmental management of packaging and packaging waste generated by consumption of their products. To meet the recycling and recovery targets and to take back used packaging and collect secondary and tertiary packaging outside the public system, producers and users of packaging have a choice between joining one of the consortia as laid down in the Decree, establishing a deposit scheme or organising their own independent collection, reuse, recycling and recovery of packaging waste.

3) The provisions in the Ordinance on Packaging distinguish between primary packaging on the one hand and secondary and tertiary packaging on the other hand. With respect to primary packaging, it provides for the setting up of a National Packaging Consortium (CONAI – Consorzio Nazionale Imballagi). This consortium, together with local authorities decides on the conditions to be applied for the return, collection and recovery of packaging waste.

4) The management of secondary and tertiary packaging is being dealt with by 6 individual consortia for each material sector (Consortia di filiera). Companies are obliged either to subscribe to one of the material consortia, or to set up their own return, collection and recovery system.

5) The public administration is responsible for the separate collection of packaging waste. Where the public administration does not implement separate collection of packaging waste within 12 months of the Decree's entry into force, producers and users may organise separate collection by means of the National Packaging Consortium.

1.2 Targets

6) The recovery and recycling targets are laid out in the same form as in the European Directive, namely 50%-65% recovery and 25%-45% recycling, with no material recycled at less than 15%. The General Prevention Plan, prepared by the National Packaging Consortium determines the final and interim targets to be attained within the range laid down in the Directive, and how packaging waste management is to be integrated with the National Waste Management Plan.

Prevention

7) In accordance with the regulations on specific prevention programmes set out in article 38 and 40, CONAI has set up a general prevention and management programme for packaging and packaging waste which, because of the various different types of packaging material, is focusing in particular on three areas:

a) in the area of supply, it will focus on the rationalisation of packaging, on the improvement of the weight/size ratio, on a comparable basis, and increasing the amount of recyclable material

b) in the area of demand, it will focus on the reduction of excess packaging levels and on selection of packaging materials according to their environmental impact, which could also lead to a 30% reduction in the weight of packaging material on a comparable basis

c) it will also focus on promoting reuse, to which end CONAI will provide for the reuse of industrial packaging (metal and plastic) and will set up a working group to look at packaging for domestic use.

8) The programme of prevention and management of packaging waste includes all information necessary for the achievement of the recovery and recycling targets (both in total and according to material) within both the long-term and intermediate periods. It sets out, among others, the initiatives currently underway and those in preparation designed to prevent the built up of packaging waste, as well as those designed to increase the amount of recyclable and recoverable packaging.

1.3 Further Provisions

9) From 1998 on packaging waste is banned from landfill, with the exception of waste derived from sorting, recycling and recovery operations. Landfilling used or recovered packaging will be punished by a fine of up to 60 million lire. No tertiary packaging may be placed in the normal municipal waste collection. Any secondary packaging can be put into municipal waste collection if separate collection is in force, otherwise the same applies. The law also provides for a range of sanctions against failure to perform the duties laid down. This includes not only penalties, but also provision for other authorities to step in and impose tougher operating conditions. If the targets are not attained economic sanctions will be applied including fines proportional to the shortfall in the targets. Income from fines are to be used to promote waste prevention, recovery and recycling.

10) Since 1.1.2000 (art.5, comma 6 of Decree No. 22 of 5 February 1997) only inert (i.e. not biodegradable) waste or wastes coming from the operation of others sorting plants should have been disposed of in landfills. But at the end of 1999 the date has been postponed to the 16th of July 2001 or, if first, when the 31/99/CE Directive will come into force.

11) With effect from January 1996 a landfill tax was introduced within the framework of the December 1995 law on public finance (Decree No. 549 of 28 December 1995 on public finance). Within certain limits, this legislation allows each region to set the tax rate each year, in accordance with local conditions and environmental costs. The rate must fall within the ranges laid down: 2 to 20 lire per kg of construction wastes, 10 to 20 lire for other special wastes (MSW) and 20 to 50 lire for other wastes. The penalty for non-compliance will be 3 to 6 times the tax rate.

12) Article 48 of the Decree implementing EC waste directives (Decree No. 22 of 5 February 1997) sets up a consortium for producers and converters of polyethylene products other than packaging. National trade associations representing companies authorised to collect and transport polyethylene waste will also take place.

13) The consortium promotes take-back of used PE-based products for recycling and recovery. The law adds that the consortium may have recourse to a mandatory deposit system. The funding mechanism is determined annually by decree. The Ministers of the Environment and of Industry set up minimum recycling targets every two years.

14) Article 24 of the Decree implementing EC waste directives (Decree No. 22 of 5 February 1997) prescribes that for the next six years (beginning on March 2, 1997) in every ATO previewed in the art. 23 (of norm correspondent to the provincial borders) separate collection to the following minimal percentages of MSW is assured:

- 15% within two years from the date of entrance in force of (...) the decree;
- 25% within four years from the date of entrance in force of (...) the decree;
- 35% to leave from the sixth successive year to the date of entrance in force of (...) the decree ".

2 Packaging Waste Management System

2.1 Compliance scheme

15) To meet the overall recovery and recycling targets and to liaise with the public authorities' collection activities, a joint National Packaging Consortium (CONAI) was set up by producers and users of packaging. The statutes of CONAI were approved by the Ministry of the Environment and the Ministry for Economic Affairs on 30 October 1997. The members of CONAI represent the entire packaging chain for the materials plastic, glass, metals, paper/cardboard and wood.

16) The consortium CONAI replaces the former consortia which were set up in accordance with the 1988 Law on Beverage Packaging, but under the new regime there are again various collection and recovery consortia for individual packaging materials. These consortia have to be approved by the Environment and Industry Ministers, and will be financed through income from activities and contributions from members (see also section 2.5). Each consortium implements its own specific program of packaging waste prevention which will form the basis for a general, national catalogue of measures to be compiled by CONAI. Each year the consortia are to report to the National Packaging Consortium on the management and results of the specific programmes, with any evidence of problems in attaining the set targets.

17) Companies that do not join the system must document the appropriate measures that have been taken and submit an annual report of the results. If a company cannot prove that the necessary steps have been taken, it must join a system and pay the corresponding fees with retroactive effect plus a fine.

18) By May 1999, around 1.3 million companies were members of CONAI.

2.2 Interactions between operators and local authorities

19) The manufacturers and distributors of packaging are obliged to take back sales packaging collected by the local authorities. Furthermore, distributors are required to take back secondary and transport packaging at no charge and to transport it to collection points set up by the packaging manufacturers.

20) CONAI prepares an operating plan, agrees it with the regions and local authorities and guarantees implementation, secure the necessary co-operation between the different consortia and between the consortia and others involved in packaging waste management, organise information campaigns. CONAI also establishes the obligation and sanctions to be placed on contracting parties, the way packaging waste is to be collected in line with the requirements of the recycling and recovery activities and the cost of operations.

2.3 Collection and sorting

21) The public administration is responsible for the separate collection of packaging waste. There are vastly different collection rates according to geographical region, and in particular a major imbalance between the north and the south. Table 1 shows the most important figures

about the Italian situation (divided by the three main regional districts) regarding MSW and bulky wastes arisings and the collection rates. Table 2 shows the figures about the separate collection in Italy (divided by the three main regional districts) regarding the main streams (organic, glass, paper and cardboard and aluminium)

Table 1: Extension of separate collection according to regions

Region	Inhabitants	MSW arisings [tonnes]	Separate collection [tonnes]
Northern part	25,567,030	11,888,870	2,021,595
%(of MSW)			17.0%
Central part	11.052.605	5.618.340	257,453
%(of MSW)			6,4%
Southern part	20.943.719	9.097.980	128,220
%(of MSW)			1.0%
Total (Italy)	57.563.354	26.605.200	2,507,268
%(of MSW)			9,4%

Table 2: Separate collection in Italy (divided by the three main regional districts) regarding the main streams

Region	Glass [tonnes]	Paper&cardboard [tonnes]	Plastics [tonnes]	Aluminium [tonnes]
Northern part	500,410	604,958	78,687	4,690
%(of sep.coll.)	24,8 %	29,9 %	3,9 %	0,2 %
Central part	87,807	133,133	10,445	1,487
%(of sep.coll.)	24,6 %	37,2 %	2,9 %	0,4 %
Southern part	55,356	44,393	7,657	175
%(of sep.coll.)	43,2 %	34,6 %	6,0 %	0,1 %
Total (Italy)	643,573	782,484	96,789	6,352
%(of sep.coll.)	25,7 %	31,2 %	3,9 %	0,3 %

22) In the northern part of Italy glass (not separated by colour), aluminium, plastic bottles and paper and cardboard are collected. The main system was based on street containers, but now, especially in urban areas, the door to door system is prevailing (paper and glass are collected in different bins in any building).

2.4 Treatment systems and outlet of recycling activity

23) One of the problems is the wide discrepancy between the recovery rates in the northern Lombardy region (between 12% - 13%) and the south.

24) Some problems occur in marketing mixed paper collected by street containers as the quality is rather low as well as from price fluctuation. The green glass is widely produced but the recycled glass (mixed) collected is now close to fit the demand from the glass industry. Accordingly, colour-separation will be become necessary if recycling rates are to increased.

Generally, constraints limiting the recovery of packaging waste result predominately from the low economic value of secondary materials rather than from technical problems. With regard to metals, particularly aluminium is widely collected and recycled.

25) Most of plastics materials recycled in Italy are collected from converters and from the packaging sector. Smaller shares of post-consumer wastes decreased in 1997 to 34% from 40% in 1996. The leading thermoplastics PP, PE, PVC, PET and PS accounted for more than 80% of recycling volume.

2.5 Financing of the system

26) Manufactures and distributors must pay the costs for the selective collection, sorting, recycling and recovery of all packaging waste collected by the local authorities. The cost allocation is proportional to the weight and type of packaging material placed on the market. CONAI allocate the costs of separate collection, recycling and recovery of primary packaging waste between producers and users.

27) As a temporary solution (before that Decree implementing EC waste directives (Decree No. 22 of 5 February 1997 came into force) the prices that have been fixed were:

steel (1/3/98-31/12/98)	40 ITL/Kg
aluminium (1/3/98-31/12/98)	1 ITL/Kg
paper & cardboard (1/3/98-31/12/98)	from 8 to 9 ITL/Kg
wood (1/3/98-8/7/99)	20 ITL/Kg
plastics (1/1/98-31/12/98)	290 ITL/Kg
glass (1/3/98-31/12/98)	3 ITL/Kg

28) On 8th of July 1999 CONAI and ANCI (National Association of the Italian Municipalities) have agreed on prices for collection of packaging materials for the next five years and valid (excepted wood) since January 1999 (as depicted below). The price for glass was set by the Ministry of the Environment at 60 ITL/kg (since January 1999 valid only for the next two years). However, this was an exceptional procedure as in general prices are negotiated between CONAI and ANCI only. Depending on the amount impurities the price for glass can be reduced[35], in case of percentages of impurities greater than 5% the consortium can refuse the charge. The prices paid to the Communities can be updated every year. The following table provides an overview on reimbursements for the collection of packaging materials. Impurity limits for separate collected materials have been fixed, if these limits are exceeded, the consortium can refuse the charge.

[35] 60 £/Kg (up to 3% of impurities);
30 £/Kg (from 3,1% to 5% of impurities)

Table 3: Prices for packaging waste collection

Material	Specification		Agreed costs in ITL/kg	
Aluminium[36]	Collected in platform		350	
Steel[37]	Collected in platform		119	
Cardboard/ Paper[38]	Spread across three categories according to population density		Packaging	printing paper
		1.	151	23.50
		2.	139	22.00
		3.	131	20.50
Wood[39]	Environmental Islands	1.	20	Impurities (less than 5%)
		2.	22	
		3.	11	Impurities (less than 35%)
Plastic[40]	Divided into three categories according to levels of impurities	0 - 6%	390	
		6 - 16%	290	
		16 - 24%	210	

29) A contribution according to turnover and an environmental levy (or tax) introduced on 1st October 98 varying according to materials is reported. The contribution for members of CONAI amounts to

- 10,000 Lira for all companies
- larger companies with an annual turnover of up to 1,000 million Lira (including packaging manufacturers, fillers and importers) will pay an additional fee amounting to 0.015% of their (national) turnover
- retailers and distributors with an annual turnover of up to 1,000 million Lira will pay 0.00025% of their (national) sales turnover.

30) On 31 July 1998 CONAI approved the operative regulation which foresees for 1st October 1998 the start of the "CONAI environmental contribution" ("Contributo Ambientale CONAI" or CAC) and refers to the six types of packaging material:

- steel 30 ITL/kg
- wood 5 ITL/kg
- aluminium 100 ITL/kg
- cardboard/paper 30 ITL/kg
- plastic 140 ITL/kg
- glass 5 ITL/kg

31) The tax level is for a limited period only and will be updated as knowledge and experiences improve, although not before 1st January 2000. The total level of revenue which the system can generate, based on volumes in 1997, is estimated in 1999 at around 385 billion Lire, equal to one percent of the total packaging market value.

[36] 350 £/Kg (up to 5% of impurities);
300 £/Kg (from 5,1% to 15% of impurities);
In case of percentages of impurities greater than 15% the consortium can refuse the charge.
[37] 119 £/Kg (up to 5% of impurities)
100 £/Kg (from 5,1% to 10% of impurities)
85 £/Kg (from 10,1% to 15% of impurities)
55 £/Kg (from 15,1% to 20% of impurities)
In case of percentages of impurities greater than 20% the consortium can refuse the charge.
[38] In case of percentages of impurities greater than 20% the consortium can refuse the charge.
[39] In case of percentages of impurities greater than 35% the consortium can refuse the charge.
[40] In case of percentages of impurities greater than 24% the consortium can refuse the charge.

2.6 Monitoring and control

32) Packaging producers (suppliers of packaging materials and manufacturers, converters or importers of empty packaging and packaging materials) and users of packaging (wholesalers, distributors, fillers, users of packaging and importers of filled packaging) must submit annual data from 1998 on the tonnages of packaging material placed on the market, reused and recycled.

33) A National body (called Osservatorio nazionale sui rifiuti - National observatory on waste) is in charge data compilation and monitoring. Istituto Italiano Imballaggio (National Institute of packaging), a private association whose members are the most important packaging producers and users, monitors on a yearly basis the packaging production in Italy.

2.7 Quantities of circulated packaging and recovered packaging waste

34) The quantity of packaging placed on the market and recovered in Italy in 1997 as reported to the European Commission according to article 12 of the Directive are shown in table 4. The figures on recycling and recovery include the quantities of packaging waste which have been exported for recovery. The figures on import and export of packaging waste are given in table 5.

35) Total packaging consumption in 1997 amounted to 9,530 ktonnes which corresponds to 165.8 kg per inhabitant and year. According to the reported data Italy achieved a recovery rate of 31.7 %, mainly by recycling. The highest recycling rate was achieved for wood (38.8%), followed by paper/cardboard packaging with 36.0%, the lowest recycling rate was achieved for metal packaging (5.1%). Total recovery for plastics amounts to 15.3%.

Table 4: Packaging consumption and packaging waste recovery in 1997

Material	Quantity put on the market	Recycling	Energy recovery	Total recovery	Recycling	Energy recovery	Total recovery
	[tonnes]	[tonnes]	[tonnes]	[tonnes]	%	%	%
Glass	2,248,000	750,000		750,000	33.4%		33.4%
Plastic	1,777,000	170,100	108,000	272,000	9.6%	6.1%	15.6%
Paper and Cardboard	3,246,000	1,178,000	100,000	1,270,000	36.3%	3.1%	39.4%
Metals	456,000	25,000		25,000	5.5%		5.5%
Wood	1,802,000	700,000		700,000	38.8%		38.8%
Total	9,529,000	2,823,100	208,000	3,031,100	29.6%	2.2%	31.8%

Table 5: Imports and exports of packaging waste for recovery in 1997 [in tonnes]

Material	Import total recycling	Export total recycling
Glass	50,000	
Plastic	53,590	6,100
Paper and cardboard	100,000	8,000
Metals	20,000	
Wood	200,000	
Total	423,590	14,100

36) The quantity of packaging placed on the market in Italy in 1998 is shown in the following table, divided according to type of packaging. Total packaging consumption has not increased from 1997 to 1998. Around 20% of glass packaging form part of reusable packaging.

Table 6: Quantity of packaging placed on the market in Italy according to packaging type in 1998

Packaging waste materials	Type of packaging		total packaging consumption			separately collected from households	
	sales packaging	transport packaging	non-reusable packaging	reuseable packaging	total		
	kt	kt	kt	kt	kt	kt	%
Glass	2,248	0	1,789	459	2,248	644	29
Paper/ cardboard	1,362	1,741	3,103	0	3,103	782	25
Aluminium	57	0	57	0	57	6	11
Steel	332	68	399	1	400		
Composites	227	5	232	0	232		
Wood	0	1,802	1,695	107	1,802		
Plastics	1,347	341	1,688	0	1,688	97	6
Total	5,573	3,957	8,963	567	9,530	1,529	16

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Luxembourg

Contents

1 Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 1
1.2 Responsibilities of economic operators 2
1.3 Targets and Instruments 3
1.4 Further Provisions 4
2 Packaging Waste Management System 4
2.1 Compliance scheme 4
2.2 Interactions between Valorlux and local authorities 7
2.3 Collection and sorting 8
2.4 Treatment systems and outlet of recycling activity 10
2.5 Financing of the system 11
2.6 Monitoring and control 12
2.7 Quantities of circulated packaging and recovered packaging waste 13
2.8 The recycling and recovery capacities in Luxembourg 15
2.9 Import/Export of Packaging Waste 15
3 Future development 15
4 References 15

List of tables

Table 1: Selective collection modalities for packaging materials 9
Table 2: Quantities of packaging waste taken in charge by Valorlux in 1999 (in tonnes) 9
Table 3: Recycling channels, 1999 10
Table 4: Green Dot tariffs established by Valorlux (in LUF and €/kg) 11
Table 5: Distribution of Valorlux expenses for selective collection 12
Table 6: Packaging waste arisings in 1996 14
Table 7: Recycling results of Valorlux in 1998 and 1999 14

1 Legislation and Voluntary Agreements

1.1 Objectives, Definitions and Field of Application

Objectives

1) In Luxembourg, the first Bill on liquid foodstuffs packaging dates from 1989. This was a consequence of the 85/339/EEC Directive on packaging for liquid foodstuff. It has been revised several times in the framework of an overall strategy for the reduction of packaging waste in general (Packaging Europe, Demey, Hannequart, Lambert 1996).

2) The collection and recycling of packaging waste was subject to a voluntary agreement between the Ministries of the Environment and Industry concluded in April 1991 to implement the EC Liquid Food Containers Directive. This agreement had a period of duration of 2 years. Fillers and distributors would offer consumers the choice of refillable bottles wherever possible: industry would work with local authorities to organise the separate collection of recyclable packaging waste: the market share of liquid foodstuffs in one-way containers would be progressively reduced (European Packaging and Waste Law-Status Report).

3) The 1991 voluntary agreement defined the following objectives to be reached by 1994:

Refilling of drinks packaging	55%
Recycling of non-refillable drinks packaging	40%
Overall objective for refilling and recycling	78%
Collection	95%

4) This agreement has not been renewed. It was to be updated and strengthened through a new law on liquid food containers which would provide for eco-taxes, but this was withdrawn in August 1995. The Council of State rejected it on the grounds that its scope was too limited because it applied only to beverage containers whereas the Packaging Directive applies to all packaging. This negative opinion followed a campaign by Luxembourg and European associations against the eco-taxes, fought both at Grand Duchy and EU level. However the text was amended and re-proposed by the Environment Minister as a working document, and was notified to the European Commission.

5) In its reply of 4 July 1996 to the notification proposal in question, the EC Commission had in particular noted the intention of the Luxembourg authorities to promote reusable packaging compared with recyclable packaging. Whilst emphasising the potential risks of competitive distortions and obstacles to trade, it invited the Luxembourg authorities to assess on a case by case basis the ecological benefits of packaging that can be-refilled compared with recyclable packaging, with a view to demonstrating that the environmental objective could not be achieved by other means having a less negative impact on the internal market (Notification 95/438/Luxembourg – Directives 83/189/EEC and 94/62/EC).

6) Following these arguments, the Government proposed to transpose the Directive 94/62/EC by a single, global law by way of a grand-ducal regulation drawn up on the basis of the amended law of 17 June 1994 relating to the prevention and management of waste[41] (Valorlux – Membership Agreement). This led to the “Grand Ducal Regulation of 31 October

[41] This last introduced into Luxembourg law the principles set out by the Council Directive of 18 March 1991, amending Directive 75/442/EEC on waste.

1998 transposing Directive 94/62/EC on Packaging and Packaging waste". It entered into force on 1 January 1999. This Grand Ducal Regulation (Regulation 31/10/98) lays down measures aiming, at first priority, at preventing the production of packaging waste and, as additional fundamental principles, at reusing packaging, at recycling and other forms of recovering packaging waste and, hence, at reducing the final disposal of such waste (art. 1).

Definitions

7) The definitions of packaging, of primary, secondary and tertiary packaging contained in Art. 3 of the Directive are reproduced word for word as well as the definitions of prevention, reuse, recycling and organic recycling. According to the Regulation 31/10/98:

- "Packaging waste" shall mean any packaging or packaging material covered by the definition of waste in Article 3 a) of the Law of June 17, 1994 as amended, concerning the prevention and management of waste.
- "Household packaging waste" shall mean packaging waste arising from normal household activity plus similar packaging waste, i.e. whose nature is identical or similar to that of household packaging waste, although its origins are other than households. The Minister of Environment may draw up an indicative list of packaging waste similar to household packaging waste.
- "Non-household packaging waste" means any packaging waste not considered as household packaging waste.
- "Packaging materials" means any single or composite material of natural or artificial origin of which a pack is composed.
- "deposit system" means the take-back system through which the acquirer pays the supplier a sum of money which the latter refunds when the packaging is returned.

Field of application

8) The Regulation 31/10/98 covers all packaging placed on the Luxembourg market and all packaging waste, whether it is used or released at industrial, commercial, office, shop, service, household or any other level, regardless of the material used (art. 2).

Definitions of re-use, recycling and recovery

9) According to the Regulation 31/10/98, the definitions of reuse, recycling, recovery, energy recovery, organic recycling and disposal contained in Art. 3 of the Directive are reproduced word for word.

1.2 Responsibilities of economic operators

10) All persons responsible for packaging are subject to the take-back obligation. They may fulfil their obligations themselves or entrust an approved organisation to comply with them (Regulation 31/10/98 art. 8). According to the Regulation, the "*person responsible for packaging" is any person who has packed products or had them packed in Luxembourg in order to place them on the Luxembourg market or at the time when they are placed on the Luxembourg market or, in the case where products placed on the market in Luxembourg were not packed in Luxembourg, the importer of the packed products who does not consume them himself"* '(art. 3).

11) In order to achieve the objectives set out (prevention, reuse recycling and recovery), systems must be put in place to assure:

- the take-back and /or collection of used packaging and/or packaging waste from the consumer, from any other final user or from the waste stream, in order to direct it towards the most appropriate waste management solutions;
- the reuse or recovery, including recycling of the collected packaging and/or packaging waste (art. 7).

1.3 Targets and Instruments

Prevention

12) Packaging may be placed on the Luxembourg market only if it complies with all the essential requirements set out in Annex I, which is a reproduction of Annex II of the EU Directive (Regulation 31/10/98, art. 9). Besides, the Grand Ducal Regulation, replicates the concentration levels of lead, cadmium, mercury and hexavalent chromium defined in Article 11 of the Directive 94/62.

13) The Regulation does not provide for other specific target or instruments but, the article 5 of the Regulation 31/10/98 opens the opportunity for the minister to conclude voluntary agreements with the persons responsible for packaging and/or the approved organisation(s) to contribute to achieving the objectives of preventing the production of packaging waste.

Reuse

14) No specific target is defined for re-use of packaging but article 5 of the Regulation provides that voluntary agreements may establish the conditions and arrangements for promoting the production and the placing on the market of reusable packaging and aim at objectives relating to market shares.

Recovery

15) The following minimum recovery and recycling rates must be attained before 30 June 2001 throughout the national territory:

- 55% by weight of packaging waste must be recovered
- 45% by weight of the totality of packaging materials contained in packaging waste must be recycled
- 15 % by weight for each packaging material (art. 6).

16) The "recovery rate" (and recycling rate) is defined as “the percentage of packaging waste for a given period comprising as numerator the weight of packaging waste actually directed to recovery (or recycling) and as denominator the total weight of recoverable packaging placed on the Luxembourg market by a person responsible for packaging and consumed on the national territory “. These definitions do not apply to packaging directed to reuse.

17) When the persons responsible for packaging have contracted with an approved organisation the targets referred to are calculated globally for all the persons responsible for packaging which have contracted with this organisation (art. 6).

1.4 Further Provisions

The information obligation

18) The Environment Administration is in charge of the monitoring of the magnitude, characteristics and evolution of the packaging and packaging waste flows including information on the toxicity or danger of packaging materials and components used for their manufacture (Regulation 31/10/98 , art. 11). Economic operators concerned must supply the Environment Administration with reliable data relating to their sector. Easing measures are foreseen for small and medium sized enterprises (Regulation 31/10/98, art. 11).

2 Packaging Waste Management System

2.1 Compliance scheme

19) The person responsible for packaging is considered to fulfil his take-back obligation once he proves that he has entrusted it contractually to an organisation approved by the Minister of Environment. If this is not the case, he shall make known to the Waste Division of the Environment Administration how he is meeting his take-back obligation (Regulation 31/10/98, art. 8) .

20) Approved systems are to be open to economic operators from the sectors affected and to the public legal entities and national authorities concerned. They must apply also to imported products, in a non-discriminatory way, including the arrangements and possible fees charged for access to the system, and must be designed such as to avoid barriers to free circulation or distortions of competition (art. 7). They must assure:

- the take-back and/or collection of used packaging and/or packaging waste from the consumer, from any other final user or from the waste stream, in order to direct it towards the most appropriate waste management solutions
- the reuse or recovery, including recycling of the collected packaging and/or packaging waste.

21) The approval can be granted for a maximum period of five years and may be renewed. It may apply to packaging waste of household origin and/or to non-household origin. It may be withdrawn or suspended temporarily or permanently by a decision from the minister, after opinion of the Pluripartite Monitoring Commission when the approved organisation no longer meets the conditions in the approval. Among other obligations, the approved organisations are in particular required to:

- conclude a contract with the persons responsible for packaging to take responsibility for their take-back obligations;
- attain the recovery and recycling rates prescribed;
- charge its contractors fees indispensable to cover the cost for all the obligations it must meet;
- publish its financial accounts each year for the previous year and its draft budgets for the following year;
- operate as far as possible on the basis of tenders.

22) Further, where the take-back obligation affects packaging waste of household origin, the approved organisation is required to:

- calculate the fees of its contractors by packaging material to reflect the costs arising for collection, sorting and recycling/recovery of the collected packaging waste. The fees must reflect the costs arising for each of these materials. They also must integrate income from the sale of collected and sorted materials
- conclude a contract with public legal entities which will define in particular the conditions and the technical details for collecting the packaging waste concerned and for taking responsibility for all the packaging waste collected

23) The financial intervention of the approved organisation must cover the real and full costs of selective collection in an appropriate way according to a scale of charges which shall be established, on a proposal from the approved organisation, by the Pluripartite Monitoring Commission (art. 8).

Valorlux - The situation for household and commercial waste

24) At the beginning of the nineties, industry in Luxembourg co-operated with the authorities to draw up a prevention and recovery concept for packaging. In the course of these activities, industry initially established the organisation "Environnement et Emballages".

25) As its best defence against the eco-tax project, Luxembourg industry like Belgium's, moved ahead to create a recovery organisation in advance of adoption of the legal framework. "Environnement et Emballages" has set up the non-profit organisation, "VALORLUX" A.S.B.L. (Non profit making organisation) on October 2, 1995. Nevertheless, "Environment et Emballages" pursues its activities which are more politically oriented. This association has around forty members which have connection with the packaging industry: packaging equipment, raw material producers, packaging producers, fillers, retailers, recyclers. This association takes the prevention sections of the Regulation into charge.

26) VALORLUX was created as a non-profit corporation by 23 associate members (regular members), each one holding one share , and by 6 supporting members. The associate or regular members represent the producers and importers of packaged products, distribution companies, producers and importers of packaging or packaging materials and professional associations. Members are grouped according to their spheres of activity. They are represented on the board of directors as follows:

- 5 administrators for the food and agriculture industry (FAI) ;
- 2 administrators for the non-food and agriculture industry (NFAI) ,)
- 2 administrators for the " recycling channels" ;
- 2 administrators for the distributors ;
- 1 administrator for the Chambers of Trade .
- 1 administrator for the a.s.b.l. "Environnement et Emballages"
- The managing director is a member ex officio.

27) To ensure the daily management of the company, an Executive Committee of 3 members, chaired by the VALORLUX General Manager, implements the strategic decisions of the Board, proposes budgets and strategies to be followed. The function of VALORLUX is to promote, co-ordinate and financially support the selective collection, sorting and recycling of used packaging. VALORLUX concentrates on household and similar packaging waste. VALORLUX started full business operation on January 1, 1997. At the end of 1999, 550 companies were licensed to Valorlux. They were distributed as follows:

Country	Percentage
Grand Duchy of Luxembourg	17%
Belgium	52%
France	14%
Germany	12%
Others	4%

28) These companies had declared 27 tonnes of packaging put on the market for a total contribution of 75 M° LUF (1.88 M° €)

The Valorlux accreditation

29) Valorlux received its accreditation as "approved organisation " on 5th of April 2000. Nevertheless, it introduced an application for review to the minister of Environment on 12 May last. The accreditation was received and thus has been modified on 17th of August 2000. The accreditation is valid for packaging waste of household origin and assimilated. It concerns following list of materials:

- Paper and cardboard
- Glass
- Plastics
- Aluminium
- Steel
- Beverage cartons

30) Considering that the demand dossier contained some approximations, the accreditation is only valid until 31st of December 2002.

The situation for non-household packaging waste

31) In 1999, Valorlux started negotiations with FEDIL (Federation of Luxembourg Industrialists) and the Chamber of Commerce for the settlement of a centralised system for commercial and industrial packaging[42]. These negotiations have end to the result – on September the 7th – at the creation of a common platform relating to the non-household packaging and packaging waste, to which are also associated the Trade Chamber, the Commerce Federation, the Federation of Luxembourg Sanitation Enterprises (FLEA) and the HORESCA (Federation of Restaurant, Hotel and Bars). There is still no registration demand introduced for this type of packaging.

The relationship between Valorlux and the adherent companies.

32) By the adhesion contract with Valorlux, the adherent companies declares that it wishes to join, for Packaging, the system designed for the management of certain waste products, covered by the Regulation and set up by Valorlux and undertakes to pay the financial contribution agreed to enable Valorlux to accomplish its mission. Varlorlux members are

[42] A first approach of commercial waste management has already started, according to Valorlux accreditation act, through agreements with the retailing sector.

obliged to contract for the whole amount of one-way packaging they put on the Luxembourg market (membership agreement art . 2.4).

33) According to the accreditation act, Valorlux is obliged to contract with all requesting companies (art. 3). Valorlux grants the contracting party a non exclusive right to place the "Green Dot" logo on primary packaging only, in exchange for the payment of the financial contribution(membership agreement, art. 2.1,2.2). The placing of the Green Dot symbol is a right, not an obligation. The "Green Dot" on packaging means that, for such packaging, a financial contribution has been paid to Valorlux (Pro-Europe definition of the logo). Among the contractual obligations of the parties, there are particularly:

- For Valorlux, the obligation to respect the obligations laid down in the Regulation, the confidentiality regarding all the financial and commercial information communicated by the contracting party without prejudice to the information obligations towards public authorities.
- For the contracting party, the completion of data sheets prescribed by Valorlux to supply all the necessary information, the providing, on request from Valorlux, of samples of packaging.

Remark:

34) Valorlux also provides the opportunity for foreign companies and possibly federations that commit themselves in the name of and for account of their customers or members to contract with it. In this case, the declarations must contain an exhaustive list of the said parties responsible for packaging as well as the packaging concerned.

2.2 Interactions between Valorlux and local authorities

According to the Law of 17 June 1994, as amended relating to the prevention and management of waste, municipalities or groups of municipalities are responsible for managing household waste and similar. Fees related to the services offered must match with the real production and notably to the type, weight or volume of waste. Valorlux sees its role as an essential interface between the various participants in the life cycle of packaging (industrialists, consumers, municipalities, associations, operators, networks). As a non-profit-making association, VALORLUX will never be the owner of any infrastructure, it will never employ workers or run lorries. In the same way, VALORLUX will never be the owner of secondary raw materials. Thus the VALORLUX role will materialise in a series of contracts, in which it will have the status of contracting party or observer, ensuring the conditions required for a smooth running of the system.

35) VALORLUX launched its first project in December 1996 and intends to cover a large part of the Grand Duchy of Luxembourg by 2001 at the latest and to reach the recycling/recovery goals (45/55%) of all household waste packaging imputable to its members by the year 2001. According to Valorlux, this progressive approach will permit progressiveness in:

- adaptation of sorting and recycling infrastructures
- adaptation of collection systems which were already in place
- adaptation of the citizens behaviour
- increase of the collected quantities.

36) The accreditation act foresees the obligation for Valorlux to cover the entire area of the national territory in an homogenous way and to conclude uniform contracts with municipalities (art. 5 § 4). Valorlux concludes two types of contracts with municipalities:

- In the first type, Valorlux finances the selective collection of PMC packaging (Plastic, metals, Beverage cartons). At the end of 1999, Valorlux had concluded such type of contracts with 42 municipalities covering 111.000 inhabitants (25,9% of the total national population).
- Valorlux also supports financially selective collection schemes organised via waste lots or neighbourhood containers by municipalities. At the end of 1999, about 229.000 inhabitants (53,4% of the total national population) were covered by such types of contracts.

37) In total, at this date, Valorlux supported one way or another, the selective collection of packaging from 278.000 inhabitants (64,8% of the total national population).

2.3 Collection and sorting

38) VALORLUX opted for a global approach, which means that VALORLUX will cover all household waste packaging and similar packaging, and that there will be no discrimination between different types of packaging materials or products. The global approach also means, that on a long term the collection and sorting system will be standardised, as far as possible, over the whole territory of Luxembourg. This will be achieved using existing public or private structures, insofar as these structures integrate into or complement the collection and sorting methods recommended by VALORLUX. The uniform system will ensure the most economic management of selective collection and will allow a uniform consumer approach (Varlorlux).

39) At the end of 1996, VALORLUX in co-operation with the local authorities initiated 10 pilot projects for the selective collection of packaging at county level (urban and rural districts). In the selected pilot regions, about 25,000 inhabitants tested different systems for the selective collection of plastic bottles, metal packaging and beverage cartons (for instance bring systems, household-oriented collections with bags and bins for recyclable and with mobile waste collection vehicles).

40) The result of this field test was that inhabitants participating in the projects gave clear preference to the household-oriented kerbside system over so-called bring systems (collection containers, container parks). Kerbside systems appeared as the most efficient and the less costly collection method. This system has thus been adopted and will be progressively developed throughout the Luxembourg territory. The present collection system for household and similar packaging waste in Luxembourg is based on the result of the projects. It is organised as follows:

- Glass bottles and containers are collected in bottle banks (bring system).
- Packaging manufactured from paper and cardboard is collected together with waste paper (newspapers and magazines) in paper containers.
- Plastic bottles, metal cans and beverage cartons are collected either via door-to-door system in blue bags (every two weeks) , or via containers.

41) Container parks are also considered as a useful and important complementary system of collection for the materials mentioned above. In 1997, studies showed an average of 1 bring container for:

- 796 inhabitants for paper
- 625 inhabitants for glass
- 9,088 inhabitants for metal bins
- 7,334 inhabitants for plastics 43

42) According to the urban configuration or the population density, Valorlux considers it might be necessary to raise the collection rhythm, or to install a greater number of containers. The great groups of materials for packaging which are selectively collected to be recycled as well as the types of packaging allowed in selective collection schemes are the same as the material collected selectively in Belgium by FOST Plus that is:

Table 1: Selective collection modalities for packaging materials

Materials	Selectively collected	Non selectively collected
Glass	Empty bottles and glass jars without lid or cork	Stoneware, earthenware, porcelain bottles or pitchers, panes, mirrors, flowerpots, lamps and bulbs, medicine bottles
Paper-cardboard	Non soiled paper-cardboard, magazines, newspapers, advertising folders, books, directories, computer paper, typing paper, paper bags, cardboard boxes,	Dirty or greasy paper, aluminium paper, cellophane paper, wallpaper, paper with plastic film
Plastics (PVC, PET, PEHD)	Empty plastic bottles and flasks used for kitchen (cleansing product and food), washing and bathroom.	Butter pots, yoghurt pots, sachets, plastic sheets or films, chips sachets,
Metals (Ferrous and non-ferrous)	Empty metallic packaging (cans, tins, aluminium dishes, boxes and flasks, metal lids and stoppers to be screwed, capsules and lids of jars and bottles.	Aluminium foils, synthetic resins, aerosols, gas bottles..
Beverage cartons	Tetrabrick for milk, fruit juices, ….	

Table 2: Quantities of packaging waste taken in charge by Valorlux in 1999 (in tonnes)

Materials	PMC collection	Traditional collection	Total
Glass	0	8,827	8,827
Paper and cardboard	0	3,105	3,105
Plastics	283	285	568
Metals	207	1,749	1,956
Beverage cartons	146	29	175
Others	180*	0	180
Total	**816**	**13,995**	**14,811**

* Residues for PMC sorting.

[43] Source: DATEN 1997 zur Abfallwirtschaft in Grossherzogtum Luxemburg, Administration de l'Environnement

2.4 Treatment systems and outlet of recycling activity

43) Luxembourg is in a unique position because of its small size and lack of capacity for reprocessing used packaging, except for steel. Valorlux is therefore negotiating with reprocessors in neighbouring countries for the other materials. The recycling channels have to guarantee, on the basis of precise and constraining contract conditions, the taking back and the recycling of the selectively collected and possibly sorted waste. In 1999, the collected and sorted packaging materials were left to the recycling channels depicted in table 3. According to the Valorlux accreditation act, the energy recovery of packaging waste has to be done exclusively in industrial plants equipped with energy recovery infrastructures (art. 8).

Table 3: Recycling channels, 1999

Packaging materials		Guarantors	Recyclers	Products	Applications
Plastics	PET	BELVAPLAST	WELLMAN RECYCLING Spijk (NL)	fibres	Clothes Seats, isolation, car rugs Industrial and domestic filters groundsheet
	PET coloured	BELVAPLAST	WELLMAN RECYCLING Spijk (NL)		
	PVC	BELVAPLAST	STABILOBLOC Seraing (B) SOREPLA Neufchateau (F)	Draining blocs PVC flakes	Road construction pipes
	PEHD	BELVAPLAST	RAVAGO PLASTICS Virton (B) SOREPLA Neufchateau (F)	High quality PEHD pellets	Packaging and other items
Metals	Steel		ARBED Belvaux (L)	Metal sheets, bars, pipes	Bodywork, building Packaging, toys, Metal pieces
	Aluminium		EUROFOIL Dudelange (L)	Ingots	Aluminum profile, wheel, small dishes,
Beverage cartons		RECARTON Belgium	DHP Bousbecque (F) INDUSTRIA PAPELERA NESA Valencia (E)	TECTAN Paper PEHD and aluminium	Furniture, briefcase, watches, office paper, packaging cardboard,
Sorting Residues			SOTEC Neunkirchen/Saarbrücken (D)	Electric and thermal energy	Heating and electricity

2.5 Financing of the system

44) According to the Regulation, the financial intervention of the approved organisation must cover the “real and full costs” of selective collection in an appropriate way according to a scale of charges which has to be approved by the “Pluripartite Monitoring Commission”.

45) Valorlux's activities are financed by the "Green Dot" contribution. The license fee structure is based on the material, weight and number of packaging unit placed on the Luxembourg market. During the first years of functioning, the license fees structure corresponded to that of FOST Plus in Belgium (see table below). Varlorlux intends to adapt its own tariffs to the local situation in order to reflect more closely the local charges for each materials. At the end of 1999, of the 550 adhering companies, 76% were paying a contribution smaller than 50,000 LUF (1,250 €). 2.4% of them paid more than 1,000,000 LUF a year (25,000 €) , which represented more than 60% of the total budget of Valorlux (activity report 1999).

Table 4: Green Dot tariffs established by Valorlux (in LUF and €/kg)

	1997-1998	1999-2000
Glass (bottles and jars)	0.31 LUF 0.0076 €	0.69 LUF 0.017 €
Paper-cardboard (> 85%)	0.33 LUF 0.0081 €	1.26 LUF 0.031 €
Steel	1.34 LUF 0.033 €	1.67 LUF 0.041€
Aluminium (> 50 microns)	2.96 LUF 0.073 €	5.39 LUF 0.133 €
PVC bottles	8.27 LUF 0.205 €	11.55 LUF 0.286 €
PET bottles	8.21 LUF 0.203 €	11.55 LUF 0.286 €
HDPE Bottles	8.27 LUF 0.205 €	11.55 LUF 0.286 €
Beverage Cartons	5.70 LUF 0.141 €	8.50 LUF 0.21 €
Others recoverable	13.63 LUF 0.337 €	13.14 LUF 0.325 €
Others, non recoverable	13.63 LUF 0.337 €	14.46 LUF 0.358 €

Financing modalities for selective collection and sorting

46) For PMC (plastic bottles, metal cans, beverage cartons) collected door-to-door via the blue bag, VALORLUX pays the full costs incurred for selective collection, sorting (provided that the materials meet the given technical specifications) and half of the cost of energy recovery and of "traditional" disposal of the sorting refuse (landfilling and incineration). The other half is paid by the municipalities. In fact, Valorlux has negotiated an average cost per hour with collection operators active in Luxembourg. These send invoices directly to Valorlux

with respective numbers of hours for each municipalities . For sorting, Valorlux has negotiated a contract directly with one of the both operators active in the national territory.

47) For other collection schemes organised by municipalities (traditional collection), Valorlux pays a lump sum per ton of packaging material collected corresponding to 400 LUF (10 €) per ton of glass, 500 LUF(12.5 €) per ton of paper-cardboard packaging and 10,000 LUF (248 €) per ton of sorted and recycled plastics (foils, jars, bottles, foam….), steel and aluminium cans as well as beverage cartons. In the particular case of paper-cardboard, because packaging waste are selectively collected with other waste of the same material, Valorlux reimburses a lump sum of 500 LUF per ton (12,5 €) for 20 % of the total quantities of mixed selectively collected lots of paper/cardboard. Valorlux also pays 500 LUF (12.5 €) per ton for 100% of the cardboard collected separately.

48) The attribution of recycling markets for the materials collected via the blue bag is done by Valorlux which receives the positive value of material resale or finances the costs when this resale value is negative. In 1999, Valorlux expenses for selective collection schemes were distributed as follows (Valorlux, activity report 1999):

Table 5: Distribution of Valorlux expenses for selective collection

Activity	Total in €	Total in LUF
Selective collection	758,575	30,600,929
Traditional collection	223,139	9,001,447
Communication	347,740	14,027,824
Total expenses	1,329,455	53,630,200

2.6 Monitoring and control

Control by the authorities

49) The Environment Administration is in charge of the monitoring of the magnitude, characteristics and evolution of the packaging and packaging waste flows including information on the toxicity or danger of packaging materials and components used for their manufacture (Regulation 31/10/98 , art. 11). Besides, the Regulation 31/10/98 provides that the monitoring of the achievement of mandatory recovery and recycling rates must be undertaken each calendar year no later than 31 March following the year in question by an approved auditor. The first monitoring must be undertaken no later than 31 March 2002. The approved auditor must rely on detailed reports supplied by the persons responsible for packaging and the approved organisation(s), by public legal entities and by companies which carry out the collection, the transport, the recovery or the disposal of packaging waste. The results of the audit undertaken by an auditor must be transmitted forthwith to the competent minister (art. 14).

50) Besides, the accreditation act provides that Valorlux must each year send to the administration of Environment a detailed report which must be accompanied with all pieces of evidence, including notably:

- The amount of packaging waste collected, recycled, recovered and disposed of
- The balance sheet and the profit and loss account for the past year and the outlook for the following one.

Remark: The Pluripartite Commission

51) A Pluripartite Monitoring Commission was established with representatives of the ministers whose area of responsibility includes the environment, middle classes, and agriculture, a representative of the Environment Administration, of the Chamber of Commerce, of the Chamber of Trades, of the Chamber of Agriculture , of the Confederation of Commerce respectively and three delegates from the groups of municipalities responsible for management household and similar waste and which are represented in the Co-ordination Council for the management of household and similar waste. The mission of the Commission are to:

- advise and assist the Minister and the persons responsible for packaging and the approved organisations in the application of this Regulation;
- discuss and make comments, whether at the request of the Minister or on its own initiative, on general problems inherent to the implementation of this Regulation.

Control by the private sector

52) The Valorlux member may place the Logo on Packaging and in its contract with Valorlux it undertakes to provide at the written request of VALORLUX, samples of Packaging that bear the Logo and/or are intended to bear it. These samples are selected on a random basis amongst the packaging (membership agreement, art. 10).

53) Besides, Valorlux obliges its members to keep special accounting records of all the documents used as a basis for drawing up the declaration to Valorlux. Every annual reporting must be certified by an authorised auditor. Valorlux opens the opportunity, to carry out, at its own expenses, the necessary controls, directly or through an authorised company auditor (membership agreement art. 8).

2.7 Quantities of circulated packaging and recovered packaging waste

Packaging and Packaging Waste Arising

54) A study conducted in 1995 –1996 has shown that:

- the quantity of municipal waste produced in 1995 was 218.000 tonnes
- 4% of which was composted
- 38% landfilled
- 58% incinerated with energy recovery.

55) Recent studies conducted by the ECO Conseil agency have shown that the total packaging waste amounted to 39,000 tonnes in 1996. These packaging waste were divided as follows:

Table 6: Packaging waste arisings in 1996

Material	Amount of packaging waste (in tonnes)	Percentage
Glass	17,300	44
Paper and cardboard	11,300	29
Plastic	7,000	18
Metals	2,700	7
Beverage cartons	680	1.8
Total	38,980	99.8

56) This is equivalent to 99 kg of waste packaging per person per year and corresponds on average to approximately 1,800 packaging units. In 1996, the recycling rate of household packaging waste ranged as follows:

Glass	58%
Paper-cardboard	27%
Plastics	2.2%
Steel	5.4%
Aluminium	3.6%
Composites	2.5%

Table 7: Recycling results of Valorlux in 1998 and 1999

	1998		1999 (estimates)	
	Recycling total (in tonnes)	Recycling (in %)	Recycling total (in tonnes)	Recycling (in %)
Glass	4,673	37.1%	8,827	57.2%
Paper-cardboard	2,014	75.7%	3,105	90.2%
Plastics	241	11.4%	568	23.8%
Metals	206	10.1%	1,956	69.6%
Beverage cartons	81	18.9%	175	35.7%
Residues+bags	93		180	
Total recycling	7,308	35.0%	14,085	56.5%
Total Recovery	n.d	35.4%	14,811	57.2%
Number of municipalities involved for PMC	34		42	
Number of inhabitants covered for PMC	85,000		110,000	
Number of inhabitants covered by selective collection schemes (PMC + existing systems)	215,000[44]		278,000	

The results in percentage were calculated on basis of the amount of packaging declared by the Valorlux members.

[44] The number of inhabitant in Luxembourg was estimated in 1997 to 400.350 (Valorlux activity report 1997)

2.8 The recycling and recovery capacities in Luxembourg

57) Luxembourg is in a unique position because of its small size and lack of capacity for reprocessing used packaging, except for steel. VALORLUX is therefore negotiating with reprocessors in neighbouring countries for the other materials (see 2.4).

2.9 Import/Export of Packaging Waste

No data available.

3 Future development

58) The draft National Plan of waste management in Luxembourg (version of August 6 1999) does not mention higher recycling or recovery targets for packaging waste in the next years. It foresees "*the possibility to harmonise the nature of various fractions, to develop further the selective collection and to promote the use of complementary collection schemes*". Regarding prevention it foresees to "stabilise and diminish quantities of waste to be collected notably for packaging waste and to avoid shifts between "assimilated waste" and "commercial waste ".

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Portugal

Contents

1 Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 1
1.2 Responsibilities of economic operators 2
1.3 Targets and Instruments 2
1.4 Further Provisions 4
2 Packaging Waste Management System 4
2.1 Compliance scheme 4
2.2 The Relationships between Ponto Verde and the adherent companies 6
2.3 Interactions between Ponto Verde and local authorities 6
2.4 Collection and sorting 7
2.5 Treatment systems and outlet of recycling activity 8
2.6 Financing of the system 9
2.7 Monitoring and control 11
2.8 Quantities of circulated packaging and recovered packaging waste 12
2.9 The Recycling and recovery capacities in Portugal 13
3 Further developments 15
4 References 16

List of tables

Table 1: Reuse targets for packaging (in % total volume (l)) 3
Table 2: Share of the capital of "Sociedade Ponto Verde" s.a. 5
Table 3: Ponto Verde License fees for packaging in 1998, 1999 and 2000 9
Table 4: Tariffs for reimbursement to municipalities in 1999 and 2000 10
Table 5: Recycling results declared by Ponto Verde in 1998 12
Table 6: Recycling results declared by Ponto Verde in 1999 13
Table 7: The Portuguese market of Packaging Materials (1996) in kt 13
Table 8: The Portuguese production of paper pulp and paper in 1998 14
Table 9: Municipal waste management data for 1995 and expected evolution for 2005 15

1 Legislation and Voluntary Agreements

1.1 Objectives, Definitions and Field of Application

1) The packaging Directive is transposed into Portuguese Law through the following regulations:

- The **Portuguese Decree-Law N° 366-A/97** published in the Official journal on December 1997. This replaced the former Decree-Law 322/95[45]. It transposes and incorporates into national law, the measures and principles stated in the EC Packaging Directive.
- It is implemented by the **Ordinance N° 29-B/98** of January 1998 which for identical reasons replaced the previous ordinance 313/96, of 29th July 1996.
- The **Decree-Law N° 407/98** of 21 December 1998, transposes into national law the essential requirements of the packaging Directive as well as the maximal concentration of heavy metal present in packaging.
- The **Decree-Law N° 162/2000** of 27 July 2000, that modifies articles 4 (responsibility of the management of packaging and packaging waste) and 6 (Symbol) of the Decree-Law N° 366-A/97.

2) The Decree-Law No. 366-A/97 applies for "all packaging introduced into the market, whether they are used or produced, namely at domestic level, at industries, agriculture or trade, including offices, shops and services, and independently of the material of which they are composed of, as well as residues deriving from such packaging susceptible to be collected and treated by the existing systems or systems to be created thereto" (D-L 366-A/97 art. 1). The definitions of packaging, packaging waste, packaging waste management, prevention, reuse, recycling, energy recovery, organic recycling and economic operator are the same as in the Packaging Directive. Besides, the Decree- Law 366-A/97 introduces following definitions[46]:

- Returning means "all collection and sorting operations by material type aiming at reusing packaging and recovering packaging residues" (art. 2)
- Filler: "the one whose profession is to pack or which orders others to pack his products and who is responsible for introducing those products into the market" (art. 2)
- Deposit system: 'system by which the consumer of a packaging pays a certain amount, the deposit, at the moment of the purchase, such amount shall return to the consumer when he hands over the used packaging' (art. 2)
- Integrated system: 'system by which the consumer of the packaging is informed, by the marking on the packaging, that he will have to lay the used packaging (once is become residue) to identified places bearing a similar marking as of the packaging' (art. 2).

[45] The Decree-Law 322/95, of 28 of November, established the rules and principles regarding the systems of management of reusable packaging and of non-reusable packaging residues. However, that Decree-Law had been approved by the Government without the respect for the formality of the previous notification foreseen on the 16th article of the Directive 94/62/EC. It has been replaced by the Decree-Law 366-A/97, of 20th December.

[46] Free translation

1.2 Responsibilities of economic operators

The situation for urban waste

3) The share of responsibilities between economic operators is described in article 4 of the D-L 366-A/97:

- the municipalities are responsible for collecting the urban waste. They should benefit of financial compensations for covering additional cost derived from the need to collect selectively and sort the packaging waste included in the urban waste
- fillers and importers of packed goods are responsible for the payment of the financial compensations stipulated above
- packaging and raw packaging materials manufacturers are responsible for the recovery of packaging waste, directly or through entities created to guarantee the take-back and recovery of collected materials

N.B.: The responsibilities assigned to the filler and importer, when these ones are not identified on the packaging or have registered office in another Member State of the European Union, are passing to the one in charge of the first introduction of the packaging into the national market of the packed products.

4) In order to fulfil the individual obligations stipulated by the Decree, fillers and importers of household packaging can choose between two systems and either:

- set up their own deposit and take-back systems
- join an integrated recovery system. In other words, manufacturers, fillers/importers and distributors may transfer their individual obligations to an organisation operating a nation-wide recovery system which must be approved by the Ministry of the Environment and the Ministry for Economic Affairs (art. 5).

5) Since January 1, 1998, traders and distributors cannot commercialise any product which packaging is not marked with an indicative symbol of the waste managing system (art. 8).

The situation for non-urban waste

6) In the case of commercial and industrial packaging, the recovery obligation lies with the final users. Producers of non-urban packaging residues are responsible for their recovery obligations which can be directly accomplished at facilities, dully licensed for the purpose.

1.3 Targets and Instruments

Prevention / Reuse

7) The Portuguese legal framework does not define specific targets for packaging waste prevention or other requirements in the field of prevention. Nevertheless, considering that during the last years there has been an important increase of the quantities of urban solid residues combined with an increase of the proportion of packaging residues and a reduction of the reuse of packaging (Ordinance 29-B/98), the Portuguese regulation provides for targets for reuse of packaging. The Ordinance 29-B/98 imposes to the packers or agents responsible of the placement on the market of a product packed in reusable packaging to establish a deposit arrangement allowing to recuperate the packaging after use.

8) The deposit cannot be subject to any additional payment and its value must be clearly identified in the packaging or in the support used to show the sales price of the product (Ordinance 29-B/98, art. 2). The distributor or retailer must charge and pay back the deposit and guarantee the gathering of the used packaging as well as their storage in proper conditions but they are neither enforced to accept nor to store used packaging of which type, shape or product label they do not commercialise. Reusable packaging can not be introduced in the municipal circuits for residue gathering (art. 2).

9) The Decree - Law 366-A/97 defines the following reuse targets for packaging which must be reached by sector, excluding the consumption in hotels, restaurants and similar places.:

Table 1: Reuse targets for packaging (in % total volume (l))

	1997	1998	1999
Soft drinks	15	20	30
Beers	70	75	80
Waters	5	8	10
Ordinary table wine	55	60	65

10) Besides, packers or responsible agents for reusable packaging must elaborate packaging management plans describing the deposit system and the control modalities of the system and present each year to CAGERE their provisions for the following year (Commission for the following of the packaging and packaging waste management). (Ordinance 29-B/98 art. 5).

11) A working group in the framework of the CAGERE will have to define the contractual and agreement modalities necessary to achieve the reuse targets. Furthermore, the Government may stipulate minimum mandatory deposits for beverage packaging after granting a hearing to the most representative sectors involved. These minimum deposits must be marked on the packaging or the shelves. Any distributor/retailer who sell soft drinks, beers, water and ordinary table wine packed in non reusable packaging are obliged to retail also the same category of products in reusable packaging.

The case of the HORECA packaging - The "VERDORECA" System

12) Soft drinks, beers, water and wine deemed to the immediate consumption in the restaurants, hotels and similar places (HORECA) must obligatory be packed in reusable packaging (with the exclusion of concentrates for dilution and preparation of drinks) (Ordinance 29-B/98. Art.5). This provision came into effect at the 1st of January 1999. However, the Ordinance also sanctions the use of non-reusable beverage packaging in the restaurants, hotels and similar places provided that these non-reusable packaging waste is 100% headed to recycling facilities. This target can be achieved by participating in a specific collection and recovery system.

13) This provision has lead to the settlement of a specific contract between Ponto Verde and the HORECA sector in order to help the latter to achieve the above mentioned target . Ponto Verde got on 8 September 1999, a license from the Portuguese Government to cover packaging from this area (see below, section 2.4.).

Recovery

14) The recovery targets fixed by the Decree No. 366-A/97 are the specific minimum requirements stipulated by the EC Packaging Directive for Portugal. After 31st December 2005, the Decree-Law provides that Minister of Economy and Minister of Environment will have to define new goals for recovery and recycling, under proposal of the CAGERE (art. 7). Current recovery targets:

- 25% recovery by weight by the end of 2001,
- 25% recycling and 50% recovery by weight by the end of 2005 with a minimum recycling target of 15% per material.

1.4 Further Provisions

15) The packers or responsible agents must communicate annually to Instituto dos Residuos, statistical data's on the amounts of reusable and non reusable packaging placed on the national market, on the amounts of used packaging effectively recovered and reused or sent for final disposal (29-B/98 art. 4). The distributors/retailers with an annual turn-over of more than 180 million escudos must communicate annually to Instituto dos Residuos the statistical data's regarding the amounts of reusable packaging that they traded (Ordinance 29-B/98 art. 4) .

Marking of the packaging

16) The Decree-Law 366-A/97 and the Decree Law 162/2000 provide the obligation to put different symbols on non-reusable packaging for which a deposit is fixed in view of their recovery as well as on primary packaging submitted to an integrated system. Marking to indicate the nature of the material or materials used as well as marking to be used on reusable packaging is voluntary.

2 Packaging Waste Management System

2.1 Compliance scheme

17) On November 16, 1996, the Grupo Intersectorial da Reciclagem (GIR), in co-operation with the Portuguese Federation of Brand Name Manufacturers, CENTROMARCA, founded the private recovery organisation "Sociedade Ponto Verde" s.a. which was officially approved by the Ministry for Economic Affairs and the Ministry of the Environment on October 1, 1997. Up to autumn 2000, the integrated recovery system covered one way packaging for household use only. " The shareholders of "Sociedade Ponto Verde" S.A. are grouped together in 3 holdings which represent 148 companies. The share of the capital are distributed as follows:

Table 2: Share of the capital of "Sociedade Ponto Verde" s.a.

	% of capital
DISPAR - the retail trade	20%
EMBOPAR - the filling industry	57%
INTERFILEIRAS - the packaging manufacturers	20%
Small companies	3%

18) Until recently, Ponto Verde was responsible for the collection, sorting and recovery of urban packaging and assimilated. This can be understood as all one way packaging which are susceptible to be collected via municipalities and equivalent systems. Practically, ”urban packaging and assimilated“ are packaging produced by agents which produce less than 1,100 l waste (a container) per day. Ponto Verde is conscious of the difficulty to put a demarcation line between “urban” and “non urban” packaging waste. That is the reason why Ponto Verde submitted in 2000 a request to be accredited for “non urban packaging waste” as well. This should facilitate the reaching of mandatory targets. The request was approved in autumn 2000.

19) Sociedade Ponto Verde" started business operation on January 1, 1998. In June 1998, 5,927 companies had submitted applications to conclude a contract with "Sociedade Ponto Verde". At the end of 1998, 2.660 companies were already contractual partners of the private recovery organisation. This figure reached more than 3.400 one year later.

20) In 1999, companies adhering to Ponto Verde declared more than 628,000 tonnes packaging. Main contributors were the food and beverages sectors which together represent nearly fifty percent of the contributions.

VALORMED – A specific system for packaging waste containing medicines

Since late 1999, another entity - VALORMED, was licensed in Portugal for managing packaging waste containing medicines arising from households. VALORMED is a partnership of the main associations that operate in the Portuguese "medicine chain".

The integrated system for the management of packaging wastes with medicines (SIGREM), mainly intends to separate them from the urban solid waste flow as well as to ensure their collection and energy recovery. Consumers are supposed to give back the medicines they want to get rid of to pharmacies, where they are deposited in specific containers. The collection and transportation of these containers are taken care by the distribution enterprises that traditionally deal with medicines and already have established their circuits. These waste are headed to energy recovery plants designed for urban solid wastes (namely VALORSUL near Lisbon and LIPOR near Oporto). SIGREM is supported by the contributions given by the pharmacist's/chemist's industry. The management of SIGREM is taken care by a non profit management society -VALORMED, that is licensed by the Ministries for the Environment and of Economy.

For short and medium term, this system views the management of more than 8000 tons of packaging waste with medicines inside them by the year 2000 and more than 9000 tons by 2005.

The system also intends to recycle about 400 tons by the year 2000 and 1400 tons by the year 2005 of cardboard, plastic films and other secondary and tertiary packaging used by the pharmacist industry and by the retail sector, that rarely reach the selling places (pharmacies) and the consumer (Instituto dos Residuos, personal communication).

2.2 The Relationships between Ponto Verde and the adherent companies

21) Ponto Verde concludes three years contracts with adherent companies. By the adhesion contract with Ponto Verde, the adherent companies entrust, totally or partially[47], their take back and information obligation to Ponto Verde in return for an annual fee based on the types and weight of packaging put on the national market. The contract is extended to all goods manufactured, imported, sold and/or distributed in Portugal including non reusable pallets. The contract does not extend to packaging for an industrial use or for hospitals as well as reusable packaging (art. 4).

22) In return for the fee collected, Sociedade Ponto Verde (SPV) grants the fillers/importers a permission to mark their packaging with the "Green Dot". This symbol, alongside with a certificate issued by SPV, confirms the companies as adherents to the integrated system and therewith to transfer their recovery obligations to an officially recognised system. The marking of all primary, secondary and tertiary packaging participating in the Ponto Verde system was mandatory until the publication of the Decree Law 162/2000 which introduced some amendments and made it mandatory solely for primary packaging. Packaging not covered by the contract may not bear the "Green Dot" logo (contract, art. 3). Among the contractual obligations of the parties, there are particularly:

- For Ponto Verde, to respect the obligations laid down in the Decree-Law and by public authorities, the obligation to establish a list of all adhering companies and to provide it on members request, the obligation to maintain confidentiality as regards commercial information communicated by the contracting party (contract, art. 11)
- For the contracting party, the obligation to use the logo on primary packaging of goods he puts on the national market, the obligation to supply each year the annual declaration of packaging put on the market which allows to determine the fee to be paid; the providing, on request from Ponto Verde, of samples of packaging; the obligation to inform Ponto Verde immediately of any unauthorised use of the logo of which he may become aware (contract, art. 12-14).

The case of service packaging – the retail sector

23) Ponto Verde has developed a specific model for service packaging (that is packaging used by the retail sector such as carrier bags, chip bags and bread bags). This new procedure allows service packaging providers and wholesalers the opportunity to pay fees to Ponto Verde and to mark directly packaging they sale to retailers with the Green Dot symbol. Invoice of the purchase of these packaging will be a sufficient piece of evidence testifying compliance with the take-back obligations.

2.3 Interactions between Ponto Verde and local authorities

24) Municipalities were confined, by Decree-law nº 239/97 of the 8th September, to the responsibility for the public service of collecting most of the urban solid waste. Since, the creation of selective collection and sorting circuits for packaging waste will mean additional costs for Municipalities, the Decree-Law n° 366-A97, foresees that the organisation operating the integrated recovery system must reimburse these additional costs by concluding contracts with the local authorities.

25) Sociedade Ponto Verde" is a non profit organisation. The license fees are primarily used to cover the additional costs incurred by the local authorities for selective collection and sorting. The remainder is used for public relation campaigns, as well as for research and

[47] Cf. contract, art. 8

development about recycling and recovery. Sociedade Ponto Verde concludes contracts with Local authorities. These contracts are valid for three years. In this contract, local authorities commit themselves to proceed to separate collection and sorting of packaging waste from households origin and similar packaging and to deliver these waste to “guarantors” assigned and accredited by Ponto Verde. The waste must correspond to technical specifications described in the contract. The way in which the different packaging materials are collected is determined and organised by the Local authorities.

26) Ponto Verde commits itself to guarantee, via contracts with “guarantors”, the take back and recycling or recovery of all packaging waste in compliance with the technical specifications. Transport of the waste must be carried out either by the municipalities or by “guarantors”. Transportation realised by municipalities are also reimbursed by Ponto Verde according to predetermined tariffs. The fulfilment of the contract between Ponto Verde and municipalities is assessed by a “Following Commission” which has to meet in a fixed frequency during the first months of the contract.

2.4 Collection and sorting

27) Glass waste is mainly collected through green neighbourhood containers in “EcoPonto” or “Ecocentro”. Paper and cardboard along with “Drink cartons” are collected in cardboard crates, via blue neighbourhood containers, in “EcoPonto” or “Ecocentro”. Plastic and metal packaging are most often collected in yellow containers in “EcoPonto” or “Ecocentro” before being sent to a sorting centre. Some municipalities are also developing door to door collection schemes for these waste .

28) At the end of 1999, 147 municipalities had concluded contracts with Ponto Verde. These represent more than 5 million inhabitants (52% of national population) and 44% of the Portuguese territory. This total population was equipped with 9,500 Ecopontos (for glass, paper, plastics and metals) plus 2,100 isolated containers for glass and 600 isolated containers for paper (http://www.pontoverde.pt/press/press-03.html).

29) With these figures, "Sociedade Ponto Verde" S.A. has nearly achieved its target to cover half of Portugal (in terms of area and population) by the year 2001. “Sociedade Ponto Verde” also intends to collect and recover 340,000 tonnes of packaging waste by the year 2000, and 1.3 million tonnes by the year 2006.

The case of the HORECA packaging - The “VERDORECA” System

30) The Ordinance 29-B/98 provides that soft drinks, beers and water deemed to the immediate consumption in the restaurants, hotels and similar places must obligatory be packed in reusable packaging (with the exclusion of concentrates for dilution and preparation of drinks). An exemption is foreseen and the use of non-reusable beverage packaging HORECA sector is allowed provided that these non-reusable packaging waste is 100% headed to recycling facilities. This goal can be achieved by participating in a specific collection and recovery system.

31) This provision has lead to the settlement of a specific contract between Ponto Verde and the HORECA sector in order to help this last to achieve a 100% recycling target. Ponto Verde got on 8 September 1999, a license from the Portuguese Government to cover packaging from this area. Ponto Verde aims to get contracts from 90,000 businesses in the sector and signed an agreement with FIHOTEL and FERECA, the two professional federations. This system called “Verdoreca” will be started during the year 2000.

32) The adhesion to “Verdoreca” is free. HORECA establishments have to sign the contract with Ponto Verde and provide annually Ponto Verde with information on the amount of concerned one-way packaging they buy per month. In this contract, they commit themselves to ensure separation of packaging waste and use separate collection infrastructures offered by municipalities. The advantage for the concerned establishments joining the system is that it allows them to continue selling beverages for immediate consumption in one way packaging. Ponto Verde will provide these establishments with an annual certificate assuring that they comply with the contractual obligations. Monitoring of the fulfilment of these obligations by the “HORECA” actors will be assured by controls of the garbage and dustbin composition at the “HORECA” actors by controllers agents from Ponto Verde, municipalities and by the General Inspection of the Ministry of Environment (Inspecao Geral do Ambiente) (Ponto Verde, personal communication).

2.5 Treatment systems and outlet of recycling activity

33) According to the Decree 366-A/97, Packaging manufacturers and raw packaging producers are responsible for the recovery of packaging residues included in the urban waste, directly or through entities created to guarantee the take back and recovery of collected materials. These manufacturers have created INTERFILEIRAS, the national association for the management and recovery of packaging waste which includes various “Fileiras” for:

- Metals: FILEIRA METAL
- Paper and cardboard: RECIPAC
- Plastics: PLASTVAL
- Glass: CERV
- Wood: EMBAR

34) Most “Fileiras” were created in 1996 and have among their members and stakeholders companies involved in transformation of raw materials, packaging manufacture, take-back and recycling of packaging waste. In 1998, Ponto Verde concluded contracts with “Fileiras”, in which it transmits its take back obligation (provided in the contracts with local authorities) to these “Fileiras”. The contracts are valid for three years. Ponto Verde commits itself to deliver the total amount of related waste collected by municipalities to the “Fileira”. “Fileiras” commit themselves to recycle or recover all these waste according to the current legislation and reimburse Ponto Verde according to the amount and the type of material corresponding with technical specifications.

35) Recovery of the collected used packaging from households is carried out exclusively by companies certified by "Sociedade Ponto Verde". To obtain the certification, these companies have to conclude an agreement with SPV on the grounds of which they are obliged to accept the total amount of sorted packaging waste left in charge by the municipalities. Municipalities have to send a take back demand form to Ponto Verde for each bale of waste. Punto Verde designates the accredited company in accordance with the “Fileira”. In order to be accepted, the packaging materials have to be in conformity with previously defined technical specifications. In case of disagreements between Municipalities and guarantors about the quality of materials collected and sorted, the three parties try to find a solution by common consensus. If the disagreement persists, parties make call to an external expert assigned by Instituto dos Residuos.

36) The fulfilment of the contract between Ponto Verde and “Fileiras” is assessed by “Material Commissions” which meet in a fixed frequency during the first months of the contracts.

Control procedures are also foreseen by Ponto Verde which can monitor and control all recycling or recovery activities carried out by “Fileiras”.

2.6 Financing of the system

37) "Sociedade Ponto Verde" S.A. finances its activities with the fees paid by the fillers/packers and importers. The license fees are calculated according to the quantity and weight of the respective packaging material. Both one way sales and transport packaging (irrespective to the material they are made of are embraced by Sociedade Ponto Verde’s Integrated System. In 1998, 1999 and 2000, the license fees for the six waste streams taken into account by Ponto Verde ranged as follows:

Table 3: Ponto Verde License fees for packaging in 1998, 1999 and 2000

Type of material	License fees 1998		License fees 1999 - 2000	
	escudos /kg	€/ 1,000 kg	escudos /kg	€/ 1,000 kg
Glass	0.3	1.50	0.3	1.50
Plastic	8	39.90	8	39.90
Paper/Cardboard	2	9.98	2	9.98
Steel	3.5	17.46	3.5	17.46
Aluminium	14	69.83	7	34.92
Wood	15	74.82	0.75	3.74
Others	15	74.82	15	74.82

38) The fee for each material is calculated according to the costs of collection, sorting and recovery of each of these materials (contract “Fileiras”, art. 14). In 1999, the total contribution of Ponto verde members amounted to 2,100 million escudos (http://www.pontoverde.pt/press/press-11html).

Financing modalities for selective collection and sorting

39) Article 5 of the Decree 366 provides that in the scope of an integrated system, the approved organisation must provide for the financial compensations necessary to support, by contracts or voluntary agreements with municipalities, the selective collection and sorting of the packaging residues. The financial support for the recycling and recovery of household packaging, must be done together with the organisations of suppliers and manufacturers of packaging materials which have been created to guarantee the recycling and recovery of the collected materials.

40) Functioning as a non-profit organisation, SPV fully allocates its annual overall income to additional costs of municipalities with regard to multi-material collection and sorting (this part represents the biggest part of the revenues), communication/environmental education and Research & Development activities.

41) The municipalities take over the multi-material collection and sorting of household packaging waste being reimbursed by SPV for the additional cost incurred through these operations. This means the costs for collection and sorting of the municipal packaging waste + transportation costs to the recycling/recovery plant minus the avoided costs for non selective collection and final disposal of the waste (contract, art. 1). In addition, municipalities are also

entitled to attain financial and technical support from SPV corresponding to 50% of the costs for awareness campaigns undertaken to gain or increase public acceptance for the selective collection programmes. This financial participation of Punto Verde is conditioned to a former approval of the content, form and budget of the campaign (art. 12). Finally, the packaging manufacturers and raw material producers are responsible for the recovery of the collected household packaging.

42) During the first months of Ponto Verde activities, there have been long discussions and sometimes disagreements between ”Ponto verde” and local authorities about the financing conditions for the reimbursement of selective collections schemes. These disagreements have impede the conclusion of contracts between “Ponto Verde” and local authorities during several months with the risk of jeopardising the chances to achieve mandatory recycling targets. In 1999, the Portuguese Government took measures and:

- settled programme-contracts in which the Government was financially involved to sustain investment in infrastructure for collection, sorting and recycling of packaging waste
- decided to recruit an international expert who would define the real costs of packaging waste management. Instituto dos Residuos commissioned a study by Price Waterhouse & Coopers which assessed the cost of collection, sorting and recovery of packaging waste (Dr. Fernando Leite in “The relationships between local authorities and Green Dot companies” ACR-AVR Conference 1999).

43) Ponto Verde adapted its tariffs according to the results of this study and proposes to local authorities a stable financial support to cover the additional costs of multi-material collection. The tariffs are fixed according to weight of specific materials. All modification of these tariffs must be approved by Instituto dos Residuos. The table below gives the tariffs valid in 1999 and 2000.

Table 4: Tariffs for reimbursement to municipalities in 1999 and 2000

Type of material	1999		2000	
	escudos /kg	€/ 1,000 kg	escudos /kg	€/ 1,000 kg
Glass	4.75	23.6	7.80	38.90
Plastic	33	164.6	161	802.91
Paper/cardboard	8	39.9	12	59.85
Steel	15	74.82	25	124.67
Aluminium	73	364.12	193.3	963.99
Wood	3	14.96	3	14.96

44) In 1999,the total financial support to local authorities amounted to 340 million escudos. In 2000, Ponto Verde aims at collecting 106,000 tonnes of packaging waste, this should increase the financial support up to 2,300 million escudos (http://www.pontoverde.pt/press/press-09.html).

The case of paper and cardboard

45) Ponto Verde only reimburses 15% of the paper and cardboard waste stream that is collected by municipalities. These 15% represent the percentage of this material that is

constituted with packaging. This percentage could be re-evaluated according to further analysis.

2.7 Monitoring and control

46) According to the Decree-Law 366-A/97, art. 10 Inspecção-Geral das Actividades Económicas (General-Inspection of Economic Activities), Direcção-Geral do Ambiente (General Direction for the Environment), Instituto dos Resíduos, local delegations of the Ministries of the Environment and Economy among other entities are liable for the control of the Decree. Besides, packers or importers must communicate annually to Instituto dos Residuos, statistical data's on the amounts of reusable and non reusable packaging placed on the national market, on the amounts of used packaging effectively recovered and reused or sent for final disposal (Ordinance 29-B/98 art. 4).

47) The distributors/retailers with an annual turn-over of more than 180 million escudos (897,784.51 €) must communicate annually to Instituto dos Residuos the statistical data's regarding the amounts of reusable packaging they traded (Ordinance 29-B/98 art. 4).

48) In 1999, the Ministry of Environment (Instituto dos Residuos) made questionnaires for the declaration of the statistical data's. A similar document already existed for reusable packaging since 1997 notably used to identify the quantities of reusable packaging sold, except in HORECA sector.

CAGERE – The supervisory Commission

49) In line with the provisions set forth in the Decree, a Supervisory Commission (Comissao de Acompanhamento da Gestao de Embalagens e Residuos de Embalagens CAGERE) has been established to monitor implementation of the statutory regulations. CAGERE is composed of the following members:

- a representative of Ministry of Agriculture, Rural Development and Fishing;
- two representatives of Ministry of Economy
- a representative of Ministry of Environment
- a representative of the National Association of Municipalities
- a representative of each association representative of the economic sectors taking part
- a representative of each integrated management systems.

The marking of packaging

50) The Portuguese regulation sets the obligation to put marking symbols on returnable packaging for recovery or on primary packaging participating in an integrated system. Moreover, each packaging may display the nature of materials it is made in. The function of the marking is to monitor the integrated system: according to the Decree, only non-reusable primary packaging marked with the Green Dot is to be sold.

Controls by Punto Verde

51) The Ponto Verde contract with adherent companies includes several disposition allowing control and notably:

- the obligation to use the logo on primary packaging of goods he puts on the national market
- the obligation to supply each year the annual declaration of packaging put on the market which allows to determine the fee to be paid. These annual declarations must be certified by a chartered or professional accountant (contract, art. 7).
- the providing, on request from Ponto Verde, of samples of packaging
- the obligation to inform Ponto Verde immediately of any unauthorised use of the logo of which he may become aware (contract, art. 12-14).

52) The provision of a certified "Green Dot" valid for the following year is done by Ponto Verde only on every fourth quarter of the year, when members have fulfilled their information obligation and paid the due fees (contract, art. 10). Within the Portuguese Integrated Recovery System a case to point out is the obligation of the trade retailers. Indeed the distribution chain performs a major role in what concerns the auditing of the system: as prescribed by law, only non-reusable packaging marked with the symbol shall be sold henceforward.

2.8 Quantities of circulated packaging and recovered packaging waste

53) Annual production of Municipal solid waste was estimated in 1993 to 3,150 ktonnes (Plano estrategico sectorial de Gestao dos Residuos solidos urbanos). Considering the present growth rate of 3% this figure will exceed 3.7 million tonnes in 2000 and 4.5 million in 2010. Packaging waste quantities are growing faster that municipal solid waste. In 1980, the packaging waste of glass, paper-cardboard and plastics represented around 20% of the household waste. At the beginning of 1990, this percentage increased to about 45%. (Ponto Verde). The average composition of municipal solid waste in 1993, shared as follows:

Paper-cardboard	22.3%
Glass	4.9%
Plastics	12.7%
Metals	2.9%
Organics	36%
Textiles	3.7%
Others	17.5%

Source: Plano estrategico sectorial de gestao dos residuos solidos urbanos, Ministerio dos Ambiente – Instituto Dos Residuos, 1999

Table 5: Recycling results declared by Ponto Verde in 1998

	Entrusted to Ponto Verde	Recycling (in tonnes)	Recycling (in %)
Glass	203,098	519	0.3
Paper-cardboard	154,171	618	0.4
Plastics	75,592	364	0.5

Steel	28,489	292	1.0
Aluminium	4,543	10	0.2
Others	3,907	-	
Total	469,800	1,803	0.4

54) These results were achieved through contracts with around 60 municipalities covering 19% of the national population and 16% of the country area. At the end of 1998, Ponto Verde had concluded 2.660 contracts with companies. These materials corresponded to a total income of 1,214 million escudos.

Table 6: Recycling results declared by Ponto Verde in 1999

	Entrusted to Ponto Verde	Recycling (in tonnes)	Recycling (in %)
Glass	261,027	17,936	6.9
Paper-cardboard	207,776	4,109	2.0
Plastics	108,927	1,030	1.0
Steel	38,630	540	1.4
Aluminium	5,574	37	0.7
Wood	2,677	43	1.6
Others	3,536	-	-
Total	628,147	23,695	3.8

(Source: annual report Sociedade Ponto verde 1999)

55) At the end of 1999, 147 municipalities had concluded contracts with Ponto Verde. These represent more than 5 million inhabitants (52% of national population) and 44% of the Portuguese territory. At this date, Ponto Verde had concluded 3,400 contracts with companies.

2.9 The Recycling and recovery capacities in Portugal

56) Packaging industry comprises 200 companies producing 1,300 million tonnes packaging. The table below gives estimates of the packaging market for packaging materials .

Table 7: The Portuguese market of Packaging Materials (1996) in kt

	Production	Import	Export	Apparent consumption	Indirect deficit	Reel consumption
Glass	670	10	390	290	39	258
Paper and cardboard	372	9	19	371	109	480
Plastics	190	22	13	199	95	294
Metal	30	5	2	33	17	50
Total	1,262	46	424	893	260	1,082

Source: Direction des Relations Economiques extérieures – French Ambassy in Portugal

Glass

57) Five companies share the production of hollow glass packaging in Portugal for a total annual production in 1998 of 700,000 tonnes of which 60% are exported[48]. In 1998, 120,000 tonnes of household and industrial glass waste were collected in Portugal from households and packers[49] (Verre-Avenir, 1999, Website). The CERV estimates the glass recycling capacities to 200,000 tonnes/year.

Paper-cardboard

58) The paper sector in Portugal is represented by 67 companies occupying 7,000 workers. The paper and cardboard packaging production is nearly the same as the paper and cardboard packaging consumption and was estimated in 1998 to 372,000 tonnes[50] (Source: Direction des Relations Economiques extérieures – French Ambassy in Portugal). This figure may be compared with, the recycled paper and cardboard consumption which was about 300,000 tonnes in 1995, 315,000 tonnes in 1996 and 352,000 tonnes in 1998 (Source: CEPI). This corresponds with an utilisation rate of 31% which is below the European average[51]. Further increase in the utilisation rate and recovered paper utilisation may be expected.

Table 8: The Portuguese production of paper pulp and paper in 1998

Production	in tonnes
Total production of paper pulp	1,710,000
Export of paper pulp	1,000,000
Import of paper pulp	95,000
Apparent consumption	805,000
The paper and cardboard production	1,100,000

Plastics

59) Portugal counts about 200 plastic producers which produce yearly 200,000 tonnes. A survey done by the GIR (Portuguese Intersectorial Recycling Group) estimated a total capacity for mechanical recycling of about 45,000 tonnes[52]. Not all of the recyclers have a washing station though. This figure has to be compared with the 109,000 tonnes plastic packaging declared to Ponto Verde in 1999 and with the 1,000 tonnes selectively collected. PLASTVAL has not defined expectations on an increase of the recycling capacities for plastics since the current capacity is only being used at 50-60% at the most.

[48] Direction des Relations Economiques extérieures: http://www.dree.org/Portugal/_private/abstract.cfm?Numero=5742
[49] 500 tonnes of waste glass were collected from households.
[50] In 1999, 208,000 tons paper and cardboard packaging were declared to Ponto Verde.
[51] The average European utilisation rate for paper was estimated in 1996 to 44 % (Source: CEPI).
[52] PLASTVAL hopes, in co-operation with the Instituto dos Residuos, to ascertain this figure for the year 1999 as well as the usage of the installed capacity. This new survey will help to know where Portugal stands regarding the quotas for mechanical recycling set out by the EU Directive 94/62.

Steel

60) The iron metallurgy had an approximate annual capacity (electric furnace) of 500,000 tonnes and it is estimated that in 2001 the sector will be in deficit of metal scraps. (Source: Fileira Metal, personal communication).

Aluminium

61) The annual production capacity of aluminium range from 8 to 10,000 tonnes with a current production of 6,000 tonnes. This capacity is widely sufficient in Portugal were aluminium packaging is not widespread.

Wood

Recycling capacities for wood are estimated by Embar to 296,000 tonnes/year (Embar, personal communication). This is much superior to the 2,700 tonnes of wood packaging declared to Ponto Verde in 1999.

3 Further developments

62) The table below gives the figures of the state of municipal waste management system in Portugal in 1995 and the expected evolution for 2005.

Table 9: Municipal waste management data for 1995 and expected evolution for 2005

	1995		2005	
	Quantity (in kt)	Percent	Quantity (in kt)	Percent
Prevention	0	0	225	5
Composting	299	9	1,123	25
Recycling	133	4	1,123	25
Incineration with energy recovery	0	0	988	22
Disposal	2,908	87	1,031	23
Total recovery	432	13	3,471	77
Total disposal	2,908	87	1,019	23
Total management	3,340		4,490	

Source: Plano estrategico sectorial de gestao dos residuos solidos urbanos, Ministerio do Ambiente – Instituto Dos Residuos, 1999

63) For packaging waste, the recycling targets for 2005 are:

- Recovery: 50%
- Recycling: 25%
- Recycling per material: 15%

64) To achieve this goals the national plan for municipal waste management foresees notably:

- to put the emphasise on public awareness campaigns
- to develop further the infrastructures of selective collection schemes.

65) Ponto Verde is also conscious that achieving the targets defined, depends essentially on the participation of the citizens in the programs of selective collection. That is the reason why SPV foresees to invest, during the year 2000, about 900 million escudos in awareness campaigns. Besides, SPV intends to commission a consultant to study the attitudes and behaviours of the consumers in the selective collection. The conclusions of this study will be used to define the conception of the following awareness campaigns.

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Contents

1 Packaging Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 1
1.2 Responsibilities of economic operators 2
1.3 Targets and Instruments 3
1.4 Further Provisions 5
2 Packaging Waste Management System 6
2.1 Compliance scheme 6
2.2 Interactions between operators and local authorities 9
2.3 Collection and sorting 10
2.4 Treatment systems and outlet of recycling activity 11
2.5 Financing of the system 12
2.6 Monitoring and control 15
2.7 Quantities of circulated packaging and recovered packaging waste 17
2.8 The recycling and recovery capacities in Spain 18
2.9 Import/Export of Packaging Waste 20
3 Future development 20
4 References 23

List of tables

Table 1: Licence fee for the Green Dot 13
Table 2: Packaging consumption and packaging waste recovery in 1997 17
Table 3: Quantities of packaging declared to and recovered by Ecoembes (in 1998) 18
Table 4: Aluminium production in Spain in 1998 [in tonnes] 20
Table 5: Imports and exports of packaging waste for recovery 20

1 Packaging Legislation and Voluntary Agreements

1.1 Objectives, Definitions and Field of Application

1) The EC Packaging Directive is implemented into Spanish Law by the Packaging and Packaging Waste Act (Law 11/1997 of April 24, 1997) which lays down the basement for the implementation of the producer responsibility in Spain. It entered into force on April 26, 1997, except for management systems (deposit or integrated) of household packaging that entered into force on May 1, 1998.

2) To achieve the objectives to be completed before June 30, 2001, Law 11/1997 establishes specific measures which aims, as first priority, at preventing packaging waste production and, secondly, at encouraging re-use of packaging, recycling and other forms of recovery with the aim of avoiding or reducing the final disposal thereof. Within its sphere of application this Law covers all packaging and packaging waste placed on the market or generated within the territory of the State (art. 1). This text is completed with a Royal Decree 782/1998 of 30 April which came into force on May 1, 1998. The Royal Decree includes the Regulation for the development and fulfilment (or implementation) of the Law 11/1997.

3) Let's mention also:

- The Law 10/1998, of April 21, on Wastes – 7th additional disposition-, which establishes the obligation of making "managerial (or entrepreneurial) plans for prevention" in certain cases.
- The Order of April 27 1998 establishing the individualised sums that must be paid for the deposit on packaging and the identification symbol for the packaging put on the market via the deposit, reimbursement or exchange systems defined in the Law 11/1997 of April 24 relative to Packaging and Packaging Waste
- The Order 50/1998, of December 30, relative to the administrative, fiscal and social measures - 19th additional Disposition – which modifies the Law 11/1997, of April 24 relative to Packaging and Packaging Waste. This obliges packers to identify in their bills or invoices the contributions of packers to the integrated management systems (individual amount for each packed product put on the market).

Definitions

4) The Law 11/1997 reproduces the definition of packaging defined in the EC Packaging Directive. This definition is refined in the Royal Decree 782/1998 which adds that *"single-use bags provided or acquired in commercial establishments for transport of the merchandise by the final consumer or user, and disposable articles used for the same purpose as packaging, for example trays, plates, cups, tableware and any other disposable article which may be used, primarily in the food and beverage service and restaurant sectors, to serve the product and allow or facilitate its direct consumption or use are included in this definition"*.

5) The annex 1 to this regulation provides a list of products not to be considered as packaging. This includes, among others, envelopes, briefcases, lighters, bags for infusions (teabags), refills for fountain or ball-point pens, syringes, plasma bags, brochures or instructions included with medications in their packaging, cassettes of magnetic recording tape, videotapes or tape for computer purposes.

6) The definitions of prevention, reuse, recycling and energy recovery in Law 11/1997 are the same as in the Directive. Definitions of recovery and disposal refer to annex II A and B of

decision 96/350/EC of the Commission dated 24th May. Besides, this Law defines following concepts:

- Packaging waste: any packaging or packaging material which the holder disposes of or is under an obligation to dispose of in virtue of the provisions in force.
- Industrial or commercial packaging: packaging which are intended for exclusive use and consumption in industries, businesses, services, agricultural or stock-breeding operations and which are, therefore not capable of use or ordinary consumption in private households

1.2 Responsibilities of economic operators

7) Articles 6 and 7 of the Law 11/1997 provide that packers of and traders in packed products, or, where it is not possible to identify the former, the importers of packed products on the national Market are obliged to charge their customers, up to final consumer, of a deposit and to take back and recover the packaging they placed on the market[53].

8) The deposit is to be fixed by the Ministry of Environment after discussions with Autonomous Communities authorities and other Ministries (art. 6). This was done by the Order of April 27, 1998 (see section 1.1). However, these actors may be exempted from their obligations by participating in an " integrated system " which will guarantee, within the area in which it operates, fulfilment of the defined recovery and recycling targets.

9) In the case of industrial packaging waste, the final owner has to manage it correctly, by trusting it to an authorised operator which will recover, recycle or eliminate it properly or by returning it to the supplier for re-use.

10) If for reasons connected with the materials used the aforementioned economic operators do not accept the packaging waste or used packaging, same may be delivered to manufacturers and importers or purchasers in other Member States of the European Union of packaging and raw materials for the manufacture of packaging. These are obliged to accept the same at the market price (Law 11/1997 art 12).

11) Royal Decree 782/1998 adds that in the event of products placed on the market by means of retail brands, the packer shall be considered as the one which holds itself out to the public as such placing on the packaging its name, company name, brand or barcode, in such manner that it may be unequivocally identified as the packer. In these products, should the packager not be identified as indicated above, the owner of the retail brand under which the product is offered for sale shall be responsible for compliance with the take back and recovery obligations set forth in Law 11/1997 (art. 2) .

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[53] According to this Law:
Packaging manufacturers are economic operators engaged both in the production of packaging and in the import or purchase in other Member States of the European Union of empty packaging already manufactured.
Packers are economic operators engaged in both the packaging of products and the import or purchase in other Member States of the European Union of packaged products for placing on the market.
Traders or distributors are economic operators engaged in the distribution, whether wholesale or retail, of packaging or packaged products. The concept of traders distinguishes between:

Traders or distributors of packaging: those who undertake transactions involving empty packaging.
Traders or distributors of packed products: those who market packed goods in any of the marketing stages of the products.
Operators engaged in the recovery of packaging waste and used packaging are the economic operators engaged in the collection, classification, storage preparation and marketing of packaging waste for the reuse, recycling and other forms of recovery thereof.

12) Furthermore, the public authorities may, in the sphere of their respective powers, adopt economic instruments or other measures to promote the achievement of the fixed recycling and recovery targets (Law 11/1997 art. 18).

1.3 Targets and Instruments

Prevention

13) Prevention is defined as *"the reduction in particular by means of the development of non contaminating products and techniques, of the quantity and impact on the environment of:*

- *those materials and substances used in packaging and present in packaging waste,*
- *the packaging and packaging waste in the process of production and in the marketing, distribution, utilisation and final disposal thereof".*

14) The art. 5 of Law 11/1997 provides that before 30th June 2001 all packaging waste generated shall be reduced by at least 10 % by weight (taking 1997 as a reference year[54)]. According to the article 5 of the Royal Decree 782/1998, the 10% reduction objective is calculated by applying the ratio of the weight of packaging waste to the weight of the packed product.

15) The Law 11/1997 art. 3 provides that within their respective spheres of competence, the General Government Administration and the Autonomous Communities, after consultation with the economic operators, will adopt the appropriate measures, especially those relating to the design and manufacturing process of packaging, with the aim of minimising and preventing the production of packaging waste from the outset. The measures to be adopted may include investigative and developmental procedures aimed at encouraging prevention.

16) According to this provision and the 7th additional disposition of the Law 10/1998 on Wastes, the Royal Decree 782/1998 imposes to packers which, during one calendar year, place on the market a quantity of packaged products, and if applicable, industrial or commercial packaging, which may generate packaging waste exceeding the following amounts shall be required to prepare a managerial (or entrepreneurial) plan for prevention.

- 250 tonnes, if they consist exclusively of glass
- 50 tonnes, if they consist exclusively of steel
- 30 tonnes, if they consist exclusively of aluminium
- 21 tonnes, if they consist exclusively of plastic
- 16 tonnes, if they consist exclusively of wood
- 14 tonnes, if they consist exclusively of cardboard or compound materials
- 350 tonnes if they consist of various materials and each one of them does not individually exceeds the foregoing amounts.

[54] Royal Decree 782/1998, art. 5.

17) The managerial plan must include quantified goals for prevention, the measures foreseen to achieve them and the control mechanisms to verify their compliance with reference to:

- the increase in the ratio of the amount of reusable packaging to the amount of single use packaging (except if life cycle analysis demonstrate that the environmental impact is not positive)
- the increase of the ratio of the amount of recyclable packaging to the amount of non-recyclable packaging
- the improvement of the reusability or recyclability,
- the improvement of properties in order to reduce the toxicity and dangerousness of the materials and the environmental impact of the waste management,
- the reduction in the weight per packaging unit, especially those for the single use,
- the reduction of the total weight of the packaging placed on the market,
- the non-use of superfluous packaging[55] and packaging of a size or weight greater than the statistical average of other similar packaging,
- the use of packaging, the relation of which in terms of container and content, is more favourable, into consideration of each one of the material,
- the use of recyclable or recoverable packaging,
- the inclusion of secondary raw material.

18) The managerial plans for prevention may be prepared by integrated management systems but in this case, they must refer to a sector of production of packaging and identify the packagers concerned which shall be individually bound to perform the measures contained in the said plan. These managerial plans for prevention, which have a periodicity of three years, must be approved by the competent environmental agency of each one of the Regional Governments in whose territory the measures must be carried out. The Regional Governments must report to the Ministry of Environment (Royal Decree 782/1998, art. 3).

19) The Law 11/1997 also implements in its article 13, the provisions relating to the concentration of heavy metals in packaging. The Decree 782/1998 implements the essential requirements of the EC Packaging Directive in respect of the composition, reusability and recoverability of packaging.

Reuse

20) The Law 11/1997 provides the possibility for public authorities to create economic, financial or fiscal measures to promote the re-use and recycling of packaging without harm to the environment (art. 4).

[55] The Royal Decree 782/1998 defines as superfluous packaging, all packaging which, although it may facilitate the handling, distribution and presentation of the product intended for consumption, is not necessary to contain or protect it. The same Royal Decree defines as luxury or designer packaging, packaging which, due to its artistic, aesthetic or compositional characteristics, generally does not become waste after the use or consumption of the product contained therein, but instead remains in the possession of the consumer or user.

Recovery

21) The targets for recycling and recovery are defined in art. 5 of Law 11/1997. They are the same as those defined in the packaging Directive. That means that before 30th June 2001 the following rates must be achieved throughout the whole country[56]:

	Minimum	Maximum
Recovery	50%	65%
Recycling	25%	45%
Recycling per material	15%	

22) Recycling targets per material addresses following materials: glass, plastic, paper and cardboard, steel, aluminium, wood and others. The recycling percentage of compound packaging shall be calculated either by adding it to the predominant material or by specifying it separately (Royal Decree 782/1998).

23) The requirements are general targets for Spain as a whole. If the recovery targets are not achieved, the system approval may be revoked. In addition, the competent authorities may set packaging duties (e.g. taxes) for packaging materials, for which the recovery or reduction targets have not been met. Furthermore, a comprehensive catalogue of fines is planned for violations: in some cases with confiscation of the packed goods.

1.4 Further Provisions

24) The Law 11/1997 also sets an information obligation for economic operators which have to supply the Autonomous Communities (possibly via the integrated management systems) the information necessary to verify the degree of compliance with the fixed targets (art. 15). These information include:

- the total quantity of packaging and packed products placed on the market (weight and total number of units of packaging and packed products), imported or acquired abroad as well as those exported or shipped abroad
- the final destination of packaging waste and used packaging (Royal Decree 782/1998, art 15)

[56] To be complete, we may mention that the Law 11/1997 also defined intermediate targets i.e. that before the expiry of thirty six months from the entry into force of the Law (that is 1st May 2001) there shall be recycled a minimum of 15% by weight of all those packaging materials with a minimum of 10 % by weight for each type of packaging material .

25) Companies participating in an integrated system are obliged to provide this organisation with the following information on March 31 of each year:

- data in respect of the quantity of packaging manufactured, sold and exported in the previous year,
- information on the number of packed products expected to be placed on the Spanish market in the current year, on the estimated volume of packaging (weight, volume, packaging units),
- information on the composition of the packaging, the anticipated quantity of packaging waste, the estimated collection quantity and the planned reuse, recycling and recovery rates.

26) Companies which operate within the scope of a deposit system are obliged to forward these data directly to the competent authorities.

2 Packaging Waste Management System

2.1 Compliance scheme

27) According to the Law 11/1997, the "integrated systems" ("systemas integrados") must possess its own legal personality and be a non-profit-making organisation. It must be authorised by the competent bodies of the autonomous regions in which they are to be set up. The authorisation is valid for five years in each case. The autonomous regions must inform the Ministry of the Environment of the authorisations they have issued (art.7 and 8).

28) Systems which are established on the basis of such agreements must regularly pick up packaging from or in the proximity of consumers' premises. They must fulfil the defined targets in the respective region (Law 11/1997 art. 7). Packaging included in an integrated management system must be identified by a certifying symbol identical for the whole territory of the said system (art.7).

Ecoembes

29) In November 1996, packaging manufacturers, fillers, retailers and recycling firms converted "ASODECO", the organisation they initially founded, into the operating company "Ecoembalajes" España S.A. (ECOEMBES). The shares of this non-profit organisation are held by about 60 companies which can be broken down as follows:

Fillers	55%
Raw material manufacturers	20%
Distributors	20%
Waste management companies and Recycling firms	5%

30) The Green Dot ("El Punto Verde") is used as the trade mark. Licensees are fillers and importers who, in turn, have the right to mark their packaging with the Green Dot. The membership increased as follows (source: Ecoembes, annual reports):

1st half 1997	19
2nd half 1997	2.540
1st half 1998	6.998
2nd half 1998	8.294
April 1999	8.700
End 1999	10.300

31) Of these 10,300 companies already adhering to Ecoembes, “Feeding” is the sector with the highest representation, with 48% of the total. “Hygiene and Beauty” sector as well as “Drinks” follow with 8% each one. More than 22% of adhering companies are from Catalonia.

The relationship between Ecoembes and the adherent companies.

32) By the adhesion contract with Ecoembes, the adherent companies entrust Ecoembes with the responsibility for and management of the packaging waste and used packaging derived from the products they offer for sale in the entire territory in which Ecoembes is authorised to manage the said system.

33) Among the contractual obligations of the parties, there are particularly:

- For Ecoembes: the obligation to manage the IMS (Integrated Waste Management System) on the terms set forth in the Packaging Act and in the authorisation it has been granted, the authorisation given to its members to make a non exclusive use of the “Green Dot”, the issue of all documents necessary to demonstrate the member’s participation in the IMS, the confidentiality regarding all the information communicated by its members without prejudice to the information obligations towards local authorities.
- For the adherent companies: to pay regularly the subscription fee and the contribution to management costs of the IMS, the provision to Ecoembes of the periodic information required by applicable laws , the submission to such review and supervision function as Ecoembes may deem to perform, to make available to Ecoembes, upon request, a sample of each type of packaging which bears the “Green Dot”

The prevention plans

34) Spanish regulation allows integrated management systems to elaborate prevention plans. Thus, ECOEMBES also offers its members to participate in the sectoral prevention plans[57] it elaborates and presents to the competent environmental agencies. To this end, Ecoembes has elaborated forms to be completed by its members to communicate:

- the prevention initiatives already adopted or foreseen,
- the objectives of reduction of the quantity of packaging
- the measures applied or foreseen for the assessment of the completion of objectives.

[57] Twenty sectors were defined

35) Each sectoral prevention plan contains, at least, the following information:

- description of the sector of activity: main data, products and packaging characteristics.
- Achievement of the prevention rate for packaging waste: types of containers and prevention initiatives already adopted and foreseen.
- Limitations to the prevention: factors limiting the possible prevention actions.
- Prevention measures adopted and predicted by companies.

36) Ecoembes is responsible for the writing of those sectoral prevention plans and for the following and monitoring of the prevention plans although the execution and the final responsibility lies with the packers.

37) Ecoembes is also in charge of the writing of a monitoring report on the completion of the prevention measures and the achievement of foreseen objectives. The main objective of this report are:

- To register and to analyse the evolution of the indicators and the measures foreseen in the plan.
- To accredit before the competent regional authorities, the degree of fulfilment of the objectives predicted.
- To detect deviations and significant changes that can suppose a revision of the plan.

Ecovidrio

38) Glass selective collection is not a new activity in Spain since between 1982 and 1997, the Glass industry developed with local authorities the National Program of Recycling . During these 15 years, the glass industry collaborated with more than 4,000 Spanish cities and selectively collected glass packaging waste from more than 35 million citizens in Spain with more than 50,000 “igloos” (Ecovidrio – antecedentes).

39) The packers which mainly use glass packaging created, in 1995, their own nation-wide recovery systems in order to adapt recycling structures to the new European standards. Ecovidrio is a non-profitmaking organisation created for managing the selective collection of glass waste packaging.

40) However, this organisation has concluded an agreement with Ecoembalajes on the use of the Green Dot. According to this, glass packaging falling into the scope of activities of Ecovidrio can also be marked with the "Punto Verde". Ecovidrio was a joint initiative of the glass manufacturers, glass recycling companies, wine and spirit , soft drinks, beers and cider packers. The Ecovidrio associates represent approximately:

- 98% of the glass containers manufacturers
- 70% of the companies putting products in glass containers on the Spanish market
- 95% of the companies active in glass recycling

41) It is the only integrated management system specialised in glass, what, according to Ecovidrio, allows to reduce prices and to give a better service to all the large or small businesses. Ecovidrio works according to the same pattern as Ecoembes and organises the collection, transport, storage and recycling of glass packaging waste. It also carries out

directly the communication with the consumers, organises contractual relationships with its members and autonomous communities, finance R&D in the field of glass recycling

42) Its activities are financed through fees paid by packers (the tariffs are the same as for Ecoembes) and Ecovidrio guarantees the recycling of waste through its associates active in the processing of glass before its melting in the glass factories. At the end of 1998, Ecovidrio had 1.295 adhering companies.

43) By adhering to Ecovidrio, a company releases itself from the obligations of take-back and recovery laid down in the Law 11/1997. The fulfilment of the recycling and recovery is the responsibility of Ecovidrio. Among its activities, Ecovidrio:

- collects the fees corresponding to the number and the type of packaging units put on the Spanish market
- guarantees the selective collection and recycling of glass packaging waste
- establishes agreements with autonomous communities and the local authorities
- contributes financially to the implementation and the renewal of the municipal collection infrastructure for glass packaging
- finances and carries out information campaigns for the public authorities and the citizens
- invests in R&D projects for improving the recovery and recycling of waste
- carries out , for the Beers, Wine, Spirit and Cider sectors, the sectoral Prevention Plans and transmits them for approval on behalf of its members.

2.2 Interactions between operators and local authorities

Ecoembes

44) Regional Governments which have approved an urban waste plan must agree on a framework agreement with the entities entrusted with the management of the IMS. This agreement must include the general conditions to be applied to all the municipalities within the Region (Royal Decree 782/1998, art 9).

45) Once the regional governments have authorised the Ecoembes IWS, two types of agreements can be reached:

- Framework agreements with regional governments, which the local authorities in that territory can adopt
- Direct agreements with the local authorities for developing selective container and packaging collection systems specifically designed for them

46) Under these agreements, participating local authorities must undertake the selective collection of packaging waste and used packaging and transport this waste to separation and sorting centres or directly to recycling or recovery facilities. Once the material has been delivered to these points, the systems take responsibility for it. The funds received from the integrated management system must, as a minimum requirement, be used to cover additional costs borne by local bodies.

47) By virtue of the agreements it concludes with local authorities, Ecoembes covers the complementary cost of the selective collection. It also supports communication campaigns,

contribute in the design of selective collection systems and participates in the construction of sorting plants.

48) If a local authority cannot reach an agreement with a system, then the local authority itself is held responsible for achieving the recovery targets and must reach an agreement with their Autonomous Community on a procedure to achieve the fixed recycling and recovery targets within their territorial area (Law 11/1997 art. 9).

49) At the end of 1999, Ecoembes was authorised in 18 of the 19 autonomous communities in Spain. A territory which represents more than 97% of the total production of municipal waste in Spain. At this date, Ecoembes had reached 53 agreements with public administrations; 41 of which with local authorities and 12 with autonomous governments. These agreements allow to cover 21,500,000 people for collection from paper and cardboard and 11,600,000 with light packaging collection.

Ecovidrio

50) The collaboration between Ecovidrio and the Autonomous Communities or Local Authorities occurs in four phases:

- First Ecovidrio is authorised to operate collection activities in the distinct autonomous communities. Ecovidrio is already authorised to operate in almost the complete Spanish territory, i.e. 18 of 19 autonomous communities.
- Secondly, each Autonomous Community carries out its own plan of urban waste and defines objectives, necessary infrastructures, investments, strategy, etc…
- Once the Plan for Waste management is defined, Ecovidrio concludes a covenant framework with the Autonomous Community, in which the objectives are defined along with time limit of execution, financing, information campaigns, etc…
- Finally, the local authorities may adhere to these covenants framework.

2.3 Collection and sorting

51) The local authorities are responsible for collection of the household waste, as an "integrated system", Ecoembes is setting up a collection and recovery system for used non industrial packaging in co-operation with the local authorities.

52) The levy paid by packers and filers covering for each packed product put on the market are used to fund the difference in cost between the ordinary system of collection, treatment and disposal in landfill and the new packaging waste management system. Thus the integrated systems compensate participating local authorities for additional costs incurred.

53) Ecoembes suggests three different types of packaging waste selective collection. The first one is the voluntary collection with sorting via bring system. Big "Igloo" type containers are used. They are divided in three groups of different colours:

- Yellow: for plastic, cans and tetrabrick;
- Blue: for paper/cardboard
- Green: for glass.

54) These containers are situated in areas where they can easily be reached by collection vehicles. The containers are collected once a week or more if necessary. At the beginning of the year 2000, Ecoembes had installed in Spain around 35.500 containers for paper and

cardboard and 95.200 containers for the collection of light packaging waste (Noticias de Ecoembes febrero 00 – n°4)

55) The second collection system is the selective collection with kerbside containers. In this case, the containers are yellow and smaller than the first ones. They are situated close to the traditional "bin" type containers near the citizens' houses. These containers are for plastic, cans and tetrabrick packaging. They are collected several times a week. Glass and paper/cardboard are frequently put in these containers instead of in the "igloo" type containers. This makes recycling difficult or even impossible because of the contamination it produces (Source: Ecoembes).

56) Finally, there is an intermediate system situated between the two others. It is the selective collection system with closed cover containers. This type of container has a closing system which impedes the opening of the lid. Therefore, waste must be introduced through holes situated in the lid. The containers are yellow and situated, as the kerbside collection system, besides traditional containers. The are collected once or several times a week depending on the population density.

57) Ecovidrio has as objectives for 2001 to achieve a total recycling rate of 50% for glass (the current recycling rate reaches 40.7%) and facilitate the selective collection increasing of the number of bottle banks to one per 500/600 inhabitant (there was at the end of 1999 approximately 63,000 bottle banks in Spain that is a container per 624 inhabitants).

2.4 Treatment systems and outlet of recycling activity

58) In 1998, seven Framework Agreements were signed between Ecoembes and each of the following Material Associations:

ENTITY	MATERIAL	DATE of SIGNATURE
FEDEMCO	Wood	3 May 1998
ANEP	PET	7 May 1998
ECOACERO	Steel	7 May1998
TETRA PAK	Beverage Cartons	12 May 1998
RECIPAP	Paper/Cardboard	10 June 1998
CICLOPLAST	Plastics (but PET)	15 June 1998
ARPAL	Aluminium	27 July 1998

59) The Framework Agreements define the action framework between Ecoembes and the Materials Associations for the management of packaging waste, the quality control of the waste/material streams and the achieved recycling and recovery rates. They include the following points:

- collaboration between Ecoembes and the material associations for the call for tenders procedures and the conclusion of tenders with recycling or recovery companies
- definition of Technical Specifications for the sorted Materials (STMR)
- collaboration for searching solutions in the case of no-conformity of waste bales
- guaranteed take-back of materials in the case where no recyclers or recoverers could be designated by the habitual procedure

60) Ecembes has developed, along with the material associations, a database gathering companies active in the recovery and recycling of waste from various materials which wish to participate in the Integrated waste management system. This database gathered at the end of 1999, 780 references of companies corresponding to defined criteria. These are divided as follows:

MATERIAL	Number of agents
Paper/Cardboard	220
Plastics	150
Aluminium	125
Steel	300
Beverage Cartons	3
Wood	40
Others	8

61) Call for tenders are sent to all recycling companies in the database and Ecoembes send to companies interested all the necessary information. A “Tender Committee” (Comité de Adjudicaciones) was settled in place. This chooses the recycling company to which the waste originating from the sorting plant and corresponding with the defined technical specifications for recovered materials (STMR) will be attributed.

62) This Committee is composed of representatives of Ecoembes and representatives of the Association of Materials. For plastics, the Committee also comprises an external technical advisor. Offers received are evaluated by the “Tender Committee” which chooses the recycling company which will get the contract according to criteria such as:

- the licenses, registrations and permits owned by the company
- the geographical nearness to the sorting centre
- the technical means and facilities of the company
- the capacities of processing (and the environmental prescriptions)
- references of the service
- the guarantee offered to the complete recycling of the material processed
- the price

63) In each one of the agreements concluded with the local authorities responsible for the waste collection or with Autonomous communities is defined the economic agent to which the adjudication is entrusted.

2.5 Financing of the system

64) The Law 11/1997 provides that integrated management systems must be financed by the contribution of packers for each packed product placed on the domestic market for the first time. This sum must be identical throughout the entire territory of the integrated system. The payment of this contribution must confer the right to use on the packaging the certifying symbol of the integrated system (art. 10).

65) Each company wishing to participate in the ECOEMBES system must pay a membership fee based on its annual turnover. If this exceeds 1,000 million Pesetas (6 million €) (+ 7% VAT), the company has to pay 100,000 Pesetas. A membership fee of 50,000 Pesetas (300

€) has been set for all other companies. A weight-related fee is charged for all materials. It is paid quarterly in four equal amounts and is distributed as follows:

Table 1: Licence fee for the Green Dot

Material	(in Ptas/kg)
Steel	5.14
Aluminium	8.45
Plastic	19.56
PET	19.56
Beverage Cartons	13.88
Wood	3.02
Ceramic	1.52
Others	19.56
Paper and cardboard 0-100 g	4.68 x weight in kg
Paper and cardboard > 100 g	0.234 +(2.34 x weight in kg)

66) For Glass, the " Green Dot " fee is calculated according to the volume. Tariffs are the same for Ecovidrio. This fee is based on the following three categories:

< 125 cc	0.15 ptas
125-500 cc	0.20 ptas
> 500 cc	0.40 ptas

67) . The fee is used, among other things, to reimburse local authorities for the additional costs incurred for the selective collection of used packaging. The "integrated systems" also have to pay the cost of transporting used packaging collected on the Spanish islands (Canary lslands, Balearic lslands) to the mainland for recovery/recycling, if adequate recovery capacities are not available on the islands. The additional cost which must be borne by the Local Entities or the Regional Governments, is independent of the possible economic value of the packaging waste (Royal Decree 782/1998, art 10).

68) In view of increasing its membership and reduce the administrative burden for the smallest companies, Ecoembes has developed, in 1999, a simplified declaration and contribution system for small companies with an annual turnover smaller than 500 millions pesetas (3 million €) putting products on the market with less then 8 tonnes packaging a year. These companies may complete its annual declaration to Ecoembes with a simple form and they pay a fixed annual contribution ranging from 10,000 pesetas to 75,000 pesetas (60 to 451 €) according to the amount of packaging put on the market . Ecoembes estimates that approximately 4,000 enterprises will adopt this system (noticias de Ecoembes – neviembre 1999 – n°3).

69) Ecoembes also allows certain European companies which sell merchandise directly to retail establishments in Spain to join the IMS and make declarations on behalf of their clients. They must declare to Ecoembes all the packaging of the products they deliver to their

customers in Spain. In this manner, said customers meet their recovery and recycling obligations for these packaging.

Financial support to local authorities

Ecoembes

70) Integrated packaging waste and used packaging management systems must compensate local bodies for the difference in cost between the ordinary urban solid waste and refuse collection, transport and treatment system and the management system defined by the Packaging Law. This difference must include the costs for depreciation and the financial charge for the investment which it is necessary to make in rolling stock and infrastructures. The "integrated systems" also have to pay the cost of transporting used packaging collected on the Spanish islands (Canary lslands, Balearic lslands) to the mainland for recovery/recycling, if adequate recovery capacities are not available on the islands. In 1998, the total financial support of Ecoembes to local authorities for the collection, sorting and recycling of packaging waste approached 2,240 million pesetas (Ecoembes – annual report).

71) The tariffs for the reimbursement of selective collection schemes of packaging waste to local authorities are negotiated on a case by case approach. This has lead to some disagreements between local authorities and Ecoembes. The frame below gives an example of the tariffs applied in Catalonia.

The funds obtained via Ecoembes to finance packaging waste municipal management are shared by the Junta de Residuos according to the population density and the areas are distributed in rural, semi-urban and urban areas. The reimbursed costs, range as follows

Light Packaging

Urban areas	30.7 ptas (0.18 €) /kg
Semi-urban areas	33 ptas (0.2 €) /kg
Rural areas	44.4 ptas (0.27€) /kg

Collection and transportation of paper/cardboard packaging

Urban areas	7 ptas (0.04 €) /kg
Semi-urban areas	7.5 ptas (0.45 €) /kg
Rural areas	9.1 ptas (0.054 €) /kg

Kerbside collection of commercial cardboard packaging: 13.5 ptas (0.08 €) /kg

In the case of paper and cardboard, the value of the collected material will return to the local authorities.

Energy Recovery

The additional cost of this part is applied to the total amount of packaging which comes in the recovery plants from the collection of urban bins of the municipalities adhering to the Integrated Management System. A revision of these tariffs was foreseen before the end of 1999.

The revision had to be done by a Commission gathering la “Junta de Residuos”, Ecoembes, the “Asociacion Catalana de Municipios”, the “Federacion de Municipios de Cataluna” and the “Entidad Metropolitana

Ecovidrio

72) In 1998, the 1295 adherent companies have paid 728,723,544 pesetas (4,379,225 €) to Ecovidrio. Of these amounts, Ecovidrio has devoted 184,800,000 pesetas (1,110,546 €) for the development of its activities. The most important operating cost were:

- Collection and transport of glass waste : 71 millions pesetas (0.43 millions €)
- Bottle banks acquisition : 27.8 millions pesetas (0.17 millions €)
- Communication and information campaigns : 17.3 million pesetas (0.10 millions €)
- Prevention plans : 14.3 million pesetas (0.09 millions €)

73) That is the reason why Ecovidrio had, at the end of the year, a surplus of 545.990.396 pesetas (3,281,154.74 €). This surplus was intended for the compensation of previous years deficit (114,132,240 pesetas – 685,883.01 €) and to the reserve allocation for reinvestment during all the year 1999 (431,858,156 pesetas - 2,595,275.25 €). As non profit making association, Ecovidrio does not split dividends and destine its funds to the following years.

2.6 Monitoring and control

Control by the authorities

74) The Law 11/1997 provides that Autonomous Communities along with the General Government Administration are responsible for the control and monitoring on the participation of local bodies, consumers and users in the system. They also must monitor the achievement of targets and obligations of the integrated management systems (art. 11).

75) Regional Governments must provide the Directorate-General of Environmental Quality and Assessment of the Ministry of the Environment with the results of the annual report and the audit of accounts of the integrated waste management systems so that it may participate in supervision of the objectives and obligations of the integrated management systems (Royal Decree 782/1998).

76) Royal Decree 782/1998 lays down a notification systems for various actors which must provide Regional authorities with information necessary to verify the degree of compliance with the mandatory targets. This information must be sent directly or via the integrated waste management system, before the 31st day of March of the year following the annual period of which the data refers. The table below lists concerned actors and information they must provide:

Packers	-	Quantity of one way and re-usable packaging and packed products placed on the market
	-	Quantity of one-way and re-usable packaging and packed products imported or acquired abroad or exported to other Member-States
Traders	-	Quantity of one-way and re-usable packaging and packed products exported to other European Union Member-States
Economic operators	-	Quantity of packaging waste and used packaging recycled, recovered, reused or eliminated
Local authorities	-	Quantity of packaging waste and used packaging collected and delivered to the IMS as well as those eliminated
Final owner (of commercial and industrial packaging)	-	Final destination of packaging waste and used packaging

77) Administration receiving this information must build an appropriate database allowing the determination of the magnitude, characteristics and evolution of the flows of packaging and packaging waste within their geographical scope and send this to the Directorate-General of Environmental Quality and Assessment before the 31st day of may of each year (Royal Decree 782/1998, art. 15).

78) The Ministry of the Environment must each year prepare and publish a report containing the relevant information in relation to the environmental achievements of the management of packaging waste and used packaging (Royal Decree 782/1998, art 16).

Marking of packaging

79) Packaging participating in an integrated system must be marked with a symbol approved by the Ministry of the Environment to ensure that it can be distinguished from products which are taken back or collected by the manufacturers and distributors themselves.

Control by the private sector

80) In its contracts with the packers, Ecoembes foresees the possibility to perform audits on books, auxiliary accounting records, documents or computer files which may allow to determine the total quantity of packaging and packed products placed on the market. These documents must be kept by the subscribing company during four years. Fines and penalties are foreseen in case of underestimates of the quantities of packaging to declare (Standard form agreement, art. 11)

81) During 1999, Ecoembes and Ecovidrio carried out a survey in combination with AC Nielsen in more than 500 points of sale throughout Spain, to assess the implementation level of the Green Dot and to detect frauds. This survey showed that 85% of products present on the Spanish market displayed the Green Dot and so were adhering to the integrated system of management of Ecoembes.

82) Ecoembes has since then, realised other surveys and is currently especially focusing its controls on the companies which use the “Green Dot” without being a member of Ecoembes. 25 companies were identified as being in this situation and Ecoembes intends to undertake

legal actions. According to the Spanish regulation, these companies could be subject to fines ranging between 10 and 100 million pesetas.

Remark: Multilateral Commission on Packaging and Packaging Waste

83) The Law 11/1997 provides for the creation of the Multilateral Commission on Packaging and Packaging Waste (fifth additional provision). This is a collective body which has consultative and advisory functions. Its purpose is notably, to examine the possibilities of reducing packaging of major consumption, and to study the possibility of applying to the European Commission an upward revision of the recycling and recovery targets.

84) The Multilateral Commission on Packaging and Packaging Waste is composed of (Royal Decree 782/1998, art 21):

- a representative of each one of the Environment, Industry and Energy, Agriculture, Fisheries and Foodstuffs, Health and Consumer Affairs, Economy and Revenue departments
- six representatives of the Association of municipalities of greatest significance nation-wide
- two representatives of consumers and users
- one representative of the industrial and employers organisation of greatest significance nation-wide.
- one representative of the Council of Chambers of Commerce, Industry and Navigation of Spain
- one representative of each one of the integrated management systems
- up to four technical and scientific experts
- a representative of each Regional Government .

2.7 Quantities of circulated packaging and recovered packaging waste

85) In 1997, the quantities of packaging put on the Spanish market were estimated to approximately 5.8 million tonnes. The amount placed on the market and the recycling and recovery results ranged as follows:

Table 2: Packaging consumption and packaging waste recovery in 1997

Material	Placed on the market		Recycled		Energy recovery		Total Recovery	
	[tonnes]	[%]	[tonnes]	[%]	[tonnes]	[%]	[tonnes]	[%]
Glass	1,398,102	23.8	521,492	37.3%	0	0.0%	521,492	37.3%
Plastics	1,215,000	20.7	64,950	5.7%	60,300	5.3%	125,250	11.0%
Paper, cardboard, beverage cartons	2,255,000	38.4	1,242,400	55.1%	25,250	1.1%	1,267,650	56.2%
Metals	340,000	5.8	76,365	22.5%	4,300	1.3%	80,665	23.7%
Others (wood, ceramics,…)	670,714	11.4	60,364	9.0%	1,300	0.2%	61,664	9.2%
Total	5,878,816	100	1,965,571	33.9%	91,150	1.6%	2,056,721	35.5%

Source: notification to the European Commission according to the article 12 of the Directive 94/62/CE

86) The previous table considers only the packaging waste generated and recycled in Spain. Besides these figures, specific amounts of packaging waste were sent and recycled abroad (see section 2.13).

87) In 1998, the quantities of packaging declared to and recovered by Ecoembes ranged as follows:

Table 3: Quantities of packaging declared to and recovered by Ecoembes (in 1998)

	Declared to Ecoembes [tonnes]	Recycled [tonnes]	Recycled [%]	Recovered [tonnes]	Recovered [%]
Plastics and metals	469,205	8,403	1.8%		
Paper, cardboard, beverage cartons	412,836	36,749	8.9%		
Total	882,041	45,152	5.1%	130,456	14.8%

Source: Ecoembes: annual report

2.8 The recycling and recovery capacities in Spain

Glass

88) Glass recycling evolved in Spain as follows:

Year	Recycled glass
1990	304,000 tonnes
1991	310,000 tonnes
1992	312,000 tonnes
1993	328,000 tonnes
1994	371,000 tonnes
1995	402,000 tonnes
1996	456,000 tonnes
1997	521,500 tonnes
1998	567,171 tonnes

89) According to the annual report of Ecovidrio for 1998, 567,000 tonnes of glass waste were collected in Spain that is a recycling rate of 41%. No data on recycling capacities have been found but recycling capacities for glass in Spain seem to be widely sufficient to absorb substantial increasing in the quantities of glass collection (source: A.NA.RE.VI. Asociación Nacional Recuperadores de Vidrio, Lucrecia Marín - Secretaria General, oral communication).

Paper-cardboard

90) According to figures from ASPAPEL, the Ministry of Environment estimated in the National Plan for Urban Waste, that in 1996, 2,125,000 tonnes out of the 5,170,000 tonnes of paper and cardboard waste were recycled in Spain (recycling rate = 41%). According that, at this date, Spain had the consumed 2,774,000 tonnes of waste paper, this means that Spain had to import 700,000 tonnes to equilibrate its balance.(Resolucion de 13 de enero de 2000…. Por el que se aprueba el Plan Nacional de Residuos Urbanos). Spain occupies the

fourth place in the world for the use of recycled paper with a 76.4 percent rate according to the last report of the Department of Environment (EUROPE PRESS - 08/17/14-31/99 http://www.bornet.es).

Plastics

91) Of the total consumption of plastics in Spain, around 36% is used in the market of containers and packaging, which supposes approximately 1 million of plastic tonnes (Cicloplast – http://www.app.es/emitec/PC/pu/47b/r47bs60004.html).

92) According to Cicloplast, in 1998, Spain recycled 66,700 tonnes of packaging waste out of the 1,028,000 tonnes plastic packaging put on the market in Spain (recycling rate: 6.5%). Besides 39,000 tonnes were recovered (recovery rate: 10.28%). 66% of the plastic recycled had an industrial origin, 18% from the agriculture sector, 7% from households, 7% from commerce and trades and 2% from the automotive sector. Plastic recycling concerned mainly PEHD and PELD, followed by PVC (Resolucion de 13 de enero de 2000…. Por el que se aprueba el Plan Nacional de Residuos Urbanos).

93) According to figures from ANARPLA, Catalunya concentrates more than 48 percent of plastic recoverers in Spain that is 44 out of the 108 existing companies in all the country. Catalan companies have an estimated annual recycling capacity of 120,000 tonnes out of 250,000 tonnes in all Spain. According to Glad Josep, of the National Association of Plastic Recyclers (ANARPLA), this demonstrates that the recycled plastic production still can increase. The major part of the recycled plastics in Catalonia are of industrial and commercial origin (around 70%), around 10% come from the agricultural sector and 8% from a domestic origin. The implementation of selective collection systems throughout Spain in the coming years, should increase the recycling rate for plastic waste from commercial and domestic origin (EUROPE PRESS CATALUNYA - 08/22/17-14/99 http://www.bornet.es).

Metals

Steel

94) The recycling infrastructures are, in the case of steel, the steelworks plants. Sorting of ferrous metal packaging is realised through magnetic separation in the different types of existing sorting, incineration or composting plants. In 1998, 74,000 tonnes of steel packaging were recovered in Spain (recycling rate of approximately 25 %). The recycled quantities reached nearly 80,000 tonnes in 1999. The increasing of selective collection schemes throughout Spain should allow approaching 100,000 tonnes for the year 2000 (Ecoacero – personal communication).

95) In 1997, about 11.6 million tonnes of ferrous scraps were used in Spain of which more than the half was imported. This gives an indication of the recycling capacities in Spain.

Aluminium

96) The consumption of cans in Spain amounted to 3,200 millions units in 1996. 1,440,000 millions units were made of aluminium (45%). 17% of these were recycled in 1996 and 19% in 1997. This corresponds approximately to 29,000 tonnes of aluminium for 1997 (Resolucion de 13 de enero de 2000…. por el que se aprueba el Plan Nacional de Residuos Urbanos). These figures may be compared with figures of the Aluminium production in Spain from the OEA which range as follows:

Table 4: Aluminium production in Spain in 1998 [in tonnes]

	tonnes
Secondary production	210,000
Foundry production	107,600
Total	317,600

2.9 Import/Export of Packaging Waste

97) The packaging waste produced in Spain and recovered abroad, and the packaging produced abroad and recovered in Spain are depicted in the following table (Source: notification to the European Commission according to the article 12 of the Directive 94/62/CE):

Table 5: Imports and exports of packaging waste for recovery

	Export		Import	
Material	Recycled	Recovered	Recycled	Recovered
Plastics	11,000	11,000	12,000	12,000
Paper and cardboard, beverage cartons	20,000	20,000	420,000	420,000
Metals	350	350		
Total	31,350	31,350	432,000	432,000

Source: notification to the European Commission according to the article 12 of the Directive 94/62/CE

3 Future development

98) The Spanish National Plan for Municipal waste for the period 2000-2006 was approved at the beginning of this year. It foresees investments up to 552,000 million pesetas (3,317.5 millions €), and has among its objectives the close down of uncontrolled landfills and small incineration plants before the year 2005, the creation of transfer stations and the adaptation of existing installations to the Directive on landfills. It also intends to equip current incineration plants with energy recovery systems and the installation of four new ones.

99) Referring to packaging, the Plan contemplates a 10 percent reduction of the weight of packaging put on the market by June 30 2001, as well as the implementation of selective collection systems in all the municipalities with more than 5,000 inhabitants before the 1st of January 2001 and in those with more than 1,000 inhabitants before January of the year 2006.

100) Besides, this Plan also defines the following targets for re-use of packaging in 2004[58]:

	Average percentage	In HORECA
Mineral water	25	50
Soft drinks	35	80
Beers (in volume)	70	80
Wine (table wine)	15	50

101) The Plan also has for objective to reduce by the year 2000 by 6 percent the 17 million tonnes of municipal waste produced each year despite the strong increased experienced during the previous years. It also intends to achieve the following recycling rates for various materials:

Material	Target for 2001	Target for 2006
Glass	50%	75%
Paper-cardboard	60%	75%
Plastics packaging	25%	40%
PVC packaging	50%	80%
Steel packaging	50%	90%
Aluminium packaging	25%	90%
Wood packaging	25% (2002)	50%
Minimum Average Recycling	25%	50%
Minimum Average Recovery	50%	70%
Minimum recycling rate per material	15%	20%

(Source: Resolucion de 13 de enero de 2000. Por el que se aprueba el Plan Nacional de Residuos Urbanos).

To these ends, Spain has foreseen the following financial supports:

	Financial support (in millions pesetas and millions €)
Prevention and minimisation	25,302 ptas 152.06 €
National programme for packaging and packaging waste	76,543 ptas 459.78 €
Energy Recovery	90,433 ptas 543.5 €
Sensitisation and information	12,000 ptas 72.12 €

(Source: Resolucion de 13 de enero de 2000. Por el que se aprueba el Plan Nacional de Residuos Urbanos).

[58] These targets will be revised in 2002 according to the results achieved.

102) Besides, Autonomous Communities as Catalonia for instance intends to develop following actions:

- to continue to realise communication campaigns with the financing of the Integrated waste management systems
- actualise framework agreements with Ecoembes according to the compilation of relative data about costs of collection, transport and sorting of packaging waste
- optimise the collection, sorting and recycling schemes in collaboration with the local authorities and the Integrated waste management systems

103) Besides, the revision of Packaging Regulation will orient the system towards increased reduction and valorisation targets. Some initiatives as the Catalan Centre for Recycling are in charge of finding new outlets for secondary raw materials and recycled products (Generalitat de Catalunya – Junta de Residus – personal communication)

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Contents

1 Legislation and Voluntary Agreements 1
1.1 Responsibilities of operators 1
1.2 Targets and Instruments 2
1.3 Further Provisions 2
2 Packaging Waste Management System 3
2.1 Compliance scheme 3
2.2 Collection and sorting 4
2.3 Treatment systems and outlet of recycling activity 4
2.4 Financing of the system 7
2.5 Monitoring and control 8
3 Current situation 8
4 References 8

List of tables

Table 1: Recycling and recovery targets to be achieved by 30th June 2001 2
Table 2: Material specific fees of REPA 7
Table 3: Deposit fees for beverage containers 7
Table 4: Packaging fees for glass 8
Table 5: Packaging consumption and packaging waste recovery in 1997 9

1 Legislation and Voluntary Agreements

Legislation

- Decree (1999:1218) of taxes on waste
- Law (1999:673) of taxes on waste
- Ordinance (1997:186) on the handling of chemical products (contains rules on maximum permitted concentrations of certain heavy metals in packaging)
- Ordinance (1997:185) on producer responsibility for packaging
- Directive 94/62/EG
- Environmental law (1998:808) and Implementation of Environmental Law (1998:811)
- Law (1991:338) on certain Beverage containers
- Ordinance (1991:336) on certain Beverage containers
- Ordinance (1983:847) concerning import duties on Aluminium cans
- Decree (1985:839) regarding cadmium
- Act (1982:349) on Recycling of Aluminium Beverage Containers
- Kretsloppspropositionen, Closed loop law, adopted in July 1993

Voluntary agreements:

- Voluntary agreement on phase out of the use of PVC in packaging, in force since July 1990

1.1 Responsibilities of operators

1) Municipalities must prepare waste plans which also include packaging waste mainly with the purpose to decrease waste amounts and hazardous wastes. The municipal waste plan shall contain a separate chapter concerning packaging waste.

2) According to *Ordinance (1997:185) on producer responsibility* packaging shall be designed, produced and sold in such a way that packaging can be reused or recycled in such a way that limits the impact on the environment when packaging waste or the “residual products” from the treatment of the packaging waste is disposed of. Furthermore packaging must be produced in a way that minimises the outlet of dangerous compounds when packaging waste or the “residual products” are incinerated or landfilled.

3) A producer shall in coordination with the municipality establish collection systems for packaging waste from households and others. The producer shall also inform households and others of sorting, collection and disposal of packaging waste. Households and other consumers shall sort packaging wastes from household waste and other wastes and deliver the waste to the collection systems established by the producers of packaging.

4) Producers shall reuse or recycle the collected packaging waste or secure treatment that is acceptable in relation to the environment. General demands are listed in *Ordinance (1997:185)* that producers must fulfil for packaging in order to produce reusable or recyclable packaging.

5) For example, maximum limits are given in *Ordinance (1997:186) on the handling of chemical products* for the content of heavy metals in the packaging materials and it is stated that hazardous compounds in the materials must be minimised. This complies with article 11 in the EU packaging directive.

6) Regarding aluminium beverage containers according to Act (1982:349) it is intended to promote recycling through a deposit system for such cans. Therefore, when cans are imported a deposit system must be established.

7) According to act (1991:336) a PET bottle sold as a beverage container shall be included in a return system for reuse or recycling.

1.2 Targets and Instruments

8) The targets for reuse and recycling of packaging are given in *Decree (1997:185)* as in the following table:

Table 1: Recycling and recovery targets to be achieved by 30th June 2001

Type of packaging	Quantity to be recoverd (percentage by weight)
Aluminium packaging other than drinks containers	70 % recycling
Packaging of cardboard, paper and paperboard	70 % recovery, but not less than 40 % recycling
Packaging of corrugated cardboard	65 % recycling
Packaging of plastic other than PET bottles for ready-made drinks	70 % recovery, but not less than 30 % recycling
Packaging of sheet steel	70 % recycling
Glass containers	70 % recycling
Aluminium drinks containers	90 % recycling
PET drinks bottles	90 % recycling
Wooden containers	70 % recovery, but not less than 15 % recycling
Packaging of other materials	30 % recovery per material, but not less than 15 % recycling per material

1.3 Further Provisions

Economic instruments

9) When aluminium cans are imported to Sweden, a duty shall be paid according to Ordinance (1983:847). Any person who has become a member of the deposit system for aluminium cans shall be exempted from paying can duty.

10) National waste tax of 250 SEK per tonne of waste shall be paid when waste is landfilled according to Law (1999:673). This tax includes all waste excl. special types of construction waste such as soil, gravel, stone and radioactive waste.

11) Landfilling of sorted combustible waste is prohibited as per 1 January 2002 according to waste law (1998:902). Furthermore, landfilling of organic waste is prohibited as per 1 January 2005 by law (1998:902).

12) The existing reuse-systems for refillable glass, PET-bottles and aluminium cans show high collection rates and are evaluated as an effective way to collect materials

13) Increasing the sorting of household waste at the source is expected to decrease the collection costs for the municipalities and maybe also for the consumers and households that carry out the sorting at the source. Some municipalities have introduced different kinds of taxes in order to stimulate the consumers to increase sorting at the source and thereby to increase the recycling.

Information

14) The producers have to inform about the collection systems, but also the role of the municipalities is important because the municipalities must inform the households of the source separation. Therefore the information activities of the municipalities and producers are often coordinated. Information on the most environmental sustainable packaging is carried out by labelling. Examples of such labels are the Nordic Swan label and the Swedish Nature Protection Unions (Naturskyddsförening) label of “Good Environmental Choice” (Bra miljöval). Furthermore packaging must be labelled with information on the type of material that has been used for the product.

2 Packaging Waste Management System

2.1 Compliance scheme

15) In order to fulfil the producer responsibility of packaging, the producers are working together and have established material-companies that administer the collection and recycling. The material-companies are owned by enterprises and trade organisations and they are operated with no interest in creating profits according to their corporate statutes.

16) The collection of packaging in every municipality is carried out by municipal or private operators/contractors that have a contract with the material-companies. In all municipalities there is a responsible contractor for every type of packaging material. In some municipalities it is the same contractor that handles all or several types of material. The contractors are among other things responsible for the siting, collection/emptying, cleaning and snow clearing of the recycling stations.

17) In order to inform and coordinate collection and recycling the material-companies have established a subsidiary company Svenska Förpackningsinsamlingen AB. The organisation of the producers is shown in the below figure. According to the website www.forpackningsinsamlingen.se and newsletter no.1 March 2000 approx. 10,500 companies are members of REPA, which equals approx. 90% of all packaging in Sweden.

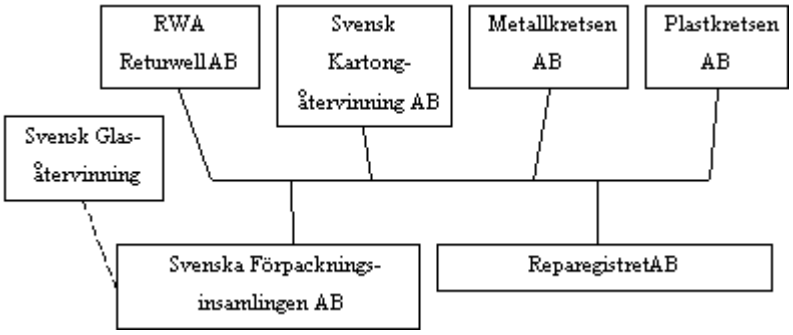

Figure 1: Organisation of packaging producers (*www.riksdagen.se/debatt/9900/forslag/RR4*)

18) The activities of the material-companies are financed by packaging taxes. The taxes are calculated by the weight of the packaging waste and the taxes are collected from companies that fill packaging, import filled packaging or producers of service packaging ("bärkassar", cardboard for pizza, wrap paper etc.) (*www.riksdagen.se/debatt/9900/forslag/RR4*).

19) The taxes are paid to Reparegistret AB (REPA). REPA is a subsidiary company to four material-companies and the name is short for "Register for Producentansvar" (Register for producer responsibility). REPA takes care of registration and administration of taxes and is operated with no interests of financial surplus. Packaging taxes of glass are not administered by REPA, but by Svensk Glasåtervinning (Swedish Glass recycling). A producer that pays taxes to REPA is hereby fulfilling the producer responsibility. The companies that are not connected to REPA must themselves organise a collection system for recycling of packaging and report the results to Naturvårdverket (The Swedish EPA).

2.2 Collection and sorting

20) Producers shall in coordination with municipalities establish usable collection systems for the packaging waste. The producers have chosen to carry out collection by a bring-system with recycling stations where households must deliver the waste. The responsibility includes that these stations are operated with easy admittance for the users. Producers have together with their material-companies decided the objective that a recycling station shall be established for every 1,000-1,300 inhabitants. This objective is based on experience with the system for collection of glass that was established before the producer responsibility was introduced. Investigations show that collection of packaging waste from companies takes place at the large recycling stations in the municipalities and that no extensions of the stations specifically for the companies have been carried out.

21) Collected packaging material is transported to transfer stations where further sorting is carried out and then the sorted material is transported to the recycling industry that recycles the material for new packaging.

2.3 Treatment systems and outlet of recycling activity

Glass

22) According to /SEPA report of 1998/ 76% of glass packaging was collected and recovered in 1997. Data of glass packaging treatment in 1997 is:

- Material recovery: 67%
- Unsorted material: 9%
- Not collected: 24%

23) The quantity of glass packaging, excluding the deposit refund system for drinking bottles, supplied to the Swedish market in 1997 was 177,200 tonnes according to the company Swedish Glass Recycling (Svensk Glasåtervinning). In 1992 the recovery level of glass packaging was 55%. Swedish Glass Recycling recorded the collection of 134,200 tonnes in 1997 and it is reported that amongst the glass sorted, 12% was removed (approx. 16,000 tonnes), because it consisted of other material such as chinaware or ceramics.

24) The recycling rate for glass has increased constantly for several years and the increase has continued since the introduction of the producer responsibility in 1994. Therefore the Swedish EPA (Naturvårdsverket) has not been able to conclude if the 15% increase in

recycling rate since 1994 is due to the introduction of the producer responsibility or if the increase would have occurred anyhow according to Riksdagens Revisorer RR:4.

25) From the recycling stations the collected glass is transported to the company Swedish Glass Recycling (Svensk Glasåtervinning) that carries out treatment of the glass including removal of other materials and crushing. Swedish Glass Recycling budget/prognosis for 2000 for sale of the glass material is:

- Glassworks in Scandinavia: 42%
- Export outside Scandinavia: 33%
- Glass wool producers: 23%
- Microfiller (additive to concrete): 2%

26) According to Swedish Glass Recycling, today Scandinavian glassworks use 30% of recycled glass in their production of clear glass, 50% in brown glass and 90% in green glass. According to the website www.glasbanken.com 143,100 tonnes of glass was collected in 1998 and 84% was recycled. In 1998 wine and spirit bottles were no longer returnable. Swedish Glass Recycling would not inform of sales prices of glass materials.

Corrugated board

27) According to the website www.forpackningsinsamlingen.se and newsletter no.1 2000 (see also www.returwell.se), the latest preliminary recycling results for 1999 show that the consumption of corrugated board was 386,000 tonnes. The collected amount for recycling was 325,000 tonnes in 1999 and therefore the recycling rate was 84%. Corrugated board is mainly collected from trade and industry (approx. 77%) and 7% from households.

28) The main type of collection system for corrugated board is collection mainly from business sources (not bring system) and then it is transported to paper mills (7 mills are mentioned). There the material is used for production of raw material for new production of corrugated board. In 1999 approx. 297,000 tonnes of collected corrugated board was used for this production and approx. 28,000 tonnes of corrugated board collected from households was recycled at 4 paper works together with paper packaging for the production of cardboard.

Paper and cardboard

29) According to the website *www.forpackningsinsamlingen.se and newsletter no.1 March* 2000 preliminary figures show that in 1999 approx. 66,900 tonnes were recycled of a total consumption of approx. 170,900 tonnes which results in a recycling rate of 39%.

Plastics

30) In the SEPA report of 1998 plastic is divided into 3 types: plastic packaging, EPS packaging and drinks packaging.

Plastic packaging:

31) According to SEPA report of 1998 the total amount of plastic packaging supplied to the Swedish market is estimated by Plastkretsen AB (the plastic material company) to be approx. 150,000 tonnes in 1997. The quantity collected is reported by Plastkretsen to be 29,000 tonnes for 1997. Of this amount 17,200 tonnes have gone for material recovery. In addition to this, other companies than Plastkretsen exported 3,000 tonnes directly for material recovery. This provides a total material recovery of 20,200 tonnes for 1997 and the level is consequently at 13% excl. returnable packaging. Plastkretsen reports that material recovery is

increasing and therefore it is estimated that the level of material recovery will be approx. 18% at the turn of the year 1997/98.

32) The amount of returnable packaging in 1996 was 40,700 tonnes and it is estimated that it is reused approx. 8 times per year. The quantity of returnable packaging supplied on the Swedish market annually can therefore be estimated to approx. 325,000 tonnes. Other material collected, approx. 11,800 tonnes in 1997 has been sent to energy production by waste incineration together with other household waste. This is done mainly in municipalities where household waste is sent for incineration and where the separate collection of soft plastics has not yet been implemented.

33) According to the website www.forpackningsinsamlingen.se and newsletter no.1 2000, the latest preliminary recycling results for 1999 show that 48,000 tonnes of plastic packaging were collected and 24,400 tonnes have been recycled (51%). In 1997 29,000 tonnes were collected and hereof 20,200 tonnes were handled by material recovery (recycling) which equals 70%. The main thing is that it shows that recycling has increased from 20,200 tonnes in 1997 to 24,400 tonnes in 1998.

EPS packaging:

34) Packaging made from expanded polystyrene (EPS) is collected by Svensk EPS Återvinning AB (Swedish EPS recycling). The available quantity is estimated to 1,500 tonnes and the collected amount in 1997 was 367 tonnes which gives the recovery rate of approx. 20%. It is estimated that a recovery level of approx. 35% can be reached.

Beverage packaging:

35) Non-returnable PET bottles for drinks packaging have a deposit refund system (1 or 2 Swedish kronor deposit) which is administered by AB Svenska Returpack-PET. The quantity sold is 5,470 tonnes and the recovered quantity is 4,220 tonnes in 1997. Therefore the recovery level for 1997 is 77% for PET bottles.

36) For returnable PET bottles a deposit of 4 SEK has to be paid. In 1997 15,600 tonnes of reusable PET bottles have been sold of which 15,290 tonnes (98 %) have been reused.

Facilities for treatment of plastic packaging

37) According to Plastkretsen, Maria Schyllander, there are 4 facilities for sorting of plastic packaging and 3 facilities for granulation in Sweden. In Sweden the demand for plastic material is larger than the amounts for sale. Approx. 10% of the collected plastic material is exported to Norway, Denmark, Germany, The Netherlands, Latvia and Lithuania.

Steel

38) According to the website www.forpackningsinsamlingen.se and newsletter no.1 March 2000 the amount of steel for recycling was 30,790 tonnes in 1998 which equals a recycling rate of 71%. The steel collection system has been changed during 1999 and the collection from industries has been increased. It is estimated the collection during 1999 increased approx. 20% and statistics of 1999 is not yet finished. After collection the steel is transported to two metal works where it is melted to new steel for production of steel bars and other parts for the construction and “fordons” industry. Some of the steel is exported to Germany where it is manufactured to raw material for new packaging.

Aluminium

39) According to the website www.forpackningsinsamlingen.se and newsletter no.1 March 2000 the recycling rate in 1998 for aluminium was 27% (3.050 tonnes), excluding beverage packaging which are taken care of within the deposit system. After collection aluminium is transported to the aluminium melting work in Älmhult where it is melted and used for "gjutaluminium" in cars and as raw material for new packaging. Regarding aluminium drinks packaging, sales of deposit aluminium cans on the Swedish market were 15,500 tonnes in 1997 according to AB Svenska Returpack /SEPA-report/. 14,047 tonnes were returned and sent for material recovery for the production of new cans, which equals a recovery level of 91%. In the years 1992-1997 the recovery level was between 86-92%. The deposit for aluminium cans amounts to 0.5 SEK and is administered by AB Svenska Returpack.

Landfilling of packaging from households

40) In 1994 approx. 39% of the household waste was landfilled (approx. 1,250,000 tonnes). It is evaluated that approx. 25% of the household waste is packaging.

2.4 Financing of the system

41) The collection of packaging is financed by fees that are administrated by REPA as described in the following. The companies that want to be a member of REPA must pay a registration fee of 2,000 SEK if the annual turnover is above 5 million SEK and 400 SEK if the annual turnover is below 5 million SEK according to www.repa.se. Furthermore the companies that are members of REPA pay the following packaging fees.

Table 2: Material specific fees of REPA

Material	Fee per March 2000 (www.repa.se)
Plastic	1.50 SEK/kg
Paper and cardboard	0.40 SEK/kg
Metal	1.00 SEK/kg
Corrugated cardboard	0.20 SEK/kg

42) Companies with an annual turnover below 3 million SEK can instead of packaging fees pay the following unit fee (this is not the case for companies that produce or import service packaging). The annual total of packaging fees is estimated to be approx. 500 million SEK.

- Annual turnover below 0.5 million SEK: free of charge
- Annual turnover between 0.5-3 million SEK: unit fee = 1,500 SEK/year

43) The following deposit fees for beverage containers have been in place since March 1973 according to the report "Packaging Waste Legislation in EU Member States and Neighbouring Countries", ERRA, AIM, CIAA, July 1999:

Table 3: Deposit fees for beverage containers

Container	Fee
Beer and carbonated soft drinks in 0.33 litres glass bottles	0.60 SEK
Crates for 20 glass bottles	23.00 SEK
Beer and soft drinks in aluminium cans	0.50 SEK

PET bottles for reuse	4.00 SEK
PET bottles for recycling	1.00 - 2.00 SEK

44) Packaging fees for glass are not administered by REPA, but by Svensk Glasåtervinning (Swedish Glass recycling) and the fees are according to www.glasbanken.com:

Table 4: Packaging fees for glass

Volume of glass container	Fee per March 2000
< 250 ml	0.06 SEK
251-500 ml	0.11 SEK
501-699 ml	0.14 SEK
> 699 ml	0.23 SEK

2.5 Monitoring and control

45) The Swedish EPA has authority to make instructions on how control and monitoring shall be carried out. The municipalities are responsible for the operative control. According to law no. 1998:900 the authorities shall per 30 June 1999 prepare an evaluation of the need for monitoring within the area of the authority in question. The authorities shall then every year prepare a plan for how the monitoring and control is carried out. According to *www.riksdagen.se/debatt/9900/forslag/RR4* it is not certain what is included in the monitoring and control responsibility of the municipalities.

46) A producer must inform the following to SEPA (Decree: 185/1997):

- The result of the waste collection, the reuse, recycling and recovery and other types of information that are relevant in connection with the treatment of the separated packaging.
- Information of production, import to Sweden, sales, and other conditions that SEPA needs in order to
  - Control the level of the reuse, recycling and recovery
  - Report to the EU Commission.

47) In general the flow of information is from a company/producer to REPA and then from REPA and treatment facilities to the material companies and finally from the material companies to SEPA.

3 Current situation

Total packaging consumption and packaging waste recovery

48) The quantity of packaging placed on the market and recovered in Sweden in 1997 as reported to the European Commission according to article 12 of the Directive are shown in Table 5. Total packaging consumption in 1997 amounted to 923 ktonnes which corresponds to 104.4 kg per inhabitant and year. According to the reported data Sweden achieved a recovery rate of 65.1%, mainly by recycling (57.9%). The highest recycling rate was achieved for glass with 75.6%, the lowest for plastic packaging (14 %).

Table 5: Packaging consumption and packaging waste recovery in 1997

Material	Quantity put on the market kt	recycling kt	energy recovery kt	total recovery kt	recycling %	energy recovery %	total recovery %
Glass	177,400	134,200		134,200	75.6%		75.6%
Plastic	150,000	21,000	22,100	43,100	14.0%	14.7%	28.7%
Paper, cardboard and corrugated board	526,000	348,000	44,000	392,000	66.2%	8.4%	74.5%
Metals	70,000	31,800		31,800	45.4%		45.4%
Total	923,400	535,000	66,100	601,100	57.9%	7.2%	65.1%

Source: Notification to the Commission acc. to Art. 12 of the Packaging Directive

49) According to the Swedish EPA reports "Have producers reached the target?", from June 1998 and May 2000 the recycling rate for glass was continuously increased since 1991 and has reached 84% in 1999.

50) With regard to plastic packaging the organisation Plastkretsen have established a collection system with 33 reception facilities for sorted plastic packaging from the industry until May 2000. New rules include an increase of the recovery target from 30% to 70%, which include a material recovery target of min. 30%.

4 References

Swedish EPA, Have producers reached the target?, June 1998

Swedish EPA, Have producers reached the target?, May 2000

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www.glasbanken.com

ERRA, AIM, CIAA: Packaging Waste Legislation in EU Member States and Neighbouring Countries, July 1999

www.repa.se

www.forpackningsinsamlingen.se

www.returwell.se

The Netherlands

Contents

1 Legislation and Voluntary Agreements 1
1.1 Objectives, Definitions and Field of Application 4
1.2 Responsibilities of economic operators 5
1.3 Targets and Instruments 6
1.4 Further Provisions 7
2 Packaging Waste Management's System 8
2.1 Compliance scheme 8
2.2 Interactions between SVM-PACT and adhering companies 9
2.3 Interactions between operators and local authorities 10
2.4 Collection and sorting 11
2.5 Treatment systems and outlet of recycling activity 12
2.6 Financing of the system 12
2.7 Monitoring and control 14
2.8 Quantities of circulated packaging and recovered packaging waste 16
2.9 Import/Export of Packaging Waste 19
2.10 The recycling and recovery capacities in the Netherlands 19
3 Future developments 21
3.1 Covenants objectives for prevention and recycling obligations 21
4 References 23

List of tables

Table 1: Target recycling percentages specified by the Packaging Covenant II 7
Table 2: Individual companies fee for 2000 12
Table 3: Estimated costs per year for packaging industry 14
Table 4: Amount of packaging waste recycled and recycling rate in 1997 17
Table 5: Prevention percentages (as compared to 1986) 18
Table 6: Recycling percentages since 1993 and recycling obligations for 2001 19
Table 7: Recycling rates achieved in 1995 and targets for 2001 19
Table 8: Additional quantity of packaging to be materially recycled in 2001 compared to 1996 20

1 Legislation and Voluntary Agreements

1) Legislation and voluntary agreements related to Packaging and Packaging waste in The Netherlands are:

- the Waste Act: Chapter 10 of the Environmental Management Act of 1st March 1993, which came into effect on 1st January 1994
- Packaging and Packaging Waste Decree which came into force on 1 August 1997
- Packaging Covenant II of 15 December 1997 which replaces the Packaging Covenant I. It came into force on 26 December 1997.

General context

2) Policy on packaging in the Netherlands dates from 1979 when its Parliament adopted the « Lansink motion » which established the hierarchy for the methods of waste management with in order:

- Prevention
- Reuse
- Recycling
- Incineration with energy recovery
- Incineration.

3) In October 1988, the problem was once again raised by a « memorandum on the prevention and recycling of waste ». This memorandum set the objectives to be reached by 2000 for the most 29 significant categories of waste (Th. Demey, J.-P. Hannequart, K. Lambert, 1996).

4) Indeed, waste policy in the Netherlands is focused on around 29 priority waste streams (such as car wrecks, car tyres, batteries, packaging waste, paper-cardboard, agricultural foils, PVC pipes, photographic hazardous waste, white and brown goods), which altogether cover more than 70 percent of generated waste. These priority waste streams are also the basis for the implementation of producer responsibility.

Producer responsibility in the Netherlands

5) The concept of Producer Responsibility (PR) was introduced as a general strategy by the Dutch Environmental Minister in 1990. This concept was given a legal basis when it was included in waste chapter of the Environmental Management Act which came into force on 1st January 1994. The chapter states that every supplier of solid, non-chemical waste itself is responsible for waste handling (collecting, removal and disposal), and authorises the government to require industry to take back end-of-life products and to recycle them.

6) As a general rule, however, the strategy of the Dutch government has been to negotiate with industry in order to implement producer responsibility through voluntary agreements rather than traditional regulations.

7) The voluntary agreements, so called Covenants, between government and industry federations are meant to implement PR within sectors of industry, mainly in areas where legislation already exist and government can exercise control such as through issuing licenses. In this manner, Covenants serve as a management tool by providing a concrete implementation

programme for the allocation of roles, fundings and goals within a more general legal framework.

8) If industry does not take the responsibility and does not sign a Covenant (or does not fulfil the goals stated in a signed Covenant) they might be "punished" by the government by the introduction of regulatory control, as was the case with the scheme on batteries.

9) Covenants are also being used to take measures on issues where government as yet have no regulatory control but where new controls are expected in the future, for instance through the implementation of European Union law. This was the case with the signing of a Packaging Covenant in 1991 between the Government and the Dutch Packaging industry, the SVM (Stichting verpakking and Milieu – The packaging and the Environment Foundation), which prepared for the forthcoming EU Directive on Packaging Waste (STIE-LEUVEN).

The Packaging Covenant I

10) In June 1991, a voluntary agreement was signed between the government and the SVM (Stichting verpakking and Milieu) for a period of 10 years: the Packaging Covenant (Demey, *et al*. 1996).

11) The Packaging Covenant 1991 formulated a number of ambitious goals, its most important objectives being to end the disposal of packaging waste on landfill sites with effect from the year 2000 and to bring the quantity of packaging to be newly placed on the market in the year 2000 below the 1986 level. As regards material recycling, a minimum of 60% has been agreed for the year 2000. In addition to these objectives, various measures have been set out in the 1991 Covenant, including the obligation to draw up implementation plans, to carry out environmental analyses, to monitor, to report etc.

12) The monitoring results for 1995 showed that the quantity of packaging waste appeared to be stabilising at the 1993 and 1994 level. In 1995, the objective of recycling 50% of the packaging material was achieved. The greatest amount of recycling was achieved with glass and paper/cardboard. Much effort still needed to be made in the case of metals and plastic. The obligation set out in the 1991 Covenant to end the disposal of packaging waste on landfill sites by the year 2000 was met via the Waste (Landfill Ban) Decree (Besluit stortverbod afvalstoffen) which bans the disposal of packaging waste on landfill sites unless a dispensation has been granted (PPW Decree, explanatory notes).

13) The introduction of the EU Directive on Packaging and Packaging waste in December 1994 meant that the 1991 Packaging Covenant was no longer adequate. The Ministry therefore drafted the Ministerial Decree on Packaging and Packaging waste[59] and the accompanying Packaging Covenant II, in consultation with the Dutch industry and the SVM (R. Van Beek, 1999).

The Packaging and Packaging Waste Decree

14) The Packaging and Packaging Waste Decree (PPWD) applies to each company in the Netherlands that introduces packaged products onto the market (producers and importers) and to each company that manufactures last minute packaging. The PPWD also apply to retailers or market vendors who sell their goods to customers in bags and to the users or suppliers of those bags (so-called ‘last minute’ or ‘service’ packaging). It imposes statutory obligations on these companies in relation to the prevention and recycling of packaging waste. The PPWD gives

[59] The Packaging and Packaging Waste Decree which came into force on 1 August 1997

companies the option of concluding a Covenant with the Ministerie van Volkshuisvesting, Ruimetlijke ordening en Milieubeheer (VROM). Companies that are signatories to such a Covenant are exempted from the main individual provisions specified by the PPWD.

15) The Packaging and Packaging Waste Decree was published on 4 July 1997 and took effect on 1 August 1997. This meant that almost every company either had to notify the Minister of VROM by 30 October 1997 about how it intended to implement the PPWD or else had to have joined the Packaging Covenant II before 15 December 1997. If by this time a company had not done either of these things, it was in violation with the PPWD. In spring 1998, the Environmental Inspectorate of the Ministry of VROM began checking whether companies had given notification or signed the Covenant (R. Van Beek, 1999) (see also section 2.10 Monitoring and control).

The Packaging Covenant II

16) On 15 December 1997, the Dutch government and industry signed the Packaging Covenant II. A very large majority of around 250,000 companies in the packaging chain signed up to the Covenant, either directly, through branch organisations or through other collaborative associations, thereby complying with the most important obligations specified by the Decree. The Covenant terminates on 31 December 2001, except for reporting and monitoring which terminates in 2002.

17) The Covenant is composed of:

- **the integration Covenant**: which includes among other things agreement on the targets and obligations for industry and the government and sets out agreements governing a number of general aspects such as monitoring, annual reporting and checking by the Packaging Committee;
- **the subsidiary Covenant for producers/importers**: which contains agreements governing e.g. prevention and product reuse;
- **five subsidiary Covenants by type of material governing recycling:** in which agreements have been set out governing respectively the collection, sorting, take-back and recycling of paper-cardboard, glass, metals, plastics and wood.

The Integration Covenant

18) It sets out prevention, recycling and recovery targets (see 1.1.1.3.). Measures to realise the prevention targets are set out in the subsidiary Covenant for producers/importers. Measures concerning recycling are contained in the five subsidiary Covenants on recycling.

19) The integrated Covenant also contains provisions relating to monitoring and reporting. These are elaborated in more detail in the monitoring protocol and in the protocol on clustering and the reporting process[60].

Subsidiary Covenant for producers and importers

20) Any entity who is the first to bring a packaged product onto the Dutch market is obliged under the terms of this Covenant to take measures to minimise the volume of material for packaging purposes, to reduce the environmental impact of these materials and to use the main

[60] A cluster comprises a number of companies that together wish to implement a number of obligations in the covenant. Provision has been made for clustering of companies from the same branch of industry if possible in accordance with the SBI code.

existing reusable packaging systems. The subsidiary Covenant for producers/importers includes two protocols:

- **The prevention protocol** offers companies advice on the best preventive measures to take.
- **The product reuse protocol** indicates which conditions producers-importers who bring a product onto the market in reusable packaging must comply with if they intend to bring the same product onto the market in one-way packaging.

Subsidiary Covenants on materials recycling

21) The subsidiary Covenants on materials recycling contain agreements with various parties of the material chains, including material producers, and in the case of paper/board and glass, also with the Association of the Dutch Municipalities (VNG) in respect of the collection and recycling of used packaging. These parties are the most appropriate in that they embody the necessary expertise, infrastructure and marketing channels which allow them to guarantee that the recycling targets will be met. The material producers are also expected to help the producers/importers to meet their obligations relating to qualitative and quantitative prevention (R. Van Beek, 1999).

1.1 Objectives, Definitions and Field of Application

22) The packaging and packaging Waste Decree provides notably for definitions as follows:

-
- **Producer or importer:** *"the one who, in pursuing his profession or carrying on his business:*

  - is the first to make available in the Netherlands to someone else substances, preparations or other products in a packaging;

  - is the first to import substances, preparations or other products in a packaging into the Netherlands and to dispose of this packaging in the Netherlands;

  - commissions someone else to mark the packaging for substances, preparations or other products with his name and makes these available to someone else in the Netherlands;

  - is the first to make available in the Netherlands to someone else a packaging that is intended to be added to substances, preparations or other products when these are made available to the user".
- **Packaging chain**: *"those ones who are involved or have a part in making available to others in the Netherlands packaging or packaged substances, preparations, or other products or the purchase thereof :*
  - *by supplying raw materials for packaging,*
  - *by manufacturing or importing packaging,*
  - *as a producer or importer,*
  - *as a purchaser of packaged substances, preparations or other products, or*
  - *by reprocessing packaging".*

- **Reuse as a product (= Reuse):** "to use packaging once more, whether it bas been reconditioned or not, for the same purpose for which it was conceived";
- **Recycle as a material (= Recycling[61]):** "after the treatment or reprocessing of packaging, to use the resulting materials once more for the original purpose or for purposes other than the one for which they were conceived"[62].
- **Recovery**: to compost, to recycle as a material or to incinerate packaging and recover the energy
- **Quantitative prevention**: to reduce the quantity by weight of packaging
- **Qualitative prevention**: to reduce the harmfulness of packaging for the environment.

1.2 Responsibilities of economic operators

23) The basic idea underlying the Packaging and Packaging waste Decree is that attaining the targets set out in the Directive calls for effort from all those involved in placing packaging on the market and disposing of it - that is the packaging chain responsibility (PPWD – explanatory notes).

- **Raw material producers** are expected to take all measures that may reasonably be demanded of them to recycle the packaging materials submitted separately. This means that they must ensure there is adequate processing capacity to be able to achieve the specified recycling targets and that they must share equally in the burdens and costs of meeting the obligations. The duty to take back packaging released from private households packaging apply from a point to be determined by the local authority (PPWD, art. 5).
- **Every producer or importer** who places packed products on the market is responsible for prevention and for achieving specified targets for recovery and material recycling
- **Local authorities** are responsible for setting up collection systems at least for glass and paper/cardboard originating from private households.
- **Disposers of waste**, being consumers (private households) and businesses are expected to co-operate in the separate collection of recyclable packaging materials. So, nothing was changed for disposers of industrial waste which have to pay for the cost of disposal themselves (although they are expected to be encouraged by producers and importers to intensify the separation of packaging waste with a view to its reprocessing).

[61] In Dutch usage, the term "recycling" frequently refers to both material recycling and product reuse. However, the substance of the term "recycling" from the directive and the term "material recycling" from the PPW Decree is the same (PPW Decree, explanatory notes, art. 1).

[62] The conversion of plastics into chemical base products (back to feedstock or gasification) is also designated as such if these base products are used as a raw material for the chemical industry. The same applies to metal packaging separated from waste incineration plant slag and used as a raw material for the steel industry (PPW Decree, explanatory notes, 4.1).

The case of service packaging

24) The take-back and recovery obligation as well as the prevention obligation do not apply to producers or importers who add packaging at the point when they make available substances, preparations or other products to a private household that is for “service” or “last-minute packaging (PPWD, art. 3). For reasons of efficiency and to prevent additional administrative burdens, these obligations are born by the producer/importer of these last-minute packaging who are responsible for achieving the percentages of recovery and material recycling. However, the retail trade does remain responsible for measures to prevent the use of these forms of packaging and they remain fully responsible as importers or producers for the packaging of products which are produced under their own name.

1.3 Targets and Instruments

Prevention

25) The Packaging and Packaging Waste Decree, in its articles 12 and 13, transposes into Dutch law the obligations set in articles 9 to 11 of the Packaging Directive (Essential requirements and concentration levels of heavy metals).

26) The article 4 of the packaging Covenant II fixes the objective of reducing the quantity of packaging to be newly placed on the market in the year 2001 by at least 10% in relation to the quantity of packaging in the year 1986, corrected for both the trend in Gross Domestic Product (GDP) and for the increase in packaging weight resulting from the application of secondary materials.

27) Producers or importers are those which must take measures relating to quantitative and qualitative prevention. The way in which the prevention goal can be met is set down in the prevention protocol. This defines a systematic approach to prevention measures that producers / importers must apply in their company. This can be done by following the “Prevention Guideline” or by applying the ISO 14001 or EMAS system or a similar working method. During the term of the Covenant, companies are expected to assess every year a number of packaging items and investigate or introduce possible improvement. During the term of the Packaging Covenant, it is expected that industries will assess the large majority of their packaging in accordance with this system. This system must evaluate the following aspects:

- Use of less packaging material
- The possibility of recycling the material after use
- The use of secondary raw materials in packaging
- Restricting as far as possible the use of heavy metals, at least to the level as prescribed in the PPW Decree.

28) Companies having more than 4 employees and which place more than 50,000 kg of packaging material on the Dutch market, must submit an annual report[63], via a cluster[64] or otherwise, on the progress of their prevention strategies. This report should, if possible, provide quantitative information, explanation and examples.

[63] The Prevention Guideline contains a model for reporting.
[64] The number of businesses required by the PPWD to achieve the prevention objectives is about 450,000. These businesses are mainly retail and whole sale trade industries. More than 98% are small and medium-sized enterprises (PPW Decree, explanatory notes 5.1).

Reuse

29) The Packaging and packaging waste Decree provides for no specific target for reuse but the sub-Covenant producer/importer contains a provision in its article 5 for refillable beverage packaging (beer, softdrinks and waters). Producer/importer of currently predominantly refillable packaging undertakes not to substitute this packaging by any one-way packaging unless it can be demonstrated that the said introduction has less or at most the same environmental impact as the same refillable systems.

Recovery

30) The Packaging and Packaging waste Decree of July 1997 provides for following targets for non reusable packaging waste (art. 3):

- Recovery: 65 % by weight
- Recycling (as a material): 45 % by weight
- Recycling (as a material): at least 15 % by weight for each packaging material

31) These objectives are strengthened and implemented in the Packaging Covenant II. This defines, among others, that by the year 2001 the total quantity of packaging waste of paper or cardboard, glass, plastic and metal to be incinerated and to be landfilled should amount to a maximum of 940 kilotonnes[65], plus the quantity of metal packaging waste that is recycled as material after incineration[66]. The sub-Covenants on material recycling defines a global recycling target of at least 65% to be achieved by 2001 as well as following minimum recycling rates per material:

Table 1: Target recycling percentages specified by the Packaging Covenant II

Material	Target recycling percentage
Paper and board	85 %
Glass	90 %
Metals	80 %
Plastics	35 %
Wood	15 %
Average	65 %

32) In the case of the Covenant, the recovery obligations are assumed by estimated 50 large material producers (27 producers of paper/cardboard, 2 producers of glass, 5 producers of metal, 14 producers of plastics).

1.4 Further Provisions

33) Producers or importers must notify the Minister (of Housing, Spatial Planning and the Environment) every five years, about how they intend to fulfil their obligations and notably describe:

[65] From 1,300 kilotonnes in 1986 (SVM-PACT).

[66] Besides, since 1st January 1996, The Netherlands has introduced a ban on landfill for combustible household and non household waste. This waste must be incinerated in waste incineration plants with energy recovery. This means that all the packaging waste from businesses or households which is not separately collected and is thus included with residual waste is therefore ultimately incinerated (R. Van Beek 1999).

- how packaging will be taken back, recovered and recycled as a material,
- the measures relating to quantitative and qualitative prevention, as well as an estimate of the results that can be achieved,
- how the collaboration with others will take place,
- the financing measures for the taking back, recovery and recycling as a material of packaging waste (PPWD, art. 6).

34) Producers or importers must submit, every three years, a report to the Minister, on the results of the preceding three calendar years, describing:

- the measures they have taken in relation to quantitative and qualitative prevention as well as the results achieved,
- the results with regard to taking back, recovery and material recycling and how these results were attained,
- the data related to the quantities of packaging placed on the market in the Netherlands as a total and broken down into packaging materials,
- the data related to the quantities of packaging waste generated, the quantity of packaging recycled as a material and the quantity of recovered packaging, as a total and broken down into packaging materials,
- the shortcomings they have found in the way the packaging chain has met its obligations (PPWD, art. 8).

35) Producers and importers who are affiliated to an organisation of producers and importers which fulfils these obligations on their behalf are released from these obligations (PPWD, art. 9).

2 Packaging Waste Management's System

2.1 Compliance scheme

36) According to the PPWD, the producer or importer must ensure that, of the amount of packaging he places on the market each year, he achieves the defined recycling and recovery target. This can be done by three possible ways, namely:

- via a Covenant
- via individual obligations
- via joint notification by producers and importers.

The situation for non-households packaging waste

37) In the case of packaging waste from non-households, the duty to take-back packaging waste and achieve the defined recycling and recovery targets applies on the understanding that the associated costs are borne by the party disposing of this waste. However, these last are supposed to be encouraged by producers and importers to the extent necessary to intensify the separation of packaging waste with a view to its reprocessing. This incentive may entail the provision of facilities for keeping collected materials apart for material recycling at a cost that makes it attractive for businesses to avail themselves of these facilities. The purpose of this measure is that the incineration costs of household packaging need to be offset (PPWD, explanatory notes).

The situation for household packaging waste

38) With regard to packaging released from private households, the duty to take back packaging applies from a point to be determined by the local authority. This means that from this point, the producers and importers are responsible, including financially, for the disposal of a quantity of packaging waste such that the specified percentages for recovery and material recycling are achieved.

39) The Covenant II provides that industry must appoint an implementation organisation which on behalf of industry will manage the implementation of the Covenant, guide and co-ordinate the implementation of the sub-Covenants. This implementation organisation functions as the direct contact with the packaging chain for the Minister (Covenant art. 7).

40) If a Covenant has been concluded, the packaging chain may reach agreement with the local authorities on the way packaging waste is collected and where the transfer's point should be (PPWD, explanatory notes).

41) The Packaging and packaging waste Decree has been devised in such a way as to encourage the conclusion of a covenant, in which case the obligations of individual companies cease to apply[67]. Indeed, being a party to a covenant releases producers and importers from fulfilling individual obligations. This means at any rate a substantial reduction in administrative burdens for notification and monitoring because the individual producers and importers are exempted from the obligation to carry any administrative deed vis-à-vis the Minister (PPW Decree, art. 2). Another advantage is that the percentages of material recycling of the various sub-streams can be offset each other. As a result, the targets specified by the Decree can be met with less effort, fewer costs and less administrative red tape (R. Van Beek, 1999).

SVM·PACT- The implementing organisation

42) Companies covered by the Decree can affiliate themselves to the Packaging Covenant II implementing organisation, SVM·PACT. SVM-PACT was established in 1997 by the Vereniging VNO-NCW (Association of Netherlands Industry and the Netherlands Christian Employers Federation), Koninglijke MKB-Nederland (Royal Dutch Association of Small and Mediumsized Enterprises) and the Stichting Verpakking en Milieu (Organisation for Packaging and the Environment). The latter organisation is the forerunner of SVM-PACT and between 1991 and 1997 it co-ordinated the implementation of the Packaging Covenant I.

2.2 Interactions between SVM-PACT and adhering companies

43) SVM-PACT started its activities on 17 March 1998 and since then clusters and businesses have been able to join (Packaging Committee annual report 1998). There are approximately 250,000 companies affiliated to SVM·PACT directly or indirectly. In the latter case, companies joined a branch organisation (cluster) or a material-recycling organisation which, in turn, joined SVM-PACT.

44) The affiliated structure can be compared with a pyramid in which SVM-PACT forms the top and the enterprises the foundation. In between operate clusters and sometimes sub-clusters. The clusters consist mainly of enterprises operating in the same branch and differ in size from a dozen enterprises towards several thousands of enterprises. Each of the nearly 60 individual

[67] Exemption: Enterprise who joined the Covenant and who have 4 or less employees or who put less than 50,000 kilograms of packaging on the Dutch market per year, can ask for an exemption of their administrative obligations (annual reporting and monitoring).

participating companies and 90 “clusters” has a co-ordinator supervising the implementation of the Packaging Covenant II. This has a crucial role to play by stimulating activities and communication with his members.

45) SVM-PACT co-ordinates, promotes and facilitates the implementation of the Covenant on behalf of the Dutch business sector. Furthermore, SVM-PACT protects the sectors interests in the field of packaging and the environment and represents Dutch business at both national and European level. It also acts as a discussion partner for the government (SVM-PACT).

46) Practically, SVM·PACT helps companies to meet their obligations. It has an account management team with four employees that keeps in touch with day-to-day practices and provides practical support and advice to all companies and clusters involved with the Packaging Covenant II. The account managers are responsible for different sectors and one account manager is appointed for the recycling organisations. They visit companies, clusters co-ordinators and the recycling organisations regularly and attend meetings. They give recommendations with respect to environmental measures for packaging and the promotion of recycling and if necessary, they solve problems. All essential matters are laid down in an action plan on the basis of which companies can start working in a concrete way.

47) The clusters “translate” the general advice and guidelines of SVM-PACT in more specific advice and guidelines for there branch and therefore play an important role in helping the enterprise to fulfil their obligations. E.g. clusters develop prevention guidelines and play an important role in the process of reporting and monitoring.

48) Account managers also encourage mutual consultation between the branches and the companies because, above all, SVM-PACT wants to be a platform where all actors of the packaging chain can exchange know-how and experience, and fine-tune their policies amongst themselves (SVM-PACT).

49) SVM-PACT also organises for non-households packaging waste the monitoring system which charts the results of the Covenant: each year a survey is sent to the companies concerned and, on the basis of the supplied reports, the account management team compiles an annual report on the measures taken by industry to assist materials recycling and prevention. These reports are submitted to the Packaging Committee once a year. Account managers also fulfil the role of adviser in respect of monitoring and reporting. They function as intermediaries between the business sector and the monitoring institute and they streamline the whole monitoring and reporting procedure. The monitoring Institute for the Packaging Covenant II is an independent institute established by SVM-PACT especially for the monitoring purpose. It is externally audited by PricewaterhouseCoopers (see also section 2.7.)

2.3 Interactions between operators and local authorities

50) The PPWD imposes a duty on the provinces to stipulate in their provincial environmental ordinances that local authorities must provide for the separate collection of packaging from private households of, as a minimum, glass, paper and cardboard. It also foresees the opportunity for producers and importers to reach agreement with local authorities on how the other packaging materials will be separately collected (art. 10).

51) Concretely, the local authorities organise the collection of household waste. The companies have to organise and meet the expenses of recycling. Indeed, it has been decided in the Netherlands as regards the collection of packaging generated in households – unlike in Germany, Austria and Belgium, for instance – not to impose the costs on producers/importers but to leave them for the time being with the local authorities, “which perform the service at the

lowest possible social cost" (PPWD, explanatory notes, 5.3). Expectations are that the costs for separate collection by the local authorities will be offset by lower incineration costs and by the proceeds from the separately collected streams, so that on balance disposal costs for local authorities will not rise.

2.4 Collection and sorting

52) Local authorities in the Netherlands are responsible for collecting household waste and consequently also packaging waste. Paper/cardboard and glass is collected separately in all municipalities. Other packaging (mostly plastics and metal) tends to be collected with the residual waste even though in some municipalities, plastics, metals and beverage cartons are also collected separately on a small scale. Indeed, the separated collection of these fractions was not considered practically or economically feasible in the action-programme from 'Afval Overleg Orgaan' (AOO)[68]. As a result, municipalities carry no responsibility in the sub-Covenants for these materials.

53) Glass is collected separately in all municipalities. 98 percent of municipalities use bottle banks with an average of 1 bottle bank for 650 inhabitants (Inleiding Afvalinzameling – IPH-03) The local authorities are responsible for quantitative measures, that is to intensify their system of collection in such a way that about 90% of packaging glass is collected from households by the year 2000. The glass industry and the glass-processing industry are primarily responsible for achieving and stabilising a required percentage of colour separation. At the time the Covenant was signed, the glass industry needs to collect a maximum of 50% of glass by colour separately.

54) Part of the collected packaging glass comes from the office, retail, service and industry sector. Companies within this sector have an individual responsibility for the separation and separated delivery of discarded glass, but in this case the Organisation for Glass Recycling is not obliged to accept glass free of charge if market prices are negative at the transfer point.

55) The collection method for paper and board differs from local authority to local authority but is usually organised through a bring-back system. Paper/board packaging is collected as far as possible with the separate collection of old paper.

56) Metal is mostly recovered from residual waste before and after incineration but there are also separate collection schemes for cans as well as for beverage cartons.

The case of wooden Packaging

57) The sub-Covenant for wood only covers wooden packaging defined as industrial waste. The authorities and the Organisation for the Recycling of Wooden Packaging commit themselves to stimulate the separated collection of wooden packaging from companies in the office, retail and industry sector.

58) Before the conclusion of the Packaging Covenant II, most of wooden packaging was incinerated with energy recovery. The target for 2001 is to reprocess at least 15% of this waste into new wooden products. The Organisation for the Recycling of Wooden Packaging is obliged to establish a structure for collection and processing and to compete in price with energy recovery.

[68] Individual companies in the service, office, retail and industry sector are themselves economically responsible for the disposal by legislation. The Vereniging Milieubeheer Kunststofverpakkingen (VMK - organisation for environmental management of plastic packaging) is obliged to apply measures to support and stimulate the separated collection of plastic packaging waste, so that targets of at least 27% material recycling are met in the year 2001 (sub-covenant plastic packaging).

2.5 Treatment systems and outlet of recycling activity

59) Industry set up organisations for implementing the collection and processing of non-households packaging waste on their behalf. These representative organisations are financed through funding from the companies involved, and are organised under the foundation SMV-PACT. These organisations are:

Glass:	Stichting Kringloop Glas
Paper / board:	Stiching Papierrecycling Nederland
Plastics:	Vereniging Milieubeheer Kunststofverpakkingen and Vereniging van Kunststof Recyclers
Ferrous / Non Ferrous:	Stichting Kringloop Blik and Metaal Recycling Federatie
Wood:	Stichting Kringloop Hout

2.6 Financing of the system

60) SVM-PACT calculates the contribution of the clusters and branches organisations according to the total turn-over of their own adhering companies. The clusters and branch organisations must consequently calculate the contributions of each of their members. The fees for individual companies contracting directly with SVM-PACT is calculated as shown below according to their annual turnover, however less than 100 mostly larger enterprises comply directly to SVM-PACT. 250.000 enterprises joined through a cluster and pay far less. Prices vary from one cluster to another between zero and 2.780 guilders. Prices are influenced by the amount of enterprises who joined the cluster.

Table 2: Individual companies fee for 2000

Company annual turnover	Fee (excl. VAT) in guilders
Until 10 million guilders (4.55 million €)	2,780 (1,263.63 €)
10-20 million guilders (4.55-9.09 million €)	5,560 (2,527.27 €)
20-30 million guilders (9.09-13.64 million €)	8,340 (3,790.91 €)
30-40 million guilders (13.64-18.18 million €)	11,120 (5,054.55 €)
40-50 million guilders (18.18-22.72 million €)	13,900 (6,318.18 €)
50-500 million guilders (22.73-227.27 €)	20,860 (9,481.81 €)
> 500 million guilders (> 227.27 million €)	27,810 (12,640.91 €)

Financing modalities for recycling

61) The duty to take back packaging released from private households packaging apply from a point to be determined by the local authority (PPWD, art. 5). The costs of collection (such as the

location and maintenance of collection containers) are borne by the local authorities. The costs for producers and importers relate to transportation, storage, pre-processing (if necessary) and recovery (material recycling or incineration) of packaging waste.

62) The division of costs lies at the so-called “point of transfer”. The “point of transfer” is the point at which the volume of collected glass or old paper/board is transferred to industry. This means that from this point, the local authority is in any event not required to pay any further costs for collection, processing, storage, etc… In the case of glass, the transfer point is the bottle bank and for paper/cardboard the transfer point is the waste paper merchant.[69] For metal packaging, the transfer point is the exit of the waste incineration plant.

63) The revenues produced by the collected material profit to local authorities, but if there is a chain deficit the producers and importers are financially liable and not the local authority. For instance, the glass is delivered to a company affiliated to the Organisation for Glass Recycling, and from this point on the glass industry carries physical and financial responsibility. The price of the collected glass is agreed between individual parties under normal market conditions, but if price is negative the local authorities may hand over the glass free of charge.

64) The Decree has no new financial consequence for the companies disposing of packaging waste together with their industrial waste. As a result of the ban on disposal at landfill sites and rising incineration rates, it is becoming increasingly more attractive for parties disposing of industrial waste to separate the packaging waste and present it separately (PPWD, explanatory notes, 5.3).

Total packaging waste management costs

65) In the explanatory notes to the Decree, the government tries to estimate the total annual cost for the packaging industry. These are divided as follows. Consumers must pay, through waste taxes, the costs which local authorities incur for collecting and disposing of packaging waste and which are not compensated by industry.

[69] In order to meet the objectives defined in the sub-Covenant paper packaging, the Stichting Papier Recycling Nederland (PRN) and the Stichting Verwijderingsfonds have introduced a fee for paper purchased or imported. This fee of 8.75 guilders (3.98 €) per ton will be used for supporting the take-back and recycling op paper packaging waste (http://www.nuv.nl/economis/ecopapiermilieu.htm) .

Table 3: Estimated costs per year for packaging industry

Activity	Estimated costs per year for packaging industry	Explanation
Transfer and recovery of glass packaging	0	The positive value of material offset the process of this stream
Transfer and recovery of metal packaging	0	The positive value of material offset the process of this stream
Transfer and recovery of paper-cardboard packaging	4 million guilders (1.82 million €)	
Plastics	?	
Administrative costs for prevention, notification, monitoring and reporting	20-24 million guilders (9-10 million €)	
Total	<< 100 million guilders (<< 45 million €)	

2.7 Monitoring and control

66) The supervision of observance and enforcement of the PPWD is the responsibility of the Minister of Housing, spatial Planning and the Environment. The environmental inspectorate has been mandated to implement the controls (PPWD, explanatory notes, 7). Hence, the Covenant II provides the obligation for the parties to set up a monitoring system for the purpose of establishing progress and checking the implementation of the Covenant and the accompanying sub-Covenants (Covenant II, art. 9). After the Covenant II was signed, the Ministry of Housing, Spatial planning and Environment and SVM-PACT as well as their respective offices discussed the exact details of the monitoring systems. The monitoring mechanism is summarised here below.

Monitoring system in the Packaging Covenant II (Packaging Committee, Annual Report 1998)

67) The monitoring protocol is defined in the Covenant. The monitoring system consists of three types of measurements:

- **market measurements**, performed by the Industry, in order to determine the total quantity of packaging introduced on the market,
- **recycling measurements**, performed by the Industry, in order to determine the quantity of packaging waste recycled on the material level,
- **waste measurements**, performed by the Government, in order to determine the quantity and composition of the various packaging waste flows disposed of by private households.

68) The monitoring of the total quantity of packaging placed on the market is assured by SVM-PACT through reporting of around 4,000 companies[70], predominantly large ones representing two-thirds of the overall packaging volume, which supply data about the quantity of newly placed packaging on the Dutch market per material. The companies are also requested to report on their efforts in relation to prevention and recycling. The recycling organisations supply the Monitoring Institute with information on the quantities of recycled packaging for each

[70] Companies which have signed the covenant and which employ four employees or less, or place less than 50,000 kg of packaging of paper, cardboard, glass, metal and plastic per annum on the market, are exempt from the Monitoring obligation (sub-covenant producers and importers, art. 9). Given this threshold, a coverage of 90% is expected to be achieved.

material and report on their activities. The volume of packaging which is ultimately landfilled or incinerated is calculated on the basis of these measurements[71].

69) On the basis of the supplied information, the Monitoring Institute (the monitoring agency appointed by the Industry) calculates on behalf on SVM-PACT, the overall national figures in respect of prevention, recycling and the amount of packaging waste still to be incinerated and landfilled. PricewaterhouseCoopers is appointed as external auditor to assess the assessment and calculation method. On the basis of the supplied reports, SVM-PACT compiles an annual report that is submitted to the Packaging Committee once a year. In fact the Monitoring Institute provides in cooperation with the RIVM a joint monitoring report to the Packaging Committee. SVM-PACT provides the Committee another report which describes how the private sector fulfil their obligations in the past year.

70) The National Institute for Public Health and the Environment (Rijksinstituut voor Volksgezondheid en Milieuhygiëne - RIVM, the monitoring agency appointed by the Minister) carries out an output measurement which estimates the quantity of packaging waste collected, recycled and disposed of. This is done by combining waste statistics with waste analysis figures on basis of the following information:

- the amount of separately collected packaging materials, as well as the amount of household waste (information provided by Statistics Netherlands-CBS)
- the packaging materials percentage in household residue waste (determined through composition analysis of residues by the RIVM)
- the quantity of packaging waste from small- and medium enterprises as well as industry (information gathered by RIVM through determination of the size and composition of packaging waste in waste flows).

71) With these figures, the packaging materials recycling percentage for household waste can be calculated. These figures are compared with figures of industry on packaging materials production, import and export to calculate national recycling figures for packaging materials.

72) The results of the monitoring is submitted to the Packaging Committee collectively by the Monitoring Institute (the monitoring agency appointed by the Industry) and the National Institute of Public Health and Environmental Hygiene (Rijksinstituut voor Volksgezondheid en Milieuhygiëne - RIVM, the monitoring agency appointed by the Minister) in the monitoring report. The Packaging Committee evaluates and compares the individual reports of the Minister and SVM·PACT together with the joint monitoring report (of the Monitoring Institute and RIVM) and then uses these to write its own annual report.

[71] Based on the short throughput time for packaging, the parties assume that the quantity of packaging introduced on the market in a calendar year is equal to the collective quantity of packaging waste from households and from the Office, Shop and Services and Industrial sectors (input = output). This also means that the quantity of packaging waste that is incinerated or disposed of in landfills can be deduced from the total quantity of packaging introduced on the market minus the reprocessed share thereof.

The Packaging Committee

73) The Covenant II provides competencies for the Packaging Committee (Covenant art. 11). This Committee comprises nine members, of which:

- four are appointed by the Minister;
- one is appointed by the Vereniging VNO-NCW,
- one is appointed by the Stichting V erpakking en Milieu;
- one is appointed by the Koninklijke Vereniging MKB Nederland;
- one is appointed by Industry
- the independent chairman is appointed jointly

74) The Committee is responsible for:

- checking compliance with the Covenant and the accompanying sub-Covenants
- checking the annual reports due by the Minister and Industry
- assessing whether the implementation is taking place in accordance with the provisions of the Covenant and the accompanying sub-Covenants and whether the objectives are being reached.

75) The Committee gives its view where the obligations and objectives of this Covenant cannot reasonably be achieved. It assesses the monitoring protocol and consults with the parties if in its view the protocol requires changing. The Committee reports to the parties on its findings annually on 1 November.

Procedure for Verification and evaluation

76) For the annual report 1998, the monitoring agencies described the verification procedures followed in the monitoring report. The plausibility of the information supplied by the clusters and individual companies for the market measurements was checked by the Monitoring Institute. This Institute also evaluated the results of the material recycling organisations where possible.

77) The RIVM evaluated the process by means of which the Monitoring Institute arrived at the results of the market measurements. The Monitoring Institute did the same for the waste measurements performed by the RIVM.

78) The packaging Committee assesses the verifications performed. In its annual report 1998 published on October 1999, it concludes notably that: "*In accordance with the agreements in the Covenant, various measuring systems are used on the materials level in order to acquire the recycling figures. The number of measuring points in these systems varies; the scope of the measurements is not always the same, and the method by which the monitoring figures are acquired differ considerably. The Committee believes it is vital that the statistical reliability of the recycling results be sufficient, in terms of both the individual material types and the entirety of the figures. The Committee feels it would be useful to have an analysis performed in order to determine whether the systems applied are sufficiently statistically reliable*".

2.8 Quantities of circulated packaging and recovered packaging waste

79) The Netherlands produced about 51 million tonnes waste in 1996 of which about 7.5 million from households. At this date, around 2.7 million tonnes packaging waste were produced in the

Netherlands. About half of these were originated from households. The most important materials are paper and cardboard (52%), plastics (23%), glass (17%), ferrous metals (8%) and aluminium (1%) (VROM 1998).

80) In its notification to the European Commission pursuant to the article 12 of the Directive 94/62/CE, the Netherlands reported the amount of packaging put on the market, recycled and recovered, as shown in Table 4.

81) The Netherlands reported that the quantity of packaging (per material) placed on the Dutch market cannot be derived from statistics concerning the production of empty packaging and the import and export of packaging because such statistic are not available. The presented data concern the figures on packaging waste in 1997, obtained by means of measurements of packaging waste originating from households, from commercial sector and the industry. It is assumed however that the input of packaging material into the market is roughly the same as the output of packaging waste in the same year.

Table 4: Amount of packaging waste recycled and recycling rate in 1997

Material	Quantities put on the market (1,000 t)	Recycling (1,000 t)	Energy Recovery (1,000 t)	Total Recovery (1,000 t)	Recycling* (in %)	Recovery* (in %)
Paper-cardboard	1,449	941	291	1232	64.9	85.0
Glass	469	354	-	354	75.5	75.5
Plastics	611	76	323	399	12.4	65.3
Steel	196	142	-	142	72.4	72.4
Aluminium	20	3	*	3	15.0	15.0
TOTAL	2,745	1,516	614	2130	55.2	77.6

(Source:notification to the European Commission pursuant to the article 12 of the Directive)

*: calculated

Amount of packaging put on the market and recycling rates in 1997 and 1998

82) As a result of the second Dutch ”Packaging Covenant”, starting data 1998, the input of packaging into the Dutch market will be measured through a comprehensive inquiry of companies. Since the monitoring method for the Covenant II was slightly different from the method used during the first one, parties agreed that the monitoring over the period 1998 would be performed on both the previous and the new system in order to assess the compatibility of the results obtained.[72] This double measurement allows to make distinction between differences in prevention and recycling as compared to 1997, and differences that can be traced back to the change in the measuring system. The data presented in the Packaging Committee Annual Report, 1998, are not included in this report as during the second monitoring year several errors were detected. Data will be replaced with the latest figures to be published in November 2000.

[72] The monitoring system for Packaging Covenant II differs from the system used for the first Packaging Covenant on three important points:

- the measurement of the total quantity of packaging is performed on a larger scale, with the intention of achieving a packaging coverage level of 90%.
- material recycling organizations determine the packaging recycling figures
- waste measurements are only performed to determine the composition of the packaging in the waste from households and from the Office, Shop and Services and Industrial sectors.

83) Because 1998 was the first monitoring year according to the new system in 1999 many enterprises had corrections for 1998. Corrections for 1998 lead to a significant decrease of the total amount of packaging in the Netherlands. The packaging volume for the years 1998 and 1999 is now considerably lower than already reported figures. SVM-PACT also believes the corrected figures are more in line with the European average if they are compared in kg / capita. Because the recycled amounts increased slightly form 1998 to 1999 this has a positive effect on the recycling percentages and the objective of 940 ktonnes. As a result the objective of 940 ktonnes is now expected be reached.

84) During the evaluation of both monitoring systems the University of Eindhoven was asked to investigate both systems. They concluded the new monitoring system is preferred and result in reliable data. Regarding the estimation of the amount of recycled packaging made of paper and cardboard it was decided to use figures of both the new and the old system. This means the amount of packaging of paper and cardboard is monitored using the “new”” system. For the recycling amount the figures of the “old”” system are used. The recycling percentage is calculated by using both figures. The report of the university of Eindhoven will soon be published.

Developments with reference to prevention

85) The Industry agreed in the Covenant to reduce the quantity of packaging introduced on the market by at least ten percent in the year 2001, with reference to the quantity of packaging introduced in the year 1986 (2340 kilotonnes), corrected for the development of the Gross National Product (GNP) since 1986 and for the increase in packaging weight resulting from the application of secondary materials[73]. The table below shows the evaluation of the prevention results achieved in 1997:

Table 5: Prevention percentages (as compared to 1986)

	1997
Growth GNP as compared to 1986 (%)	34.5 %
Reference value	3147
Total quantity of packaging (kilotonnes)	2,674
Prevention as compared to 1986 (%)	15 %

(source: Packaging Committee Annual Report – 1998)

Developments with reference to recycling

86) The table below presents the recycling percentages achieved since 1993 and the recycling obligation for 2001 (figures for 1997 and previous years are based on the monitoring system applied for the first Covenant):

[73] With these corrections for the quantity of packaging in the year 1986, the reference value for prevention is determined for the monitoring year

Table 6: Recycling percentages since 1993 and recycling obligations for 2001

Packaging material	Recycling percentages					Recycling obligation (%)
	1993	1994	1995	1996	1997	in 2001
Paper-cardboard	57	56	62	62	64	85
Glass	66	72	74	72	75	90
Metals	36	32	39	60	69	80
Plastics	9	10	11	11	14	27*
Total	**47**	**47**	**50**	**52**	**56**	**65**
Wood	-	-	-	-	-	15

(source: Packaging Committee Annual Report – 1998)

*In addition to this 27%, an additional obligatory effort amounting to 8% material recycling was agreed to in the Covenant.

2.9 Import/Export of Packaging Waste

87) In its notification to the European Commission pursuant the article 12 of the Directive 94/62/CE, the Netherlands reported that no statistics were available on the export of packaging waste after (separate) collection and the subsequent treatment by collection and sorting companies. Neither the (supposedly insignificant) export of packaging waste directly by the producing companies is reported. It is assumed, however, that the export of separately collected and sorted packaging waste can be considered as material recycling (Packaging Covenant). Furthermore, the import of packaging waste for recycling in the Netherlands is not registered. There is no export or import of packaging waste in mixed waste streams to be disposed of by landfilling and incineration. Consequently it is not possible to establish the amount of packaging waste produced as well as recycled in the Netherlands.

2.10 The recycling and recovery capacities in the Netherlands

88) According to the chain responsibility principle, raw material producers are expected to ensure that there is adequate reprocessing capacity to be able to achieve the specified recycling targets (PPWD – explanatory notes). According to this, in the PPWD, the ministry stated that the possibilities in the sphere of material recycling, based inter alia on the results of various trial projects with separate collection was the following:

Table 7: Recycling rates achieved in 1995 and targets for 2001

	1995		2001
	Supply (Ktonnes)	% material recycling	% material recycling
Glass	455	74	90
Paper and cardboard	1,366	62	85
Plastic [1]	601	11	35
Ferrous [2]	199	56	80
Non-ferrous [3]	20	20	
Total [3]	**2,645**	**51**	**>65%** [4]

1) including chemical recycling
2) allowing for recovery of ferrous/non ferrous items from waste incineration plant slag
3) in this overview composites have been grouped with several types of material
4) weighted average: this is based on the same proportion of packaging materials in the total supply as in 1995.

89) Commenting on the notification of the draft Covenant, in 1997, the European Commission asked the Netherlands to confirm the intention to invoke Article 6(6) of the Directive 94/62/CE and to provide information on the expected recycling target as well as on the measures taken to avoid compliance problems of other Member States with the Directive, trade restrictions and market distortions.

90) The United Kingdom also commented on this notification, requiring additional information seeking to demonstrate that the conditions laid down in Article 6(6) of the Directive 94/62/CE are complied with.

91) By letter of 18 March 1998, reacting to the comments of the Commission and the United Kingdom, the Netherlands informed that material recycling had already attained the overall rate of 51 % and that existing recycling capacities were considered to be largely sufficient in order to exceed the maximum recycling target set by the Directive. The Netherlands also pointed at the fact that recyclable packaging is subject to the rules on free circulation, which makes it difficult to exactly monitor which part of the existing Dutch recycling capacities is used for recycling Dutch waste as well as which part of Dutch waste is recycled abroad.

92) The Netherlands referred to the discussion in the Article 21 Committee on 21 April 1997, where a general consensus was reached about the primary role which should be played by those Member States fearing that their compliance with the Directive would be hindered by measures which were adopted by other Member States. In any case, in order to give an insight about the existing recycling capacities in the Netherlands, the following table was provided, in order to show that there is enough capacity to treat the additional packaging to be recycled by 2001.

Table 8: Additional quantity of packaging to be materially recycled in 2001 compared to 1996

	Glass	**Paper-cardboard**	**Metals**	**Plastics**
Production capacity in The Netherlands in 1996 (in ktonnes)	820	2,824	6,000	3,000
Use of recyclates in 1996 (in ktonnes)	400	2,106	1,500	300
Quantity of packaging put on the market in 1996 (in ktonnes)	472	1,401	214	613
Quantity of packaging materially recycled in 1996 (in ktonnes)	338	865	126	67
Percentage of packaging materially recycled in 1996	72%	62%	59%	11%
Intended percentage of packaging waste to be recycled in 2001	90%	85%	80%	35%
Intended quantity of packaging waste to be recycled in 2001 (in ktonnes)	425	1,191	171	214
Additional quantity of packaging to be materially recycled in 2001 compared to 1996 (in ktonnes)	87	326	45	147

93) The Commission consulted the Member States and invited them to send written comments to these notification by the Netherlands: no objections to the Dutch measures have been raised. According to this, by a decision of 22 November 1999, the Commission confirmed the measures notified by the Netherlands pursuant to Article 6(6)of Directive 94/62/EC on packaging and packaging waste (notified under document number C(1999)3818).

3 Future developments

94) According to the PPWD, art. 15, the effectiveness and the effects of this regulation had to be evaluated before the end of 1999. To date, the conclusions of this evaluation has not yet been published. Parties have requested that the Chair of the Packaging Committee hold the discussions necessary in order to determine the procedure to be followed in the evaluation of the Covenant. However, we have tried in this last chapter to summarise the findings, conclusions and recommendations made by the Packaging Committee in its annual report 1998.

3.1 Covenants objectives for prevention and recycling obligations

- According to both the 'old' and 'new' measuring systems, the quantity of packaging waste that was dumped in landfills or incinerated continued to grow in 1998. Although the difference seen in the double measurements were considerable, the results of both measuring systems indicate that the objective defined in the Covenant (Article 3 of the integration Covenant) cannot be achieved without additional effort.
- In 1998, the Industry fulfilled its minimum prevention obligation for 2001 as defined in the Covenant (Article 4 of the integration Covenant). The percentile growth in the quantity of packaging, however, exceeded the percentile growth of the GNP in 1998. The Committee would like to comment that if the economy continues to grow, achieving just the minimum recycling and prevention obligations will not be sufficient in order to achieve the objective of landfilling only 940 kilotonnes.
- (…) The Committee believes that the estimation of the amount of recycled packaging made of paper and cardboard used in the 'new' measuring system does not render an accurate representation. Special attention should be devoted to this aspect during the evaluation of the monitoring system.
- (…) For paper and cardboard and for plastics, extensive recycling efforts are still required in order to achieve the recycling obligations for these materials. For glass, the minimum recycling obligation is coming nearer. If the transition from dumping in landfills to incineration of residual wastes continues, the expectation is that the recycling obligation will be met for metal packaging in 2001. For wood in 1998 the recycling percentage is far higher than the recycling obligation for 2001.

Implementation of the monitoring

- The monitoring system defined for the Packaging Covenant II did not function (properly) with reference to a number of elements. The Committee expects that the evaluation of the monitoring protocol in the Autumn of 1999 will render more insight in the reliability of the monitoring figures as presented for 1998 (…). In particular, improvements are vital for the recycling measurements for packaging made of paper and cardboard and for plastics.
- For 1998, not all of the agreed verifications of the monitoring system were performed. The verifications of the working method employed by the Monitoring Institute, of the material recycling measurements and of the Government's tasks are missing (…).
- With a packaging coverage percentage of 59% for the measurement of the total quantity of packaging, the premise of 90% as defined in the Covenant was not achieved. The parties must continue to strive towards increasing the coverage percentage. (…) Within this framework, measures must also be taken against clusters and companies that fail to meet the Covenants' monitoring and reporting obligations. This is necessary for the continued motivation of the many affiliated companies, that do meet these obligations, to participate in the Covenant.
- In determining the recycling figures on the materials level, in accordance with the agreements of the Covenant, different measuring systems are applied. The number of

measuring points differs, the scope of the measurements is not always the same, and the manner in which the monitoring figures are determined varies considerably. (…) The Committee believes that it would be useful to have an analysis performed in order to determine whether the systems applied suffice in this respect.

- In 1998, no waste paper traders or municipalities had joined the Foundation for Paper Recycling in the Netherlands (Stichting Papierrecycling Nederland – PRN), and it was difficult for the traders to monitor packaging separately in accordance with the monitoring protocol. Instead, PRN did supply estimates. At this time, still the number of joined waste paper traders and municipalities is too low to acquire sufficient data in this manner in order to determine the recycling figure for the monitoring in 1999. An analysis is needed in order to determine whether or not these problems can be solved. If this proves impossible, a different method is needed for 1999 with which the recycling of packaging made of paper and cardboard can be measured with sufficient reliability.

Progress in the implementation of the Covenant

- After this first full year of effectuation of the Covenant, the Committee believes it is important that better quantitative insight be gained with reference to participation of the industry in the Covenant and participation of companies in the monitoring and reporting.
- Regarding prevention and recycling, a number of problem areas were identified, in particular with reference to smaller companies that are often dependent in this respect on the packaging supplier. SVM-PACT strives towards establishing a 'customised' systematic approach, where possible in co-operation with the supplier, for smaller companies. In addition, SVM-PACT also strives to improve separate collection of packaging waste (…).
- According to the Glass Recycling Foundation (Stichting Kringloop Glas – SKG), separate collection based on colour is in danger of dropping below 50%. It was agreed in the Covenant that the parties (the Minister van Housing, Spatial Planning and the Environment, VNG and SKG) would consult with one another if and when the degree of colour separation fails to meet the need.
- In its previous annual report, the Committee noted that recycling of plastic packaging has scarcely improved in the years past and that additional efforts are required in this respect. Recycling also remained much too low in 1998 with reference to the recycling obligation for 2001. The Ministries of Housing, Spatial Planning and the Environment and Economic Affairs, the Association for Environmental Management of Plastic Packaging (Vereniging Milieubeheer Kunststofverpakkingen – VMK) and the EcoPackaging Foundation (Stichting EcoVerpakkingen) are now supporting collective projects in which separate collection and recycling of Plastic packaging is stimulated[74]. In order to assess the progress in this area, more insight is required into the scope of the expected effects of these projects and other measures and actions oriented towards recycling Plastic packaging.
- The Committee assumes that next year the report from the implementation organisation will contain a more detailed picture – in terms of both quality and quantity – of the developments with reference to disposable and reusable beverage packaging, in accordance with the Protocol Re-use of Products.

[74] The Government and the Association for Environmental Management of Plastics (Vereniging Milieubeheer Kunststofverpakkingen – VMK) and the EcoPackaging Foundation (Stichting EcoVerpakkingen) have financially supported 13 projects to improve selective collection of plastic packaging waste from industry, notably the construction sector, and from households. The financial support amount to 2.5 million guilders (1.14 million €) (http://www.nieuwsbank.nl/inp/2000/02/0224M023.htm)

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Contents

1 Packaging Legislation and Voluntary Agreements 1
1.1 Definitions and Field of Application 1
1.2 Responsibilities of economic operators 1
1.3 Targets 3
1.4 Further Provisions 4
2 Packaging Waste Management System 5
2.1 Compliance scheme 5
2.2 Interactions between operators and local authorities 6
2.3 Collection and sorting 6
2.4 Treatment systems and outlet of recycling activity 6
2.5 Financing of the system 11
2.6 Monitoring and control 12
2.7 Quantities of circulated packaging and recovered packaging waste 15
3 Current situation 18
3.1 Impacts on waste collection systems 18
3.2 Impacts on treatment systems and secondary material market 18
4 Further Development 23
5 References 24

Tables

Table 1: Capacity of accredited reprocessors to recover or recycle (tonnes) 7
Table 2: UK Glass Recycling Figures 1998 8
Table 3: Breakdown of current EfW capacity 11
Table 4: Predicted UK Recovery and Recycling and UK requirement based on packaging in waste stream plus annual growth 16
Table 5: Estimated proportion of packaging materials arising in the household and commercial/industrial waste streams 16
Table 6: Estimated recovery of packaging waste within the UK and abroad 17
Table 7: Material specific issues to be addressed 18

1 Packaging Legislation and Voluntary Agreements

Legislation

- The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 as amended in SI 1361 and SI 3447 in 1999 ('the Regulations') transpose the European Packaging Waste Directive into UK law.
- The Packaging (Essential Requirements) Regulations 1998 transpose Article 9 and 11 of the EU Packaging Waste Directive
- The Producer Responsibility Obligations (Packaging Waste) Regulations (Northern Ireland) 1999 came into effect on 1 June 1999. The legislation is almost identical to the original Great Britain regulations.

1.1 Definitions and Field of Application

1) The Producer Responsibility Obligations (Packaging Waste) Regulations cover primary, secondary and tertiary packaging. The relevant packaging materials are aluminium, glass, paper (including board), plastic and steel. In addition, there will be an obligation for recovery only of wood and other packaging materials from 2000.

2) The packaging regulations require certain businesses who handle packaging (from raw materials manufacturers, converters, packer/fillers to sellers) to recover and recycle specified amounts of packaging waste each year based on the amount of packaging handled by business, on national recovery and recycling targets, and on a percentage activity obligation depending on the activity the business carries out.

3) The UK view of "shared producer responsibility" for packaging waste is based on a much more specific and narrower definition than in other countries where this concept involves at least a partnership between the consumer, local authorities and industry. Shared producer responsibility for packaging waste in the UK refers only to the industries which produce or use packaging. Responsibility for recovery and recycling of packaging waste is divided among the commercial enterprises which form part of the "packaging chain". In 1995, after considerable debate the division of responsibilities was agreed between the four activity sectors: raw material producers, packaging manufacturers, packer/fillers and sellers.

1.2 Responsibilities of economic operators

Producers

4) The Packaging Waste Regulations place obligations on certain businesses to register with the Environment Agency (EA) or the Scottish Environment Protection Agency (SEPA) to submit data annually on the quantity of packaging and packaging materials handled; recover and recycle specific tonnages of packaging waste; and certify that this recovery and recycling has been achieved. As from 1 January 2000 there was another obligation introduced, whereby those businesses which are mainly sellers are obligated to provide information to consumers about opportunities for recovery and recycling. This amendment was introduced because the UK was threatened with infraction proceedings by the European commission for not implementing Article 13 of the Packaging and Packaging Waste Directive.

5) Firms attract an obligation when they are involved in the following activities:

- the manufacture of packaging raw materials (referred to as raw material manufacturers);
- converting materials into packaging (converters);
- using packaging to pack products or putting products into packaging (packer/fillers);
- selling packaging to the final consumers (sellers); or
- importing packaging materials, packaging or packaged goods.[75]

6) However, thresholds exist so that small businesses are exempt from the Regulations. From 2000 and in subsequent years, businesses which handled more than 50 tonnes of packaging (excluding exports) in the previous year and had a turnover of over £2 million in the last financial year for which audited accounts are available must register not later than 7 April 2000 and in subsequent years and then prove material recovery and recycling[76]. It has been estimated that the thresholds will exclude 96% of businesses but will include 88.6% of packaging. The former £5 million threshold is considered to exclude 16% of packaging from the regulations. The 5,300 registrations for 2000 under the Packaging Regulations therefore represent 12,000 businesses[77]. Since the second amendment of the Packaging Regulations producers with over £5 million turn over and applying for individual registration with an Agency are required to include an operational plan showing the steps to be taken to comply with their obligations[78];

7) Companies in Northern Ireland are currently affected if they handle over 50 tonnes of packaging in Northern Ireland and if their Northern Ireland or combined Northern Ireland/Great Britain turnover is more than £5 million. Affected businesses must ensure registration with the Environment & Heritage Service (EHS) by 30 September 1999 and supply data on packaging handled last year. However, recovery and recycling obligations did not come into force until 2000.

8) In contrast to most other member states, individual take-back obligation is not foreseen. Businesses can either arrange for the recovery and recycling of packaging waste themselves, in most cases through agents acting on their behalf, or through joining a compliance (collective or exempt) scheme thereby placing responsibility on the scheme to arrange for the recovery and recycling to be undertaken on its behalf.

9) Responsible parties in the “packaging chain” are required to submit certificates documenting certain recovery and recycling quantities. PRNs (Packaging waste Recovery Note) are uniquely number documents supplied by the Environment Agency or SEPA to reprocessors accredited by them. PRNs are also referred to as main evidence of compliance. The reprocessor can issue a PRN to certify that a specific tonnage of post use packaging waste, arising in the UK, has been recycled or recovered. Obligated companies, their representatives and compliance schemes (on behalf of their members) purchase this evidence to demonstrate that their obligations under the regulations are discharged. There is also alternative evidence which must be obtained when using a non-accredited reprocessor. If purchased, it must prove acceptable to the Agencies. They therefore request certain information about the reprocessor and the responsibility to obtain these details falls on the obligated company, representative or scheme.

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[75] DETR: Review of the Producer Responsibility Obligations (Packaging Waste) Regulations 1997, A Consultation Paper
[76] Up to 1999 the threshold was a turnover of more than £5 million and handling of more than 50 tonnes of packaging (excluding exports) in the previous year.
[77] Cooper, Jeff: The EU packaging and packaging waste directive: UK response. 2000
[78] Statutory Instrument 1999 No. 3447 - The Producer Responsibility Obligations (Packaging Waste) (Amendment) (No. 2) Regulations 1999

Reprocessors

10) A system of voluntary accreditation of reprocessors has been developed to achieve certain objectives in relation to the obligations of producers under the regulations such as to provide the Agencies with a means of distinguishing between reprocessors who, because of their adherence to a set of specific criteria, are expected to have carried out the necessary recovery and recycling as claimed, and those who may not have done so. The Agencies would expect to undertake less frequent monitoring of reprocessors once they have been accredited and the administrative burden for producers demonstrating compliance is eased if accredited reprocessors are used.

11) Reprocessors will be accredited on a site basis (not their registered office or principal place of business). The two main criteria for accreditation are: the provision of a system of documentation to be established with regard to the material delivered to a reprocessor and that the reprocessor should reach an appropriate operating standard.

12) The existence of similar overseas accreditation procedures, administered by local or national authorities, was explored by the Agencies. Where such procedures operate the Agencies seek to agree mutual recognition. Such accredited overseas reprocessors were to obtained blank PRNs from either Agency, to be used in respect of packaging waste exported from the UK and reprocessed on their sites. In addition to the PRN, there is the PERN (Packaging waste Export Recovery Note), the Packaging waste Export Recovery. UK exporters are required to provide an auditable trail from sources of packaging waste through to the reprocessing in overseas facilities.

1.3 Targets

Prevention / Reuse

13) Both at individual company level and at national level, there are no specific targets for prevention in the Regulations.

Recycling / recovery

14) The Producer Responsibility Regulations set down interim targets each year in order to enable the UK to get from its low starting point (circa 30% recovery) to the 50% recovery required in 2001. The Regulations establish the following recovery and recycling targets:

Year	Recovery	Recycling by material
1999	43%	10%
2000	45%	13%
2001	52%	16%

15) In the Government's announcement on the review of the regulations on 28 January 1999 it was proposed that the targets for 1999 and 2000 should be raised and in a recent consultation paper from August 2000, targets for 2001 of 58% recovery and 18% recycling of specific materials are discussed. This is to ensure that the UK meets its 50% recovery and 15% recycling targets in 2001[79].

[79] DETR, Consultation Paper on Recovery and Recycling Targets for Packaging Waste in 2001, August 2000

16) The recovery and recycling targets are then to be met according to the percentage obligation associated with the economic activity as shown below. Importers are responsible for all activities which take place before the import. In December 1999, coming into effect January 2000, the Government has amended three of the four percentage activity obligations as follows[80]:

Activity sector	Activity obligation	
		amended
Raw material manufacturers	6%	6%
Packaging converters	11%	9%
Packers/Fillers	36%	37%
Sellers	47%	48%

17) A company has to perform one of these functions on packaging to be obligated. The 'shared responsibility' approach has been adopted to ensure that all companies who handle the packaging prior to its becoming waste take a proportion of the responsibility for its potential environmental impact. Therefore:

- for a can of baked beans, the manufacturer of the steel takes a 6% responsibility for the recovery and recycling by weight of the can, the company that turns the steel into a can takes 11%, the company that puts the beans in the can takes 36% and the supermarket that sells the can takes 47%.
- for a box of copier paper, the manufacturer of the cardboard takes 6% responsibility for the weight of the cardboard box, the company that turns the cardboard into the box takes 11%, the company that puts the paper in the boxes takes 36%, the stationary company who sells the box of copier paper to a business takes 47%.

18) Therefore, a company who manufactures 'y' tonnes of cardboard in a given calendar year will have a responsibility to have proof of recovery of 'y' x 6% x the recovery target for that year.

19) A company can perform more than one activity on packaging, e.g. a company that places products inside transit packaging that their customer removes has both a seller and packer/filler responsibility for the transit packaging.

1.4 Further Provisions

20) 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. 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). The Waste Strategy involves a programme of increases in landfill tax to encourage the development of alternative waste management practices. The tax on a tonne of active waste will rise by an additional £1 per tonne each year, at least a further 5 years when, by 2004, the rate will be £15 per tonne.

[80] Statutory Instrument 1999 No. 1361 -The Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations 1999

2 Packaging Waste Management System

21) The following description is mainly based on a publication from the Department of the Environment, Transport and the Regions *A Forward Look for Planning Purposes*, 28 July 1999 and on the Draft Waste Strategy for England and Wales

2.1 Compliance scheme

22) The Regulations do not prescribe how producers and schemes are to achieve their obligations but leave them the flexibility to do this in the way that best suits them. Economic operators can either carry out the recovery and recycling obligations individually or they can join a registered compliance scheme. Membership in compliance schemes will exempt the economic operators from individual recovery/recycling obligations. The compliance scheme, which has to be registered with the Environment Agency, shall be responsible for reaching the targets. There are now a total of 16 compliance schemes. If the individual route was chosen, companies had to first register with the Environment Agency.

23) The British scheme makes no distinction between ICI (industrial, commercial and institutional) waste and household packaging waste. Therefore, inevitably, given the greater ease with which ICI waste can be collected and processed, in the initial stages of the further development of recycling of packaging waste in the UK the focus will be on ICI waste recovery[81].

24) All compliance schemes are required under regulation 12(3)(d) to submit to the Environment Agency detailed operational plans, looking two years ahead, and one of the amendments to the Regulations that has been announced, is that schemes will have to provide updated operational plans to the relevant Agency each year. These plans will need properly to reflect detailed three-year forecasts of the scheme's recovery and recycling obligations together with an indication of the way in which the scheme proposes to meet them, including an indication of the reprocessors to be used and the source of the necessary tonnages of packaging waste. A recent consultation paper discussed the option of requiring compliance plans from individually registered businesses as well.

25) The current provisions in Producer Responsibility Regulations 31 to 33 provide for a competition scrutiny regime and for the disapplication or modification of the Restrictive Trade Practices Act 1976 (RTPA) in relation to a scheme, or an agreement where at least one of the parties is an operator of a registered scheme made for the purposes of that scheme ("the special regime"). Under the Competition Act of 1998 commenced on 1 March 2000, the RTPA will be repealed and replaced by new competition legislation. The Act will introduce, among others, a prohibition on anti-competitive agreements, based closely on Article 85 of the EC Treaty. Because of the change in the legislation, the Department of Trade and Industry will be making new regulations. As a result, the Government has simplified the Regulations and remove the special competition scrutiny regime to which those who propose to establish a compliance scheme are subject. All compliance schemes and individual businesses will, in any case, be subject to the Competition Act 1998 and the Office of Fair Trading can still investigate any compliance scheme which seems likely to have an anti-competitive effect.

[81] Cooper, Jeff: The EU packaging and packaging waste directive: UK response. 2000

2.2 Interactions between operators and local authorities

26) Local authorities are responsible for the collection of household waste. Further processing is done by reprocessors who pay the market price for collected waste materials. Agreements about purchase guarantees etc. are not known.

2.3 Collection and sorting

27) Large numbers of local authorities have either kerbside collection of recyclables or run municipal depots for the collection of waste including packaging waste; and local authorities have a duty to collect commercial back-door waste if asked to do so, and for this they may impose a charge. The vast majority of UK recycling schemes require consumers to bring their recyclables to facilities in areas such as car parks and retail outlets.

28) As mentioned above in the initial stages of the development of recycling of packaging waste the focus lays on industrial packaging waste recovery. In 1996 VALPAK calculated that in 2001 27% of UK's recovery operations will be accounted for by recycling of household packaging waste, 57% from ICI waste and 16% from energy recovery in order to meet the EU targets for packaging waste recovery.

29) However, in future, a greater proportion of packaging will be accounted for by primary (household and other end user) packaging. Therefore recovery will be concentrated more on the recovery of household waste, especially when trying to achieve high targets at the turn of the millennium.

2.4 Treatment systems and outlet of recycling activity

30) There is evidence that recycling capacity is diminishing in 1999, particularly in plastics, but also in paper. This is likely to be, perhaps largely, the result of international market developments. However, any reduction in collection and reprocessing activity may endanger the build-up of the collection and reprocessing capacity that is required to meet 2001 target. Less reprocessing capacity, coupled with continuing absence of the increases necessary in collection capacity of some materials – in particular aluminium, steel and plastics – which arise primarily in the household waste stream, is likely to make it difficult for businesses to meet targets in 2001.

31) Table provides a breakdown of the reprocessing capacity available for each material (packaging and non-packaging) and the capacity currently reserved for packaging waste.

Table 1: Capacity of accredited reprocessors to recover or recycle (tonnes)

Material		total recovery/recycling capacity (packaging & non-packaging)	capacity reserved for packaging
Paper/fibreboard		5,000,000 [82]	1,840,000
Paper (composting)		60,000	60,000
Glass		670,000	670,000
Aluminium		375,000	75,000 [83]
Steel		6,000,000	144,000 [84]
Plastics		400,000	150,000
Incineration	- MSW - RDF - clinical waste[85] - in-house recovery	2,383,000 211,000 23,000	453,000 [86] 84,000 859

RDF: refuse derived fuel

Glass

32) There are nine glass container manufacturers in the UK. The largest three manufacturers (United Glass Limited, Rockware Glass Limited and PLM Redfearn Glass Limited) use 80% of the cullet available. T. Berryman & Sons and Glass Recycling UK are two of the largest collectors and processors of waste glass in the UK. Having obtained the waste glass from local authorities and others, they remove contaminants and crush it in their own plants, and finally sell the resulting cullet to the container manufacturers for recycling.

33) The glass container manufacturers produce around 1.9 million tonnes of glass per annum. The majority of this is clear (flint) glass. Filled glass exported from the UK totals around 440,000 tonnes per annum (mostly flint glass bottles of spirits, particularly whisky). The UK imports around 750,000 tonnes per annum of filled glass, much of which is beer and wine in green bottles. The UK's annual consumption is therefore around 2 million tonnes of glass per annum, which is estimated at approximately 600,000 tonnes of flint glass and 1.4 million tonnes of coloured glass (green and amber, but the majority of which is green).

34) Glass had sufficient collection, sorting and cullet treatment capacity to meet 1998 demands (see table 2 below). In 1998 some 657,000 tonnes of container cullet were recycled, of which some 80,000 tonnes were exported for recycling. Over half of this was likely to be green glass, one third flint and the remainder amber. Exports of cullet rose sharply in 1998 compared to 10,000 tonnes in the whole of the previous year. Destinations for the cullet include Europe and South America. The glass container manufacturers also recycle a significant amount of flat glass annually (95,000 tonnes in 1998) into new glass containers. According to DETR current total capacity to recycle glass packaging is 670,000 tonnes although, subject to the prevailing commercial conditions, there are plans for this to increase to around 730,000 tonnes by 2001. There is adequate remelt capacity for brown and clear glass at present.

35) In 1998, total glass packaging recycled was 22% with the total for all glass recycled at 26%. The UK glass recycling rate has remained more or less static over the last three or four years, but the container glass manufacturers are committed to maximising their use of cullet.

[82] includes newspapers, tissue, printing papers and other non-packaging paper
[83] the industry could recycle up to 375,000 tonnes of packaging if the material was available
[84] figure from the EA. Theoretically the industry could recycle up to 6 million tonnes of packaging if the material was available
[85] Agencies have provisionally agreed that 6% of clinical waste is deemed to be packaging
[86] 19% of 2.38 million tonnes

36) The capacity for recycling green cullet is very different to that for flint and amber. It is estimated that there is approximately twice the capacity for clear and amber cullet usage within the container glass industry than is currently collected. More green glass, however, is collected now than can be recycled by the glass container manufacturers. British Glass Ltd provides the following figures on glass recovery and recycling in UK.

Table 2: UK Glass Recycling Figures 1998

Total glass including flat recycled in 1998:	574,000 tonnes
Total glass packaging recycled in 1998:	476,000 tonnes
National production of glass in 1998:	1.83m
Percentage of glass packaging recycled:	22%
Percentage of glass recycled including flat:	27%
European average recycled:	Over 50%
Number of districts with bottle banks sites:	426
Total number of bottle bank sites at end of 1998:	22,821
Current number of public bottle bank sites:	17,291
Current number of commercial bottle bank sites:	4,530
Bottles and jars in a tonne:	Approx. 3,000
Bottle and jars per kilo:	Approx. 3
Year of first bottle bank scheme:	1977
Glass as a percentage of the average household dustbin:	8 - 10%
Current ratio of Bottle bank sites per head of population:	1:2,700

Paper

37) UK paper production amounts to around 6.5 million tonnes per annum of which some 1.4 mt were exported and 7.2 mt were imported. Paper packaging placed on the market amounts to around 4 million tonnes. In 1997 some 5 million tonnes of paper and board were recovered from the waste stream. Of this, 4.6 million tonnes were recycled, of which around 1.8 million tonnes were paper packaging. The remainder was exported. The majority of waste paper recovered originates from the commercial and industrial waste streams, but increasing amounts are recovered from household waste each year. Currently, due to the imbalance of trade and existing UK production capacity limitations, some 5 million tonnes of waste paper are either landfilled or incinerated.

38) The industry manufactures a wide range of virgin and recycled products. 63% of the fibre used by the industry today is waste paper, and this amount is increasing each year. While non-packaging paper waste may be recycled into packaging to a limited extent, the reverse is largely not possible. Some mills (reprocessors) have considerable facility to vary their source of raw material - virgin material, packaging waste or non-packaging waste. Their choice depends upon the product they are making, its quality requirements and economic considerations. However, although the proportion of waste paper used in production is relatively high, the overall recovery rate for the UK is low due to the high level of imports of paper products. The demand for paper and board in the UK cannot be satisfied from indigenous production alone, and this places limitations on the levels of recycling possible in the UK.

Aluminium

39) Aluminium packaging represents the major part of non-ferrous metal in household waste and is made up of drinks cans, foil and some aerosols and enclosures. Around 95% of aluminium packaging waste arises in the household waste stream. The UK recycling rate for aluminium drinks cans has grown consistently to reach 34% by the end of 1997, with 1.4 billion cans being recycled that year. In 1998 some 14,500 tonnes of aluminium packaging waste were recycled. The collection of aluminium packaging for recycling is driven by the intrinsic high value of the metal. For drinks cans, the industry-led 'cash-for-cans' system enables collectors to be paid cash for every can collected. In 1997 nearly £10 million was paid to consumers in this way. In the case of aluminium foil, community groups, charities and schools benefit directly from the value of the foil collected through more than 100 local authority-assisted projects nationwide. Aluminium packaging is also increasingly being collected for recycling through kerbside and bank schemes.

40) There are sound environmental and economic benefits associated with recycling aluminium. The use of secondary aluminium compared to primary may save up to 95% of the energy used in the production process. The capital cost of the capacity required to produce secondary aluminium is only a fraction of the cost of a primary smelter. Secondary aluminium is equivalent to primary in composition and quality and is price competitive. The aluminium industry has invested more than £60 million over the past ten years in increasing aluminium packaging recycling rates. This has funded consumer education, collection infrastructure development, support of collection programmes and the provision of reprocessing capacity, backed up by guaranteed end-use markets. The aluminium reprocessing industry reports that it now has sufficient installed capacity (375,000 t) to handle current and future demands.

Steel

41) There are five major British Steel plants in the UK with a further 3 operating independently. Some 6 million tonnes of ferrous scrap is recycled in the UK each year and this well established industry has no effective limit on the quantities of packaging waste it can consume. Steel scrap is an international commodity and is subject to cyclical variations in supply and demand which impacts on packaging waste recycling economics. Around 78% of steel packaging waste arises in the household waste stream. The barrier to increased recycling in steel, as in aluminium, is the quantity of metal collected. There does not appear to be any failures in demand for steel, the issue is the need to increase collection.

Plastics

42) Surveys suggest that each UK household generates each week approximately 0.6 kg of 'dense plastics' waste (bottles, food packaging and other non-film items) and 0.6 kg of plastic film waste. This amounts to some 1.3 million tonnes of household plastic waste per annum.

43) Plastics recycling companies are often small and medium sized enterprises (SMEs), typically with a capacity of 5,000 to 20,000 tonnes per annum. In general the plastics industry is more diverse and fragmented than the other main recycling industries, partly because of the diversity of polymers and products and partly because of the comparatively low investment necessary to set up a recycling plant. Feedstock recycling plants can handle a significantly higher tonnage and require major capital investment (in the region of £20 million). Feedstock recycling processes are not market limited in the same way as mechanically recycled processes as the resulting product is vertically integrated into the plastics producing industry.

44) The plastics industry has installed recycling capacity for some 400,000 t per annum. However 250,000 t of this is, and would continue to be for economic reasons, used for the

recovery of in-house production waste. Plastics packaging waste recycling capacity is therefore currently estimated to be 150,000 t with forecast growth to around 255,000t by 2001. Around 65% of plastic packaging waste arises in the household waste stream. RECOUP (Recycling of Used Plastic Containers) estimates that in 1998 11,000 tonnes of post-consumer plastic packaging were recovered from the household waste stream.

45) There are two methods of recycling plastic: mechanical recycling and feedstock recycling. Mechanical recycling is the physical separation and treatment of plastics waste, mainly by single polymer types, where the original plastic or polymer characteristics are retained. Feedstock recycling is the conversion of plastic waste back to its original hydrocarbon base. This can be conducted in one of two ways according to the polymer type: chemolysis with conversion from single polymer type (e.g. PET, PU) back to intermediate building blocks for condensation polymers; or thermolysis where heat and/or pressure is used to convert mixed plastics waste (e.g. PE, PP, PS, PVC) back to original hydrocarbon building blocks. Almost all UK plastics material is recycled mechanically. Feedstock recycling is a comparatively new technology.

46) The margin between the cost of the recovery process (from collection of waste material to production of end products) and the income obtained for the end products varies significantly depending on polymer type, source of material and end market. The economics of the feedstock recycling process are such that they require much larger economies of scale to support the investments required. A national or regional logistics infrastructure is necessary to generate regular quantities and qualities of feedstock raw materials that will make capital investment in feedstock plant viable.

Wood

47) Wood and 'other' packaging materials are widely used but data on wood packaging is sketchy. It is estimated that some 1,300,000 tonnes of wood packaging is used, predominantly for commercial and industrial packaging. Under the UK Regulations there is no material specific recycling obligation on wood and 'other packaging materials', but the statutory recovery obligation comes into force on 1 January 2000. Strenuous efforts will be needed to initiate effective collection systems and develop recovery processes for wood packaging waste. For planning purposes it has been calculated that 150 - 200,000 tonnes will be recovered in 2000 and perhaps 300 - 400,000 in 2001.

Other Materials

48) Falling under this category are such materials as jute, hessian, textiles, ceramics, earthenware and any others not otherwise covered. It is estimated that some 40,000 tonnes of such miscellaneous materials enter the packaging waste stream annually, but data on these 'other packaging materials' are particularly insufficient and need improvement.

Energy from Waste

49) The significance of EfW is been mentioned in the context of paper and plastics. Lesser amounts of aluminium packaging are also recovered. It is a well established technology and the national installed capacity is now 2,500,000t/year which consumes 475,000t of mixed packaging waste. Three new EfW plants are under construction. 8 more are awaiting planning permission which would bring capacity up to 4 mt and add a further 120,000 tonnes to the packaging waste reprocessing capacity.

Table 3: Breakdown of current EfW capacity

Municipal Solid Waste	398,429 tonnes
Refuse Derived Fuel	49,066 tonnes
Packaging in clinical waste	859 tonnes

50) The absence of sustainable end-use markets for recycled materials affects glass, plastics, wood and to some extent paper. A marked increase in the use of recyclate is fundamental to the cost-effective achievement of the recovery and recycling targets. It is particularly important when considering this problem to take account of the wider context in which the packaging recovery and recycling regime operates.

51) The development of new sustainable markets is an urgent requirement. External factors such as international supply and demand affecting both virgin and secondary material prices, will continue to affect the viability of collection and reprocessing systems. This has, of course, been a fact of life for some time and, while steps can be considered to ease the impact of such factors, their changeable influence must realistically be accepted as part of the context in which the obligation is placed on industry.

52) The development of end-use markets is such a significant factor in the successful functioning of the UK packaging recovery system that investment in the development of alternative sustainable end-uses for recyclate needs to be planned urgently, initiated at an early stage and sustained over a period of time. It does not look as though market conditions can be relied on to be favourable enough to achieve the appropriate recyclate demand levels. (see chapter 3 for further information on constraints and possibilities for the development of new markets for recyclates)

2.5 Financing of the system

53) Firms will face costs associated with (a) initial registration, (b) annual supply of data and calculating recycling and recovery obligations, (c) facilitating sufficient recovery and recycling of packaging waste in order to meet their obligations and obtaining supporting evidence of compliance and (d) submitting Certificates of Compliance[87]. In 1999, all obligated firms that comply individually had to pay a £750 registration fee. This is assumed to cover the Agencies' administration costs and costs of monitoring compliance. As businesses can discharge their obligations entirely through compliance scheme membership or PRN purchases, they may, but will not necessarily, incur the cost item c). In a move to ensure stronger enforcement and monitoring of the regulations, the Agency registration fee has increased from £750 to £950 from 2000 for individual compliers. The Consultation Paper on the Charging Mechanism for Registration Fees for Compliance Scheme Members from June 2000 considers options for altering the current mechanism according to which the registration fee payable by a member of a scheme to the relevant Agency is calculated.

54) Those who have joined compliance schemes will have to pay a joining fee. There are seventeen compliance schemes all with different joining fee arrangements. Some schemes charge a one-off joining fee, while others charge an annual subscription or a materials levy. The fee is sometimes the same for all members, in other schemes this is varied according to turnover. Given this variation, the costs of the joining fee are not estimated.

55) Evidence of compliance from individual obligation holders and collective schemes generally takes the form of certificates from an accredited reprocessor, certifying that a given

[87] Bailey, Ian G., 1999

tonnage has been recovered or recycled at reprocessing facilities - the so-called Packaging Waste Recovery Notes (PRNs). The reprocessors sell the PRNs to compliance schemes and individually obligated producers.

56) The Packaging Waste Recovery Note (PRN) system was devised to demonstrate compliance with the recovery and recycling obligations under the packaging Regulations, to deter fraud and to generate resources for increased investment in the reprocessing and collection capacity, and the development of end-use markets. PRNs can only be issued by reprocessors who are accredited by the Environment Agency or the Scottish Environmental Protection Agency. Stark reality dictates that if the soft market for PRNs continues in the near future, PRN prices continue to be very low and this mechanism is not directing sufficient investment at the collection infrastructure as expected, alternative ways of directing the necessary investment need to be considered now. Prices in early 1998 ranged from £20 per tonne for an aluminium PRN, through £28 for paper to more than £100 in certain instances for plastics PRNs. In September 1998 prices plummeted to less than half the levels prevailing in early 1998 and have never recovered since.

57) The PRN system started operating in January 1998 concurrently with the entry into force of the obligation to recover and recycle packaging waste. Extensive discussion of the PRN system and ways of ensuring that the main objectives would be achieved have occurred and are still going on (will be updated). The main concerns seem to be:

- Lack of transparency. There is concern about what reprocessors are doing with revenue received from the sale of PRNs; concern that a price, sometimes a significant one, was being put on a PRN with no indication of the factors leading to the setting of the price or the policy of the reprocessor on PRN pricing; and concern that resources were not, as intended, flowing towards increasing collection and reprocessing capacity and developing markets for recyclate;
- who should have the right to receive a PRN?
- concern about the development of a secondary market in PRNs, in particular, trading in PRNs by non-obligated parties for their own profit;
- concern that PRNs are not equally available to all obligated parties.
- As businesses who collect their own waste for reprocessing are still obliged to pay for their PRNs, many sectors (e.g. Biffpack, British Retail Consortium) complain that there is no incentive for them to recover waste for recycling. This is a major inhibitor.

2.6 Monitoring and control

58) Responsibility for enforcing the Packaging Regulations rests with the Environment Agency in respect of England and Wales, and SEPA in respect of Scotland. Regulation 25 places a duty on the Environment Agency to monitor compliance with the above Regulations in England and Wales. The first round of data provision under the Regulations took place in 1997 and it is this data, provided annually by obligated businesses, that provides the basis for assessments of the amount of packaging waste in the waste stream. This duty covers:

- registered producers;
- scheme operators; and
- companies the Agency considers may be producers, but are not registered with an Agency or a compliance scheme.

59) Regulation 25A states that "The appropriate Agency shall take such steps as seem to it appropriate to publish, in relation to each year commencing with 2000, the following details of the monitoring carried out under regulation 25.

- the Agency's policy in relation to monitoring and enforcement of producer responsibility obligations; and
- an indication of the minimum number of persons which it proposes to monitor in the course of that year."

Priority Areas for monitoring in 2000 will include[88]:

- Companies the Agency suspects may have obligations under the Regulations, but have not registered with an Agency or a compliance scheme. It is important that free-riders are identified and brought into compliance with the Regulations. This results in the UK's recovery and recycling burden being shared more equitably;
- Companies in Sectors with suspected under-declaration of packaging. Specific sectors will be targeted during the course of the year to investigate perceived under-reporting;
- Companies with particularly large recovery and recycling obligations. A relatively small number of companies can have a disproportionately large impact on the UK meeting its recovery and recycling obligations, it is important that these companies are meeting their obligations;
- Companies that have declared a significant proportion or quantity of exports, third party exports or special packaging. The Agency wishes to ensure that declarations in these areas are as accurate as reasonably possible and are always supported by reliable evidence; and
- First-time registrants. The Agency recognises that if it can correct misunderstandings and data errors at an early stage there should be longer-term benefits in terms of a reduced requirement for enforcement action. Monitoring of these registrants is likely to include organising local data workshops at which data submissions can be checked and justified.

60) It is important to note that compliance monitoring will not be restricted to these groups; all producers should check their data and maintain their records on the assumption that they will be contacted during the course of the year.

Monitoring of Registrants

61) The Agency monitors registrants in a number of ways. Many will be subject to a site visit usually involving two Agency Officers. The visit will include inspection of documents, validation of data, and a tour of the site to identify packaging types and activities. Some registrants may require a subsequent visit; this is likely to be the case where records and activities are based at different locations.

62) Visits are preceded by preparatory work such as checking current and previous data forms and reviewing previous advice given to the company. Visits give rise to a number of follow-up actions including preparing a site visit report, requesting resubmission of data where appropriate and, sometimes, the instigation of formal enforcement action.

63) The Agency also targets specific aspects of the Regulations (e.g. special packaging, exports, etc) and may choose to monitor compliance with these aspects through requesting and analysing supporting documentation.

64) Besides the specific contact with individual companies identified above, the Agency will also undertake routine 'logic checking' of all registration forms, data and Certificates of Compliance associated with companies registered with the Agency. This work will predominantly be undertaken by the Agency's Registration Unit based in London.

88 SEPA Web site: http://www.sepa.org.uk

65) The identification of 'free-riders' has been a priority since the Regulations came into force. The Agency analyses business directories to identify companies that exceed the turnover threshold and are within industrial classifications associated with handling significant quantities of packaging. Such companies are contacted and many will receive a site visit. In some cases it will also be necessary to make contact with holding companies and other group members.

66) The Agency also acts on reports received from trade bodies and registered producers and investigates previously registered companies, which do not renew their registration.

67) The Agency's achievements in this area are reflected in year-on-year increases in the number of businesses covered by registrations and a significant amount of enforcement action against companies which fail to meet the requirements of the Regulations.

Monitoring of Scheme Operators

68) The Agency principally monitors scheme operators through considering their compliance plans, and analysing data returns and comparing them with data obtained from the monitoring of individual scheme members. Scheme data is also analysed for trends which might suggest that obligations are not being declared or met in full.

69) There are currently 16 compliance Schemes based in England and Wales. The Agency will scrutinise data and other submissions from Scheme operators. Periodically, the Agency may request additional information from Scheme operators and will visit each scheme operator during the course of the year.

Monitoring of accredited Reprocessors and Exporters

70) All reprocessors and exporters are visited when they first apply to be accredited and when they renew their annual accreditation. For reprocessors, the Agency will, amongst other things, ensure that the applicant:

- has an adequate understanding of the Packaging Regulations (in particular, the ability to identify packaging waste from other materials);
- is reprocessing packaging waste; and
- has in place an auditable system of record keeping.

71) In addition, all accredited reprocessors and exporters are subject to not less than one annual compliance inspection; these may be unannounced. There are currently around 250 accredited reprocessors and exporters. Accreditation may be suspended or removed whenever the Agency suspects the rules of accreditation are not being adhered to. Should fraud be identified, accreditation will be removed.

Costs

72) The typical cost of monitoring a registrant (including preparation, travel, site visit and follow-up) is approximately £700. The total cost of compliance monitoring for 2000 is predicted to be around £1.95m; this represents approximately 80 percent of fee income for 2000. The registration fee is not intended to cover the cost of taking formal enforcement action (prosecutions, etc)

73) The Agency's monitoring activities discussed above are funded from the annual registration fees paid by producers registered with the Agency or a Compliance Scheme based in England or Wales. PRN revenue does not fund the Agency's monitoring work. PRN

revenue goes to accredited reprocessors to expand collection and reprocessing capacity and to develop markets for reprocessed packaging waste.

Data to be supplied by obligated businesses:

74) The main difficulty for most businesses is generating the packaging flow information. While all the compliance schemes offer some assistance the responsibility for providing accurate data rests with the business. Therefore for 1997, 1998 and 1999 "producer's reasonable estimates" were acceptable. For 2000 and beyond the data has to be "as accurate as reasonably possible".

75) **Reasonable estimate** means that some thought should have gone into its calculation, but it is not expected that every package will be individually accounted for. Therefore, trade association ready reckoners, rough pro rata calculations based on a small representative sample, average weights multiplied etc. was acceptable[89].

76) **As accurate as reasonably possible** means that businesses are expected to account by weight for every item for which you have a responsibility, including imports. For most, this will require detailed figures from suppliers and will mean the introduction of a database by the beginning of 1999 to record that year's packaging by weight. The responsibility does not demand that companies recover a proportion of the actual packaging they have handled. It simply means that companies have to own proof of recovery of an equivalent proportion of their responsibility percentage multiplied by the actual target percentages.

77) Businesses affected by the packaging waste regulations are required to submit data on the following:

- the tonnage of packaging raw material manufactured in the UK, tonnage that gets converted into packaging, tonnage of packaging into which products are placed, tonnage of packaging around products that are supplied to the final user.
- tonnage of the above listed materials that is exported by the producer or by third parties
- tonnage of the above listed materials that is imported into the UK
- to submit PRNs, PERNs or alternative evidence to demonstrate compliance with the recovery and recycling obligations

2.7 Quantities of circulated packaging and recovered packaging waste

Packaging and Packaging Waste Arising / Recycling and Recovery

78) What the figures shown below are suggesting is that the present recovery rate will have to increase by more than half as much again between now and 2001 if 50% of the packaging waste stream is to be recovered as required.

89 Packaging Flow Data Form Guidance Notes, Biffpack

Table 4: Predicted UK Recovery and Recycling and UK requirement based on packaging in waste stream plus annual growth

	1998	1999	2000	2001
Total packaging in the waste stream (tonnes)	8,7440,000*	8,912,981*	10,586,300	10,765,902
Required recovery to meet Directive targets				50%
Current recovery	3,322,715			3,322,715
Excess/shortfall against current recovery				-2,060,236

excluding wood/other as no recovery/recycling obligation on these in 1998,1999

79) Table 5 below shows estimates of the amount of each packaging material flowing into the household and commercial/industrial waste stream. In percentage terms, the following are the percentages of each packaging material which becomes waste in the household waste stream – roughly half the tonnage of packaging flowing into the waste stream is waste arising in households. Some materials (for example glass or aluminium) are found principally in the household stream.

Table 5: Estimated proportion of packaging materials arising in the household and commercial/industrial waste streams

Material	household stream [%]	commercial/ industrial stream [%]
Aluminium	96%	4%
Steel	78%	22%
Plastic	71%	39%
Glass	84%	16%
Paper	13%	87%

Source: Waste Strategy 2000 for England and Wales Part 2

80) This illustrates the degree to which it is important for consideration to be given now to ensuring that systems will be in place to permit sufficient household packaging waste recovery in 2001.

Import/Export of Packaging Waste

81) The table below shows estimates on the amount of packaging waste exported for recovery. Of the total recovery 12% was effected through the export of packaging waste, a substantial increase to earlier estimates and likely to be exceeded again in 2000 and 2001. It was most significant, in proportionate terms, for steel, glass and plastics with only insignificant and unrecorded amounts of aluminium packaging exported.

Table 6: Estimated recovery of packaging waste within the UK and abroad

Material	Tonnage '99	Total Recovery '99	Exports	
			tonnes	%
Paper	3,855,000	1,769,088	49,814	3%
Glass	2,155,000	451,407	131,170	29%
Aluminium	109,000	15,402		
Steel	750,000	123,524	101,654	82%
Plastics	1,600,000	160,821	24,904	15%
Total	8,469,000	2,520,242	126,558	12%

82) Performance to date by the UK in meeting its recovery target in 2001 shows that while it will fulfil the recycling targets of 15% material specific recycling rates and the 25% overall recycling rate, achieving the 50% recovery target will be much more difficult. Reaching the 2000 target should be reasonably simple in that there will be a considerable amount of wood recovery, estimated at over 150,000 tpa that will be added to the total UK recovery levels. In addition, exports of most packaging waste materials have continued to increase[90].

[90] Cooper, Jeff: The EU packaging and packaging waste directive: UK response. 2000

3 Current situation

3.1 Impacts on waste collection systems

83) The different nature and circumstances of the various packaging materials give rise to specific problems, which need to be addressed accordingly. The overview below shows the various problems.

Table 7: Material specific issues to be addressed

	Collection from Households	Comm. & Industry	Reprocessing	End-use
Aluminium	*			
Glass	*			*
Paper				*
Plastics	*		*	*
Steel	*			
Wood		*	*	*

84) Inadequacies in the collection infrastructure particularly for household packaging waste, affect aluminium, plastics, steel and glass. The commercial/ industrial source is already achieving a relatively high rate of recovery (in excess of 2 million tonnes in 1998) and, while there is still potential for greater volumes from this source in some materials, growth in collection of commercial/industrial packaging waste is likely to become increasingly difficult. Collection of glass, steel, aluminium and plastic packaging waste from the household waste stream is already an important source; as the recovery requirement rises, additional tonnages of these materials from this source will be crucial to meeting targets.

85) Throughout 1998 it was evident that some collection systems were closing down rather than expanding - and economic conditions would not have helped - but to meet the Directive targets, such systems are going to have to expand. There has been a marked reduction in new schemes being established, for instance, some local authorities have withdrawn from or reduced kerbside collection (eg. Winchester, Bury St Edmunds). Closure of the Reprise PET processing plant, along with a halt in the expansion of plastic bottle collection facilities (whether kerbside or bring systems), mean that there has been a set-back in the much needed expansion of plastics collection from households (and the same sort of expansion is needed for aluminium and steel). This loss of collection capacity, together with the need to allow for between 1 to 2 years lead-in time to get new systems into operation, means that urgent steps need to be taken to expand collection systems now so that an increasing percentage of the total packaging waste required can come from this source.

3.2 Impacts on treatment systems and secondary material market

86) The Packaging Waste Recovery Note (PRN) market has, with the exception of the first half of 1998, experienced low prices. Consequently, lower than expected levels of investment have been directed at increasing collection and reprocessing capacity, and developing end-use markets, in order to meet the 2001 targets. Following the consultation in 1998, the targets for 1999 and 2000 were raised because it seemed that otherwise the UK was not on course to meet its 2001 targets. The increase in targets also provided some tightening of the PRN market by virtue of increasing demand, but the market has remained generally flat

nonetheless as the targets for packaging waste recovery and recycling are not the only influences; prevailing UK and international virgin and recycled materials prices are also influential (DETR, Consultation Paper on Recovery and Recycling Targets for Packaging Waste in 2001, August 2000)

87) The following more specific issues must be considered when planning for higher recovery of materials:

Paper:	paper is vulnerable to international commodity based pricing and trading. Investment is required by both collectors and reprocessors to compete internationally.
Metals:	the metals industries may continue to accommodate imports of packaging waste. In the case of steel and aluminium there is a current recycling over-capacity, which is being utilised by importing packaging waste to make the process economic (aluminium); collection needs to increase.
Glass:	collected glass has to compete against a plentiful raw material (sand); alternative uses urgently required - particularly for green / mixed glass.
Plastic:	Major producers have limited involvement in recycling activities. High collection costs have proved the major barrier to increasing recycling levels

Paper

88) Paper is vulnerable to the fluctuations in world-wide demand. Paper packaging waste is an international commodity and its value varies greatly from time to time in a generally unstable market. However, there is further scope, with respect to some paper products, for a further increase in recycled fibre content. These include the printings and writings market, corrugated box packaging and pharmaceuticals packaging (folding box board). The major barrier to increased use of recyclate was the now outdated, but still persisting, perception that recycled paper is inferior. As a result, the UK has tended to overspecify the quality of paper required. The UK uses packaging which has a higher virgin fibre content than that typically used in Europe.

89) The production capacity limit at UK mills is also relevant - paper mills in the UK are currently operating at close to full capacity and further investment in new reprocessing capacity will be needed to cope with the demand that will be produced by the 2001 packaging waste recovery targets. There was sufficient collection and reprocessing capacity to meet 1998 demands for packaging waste recycling. Further increases in paper reprocessing capacity, in particular recycling are planned. New investment in technology and production capacity should, if the right commercial conditions prevail, rise to 4.4 million tonnes by the year 2001 which suggests that some 2.3 million tonnes of packaging waste would be consumed. Economic factors will determine how much of this is actually utilised.

Aluminium

90) The main barrier to increased recycling in the aluminium market is the need to increase collection rates. At present it has to use imported waste currently estimated to be 50,000 t per annum, solely to reach economic utilisation levels, but this figure is expected to decrease as increasing amounts of UK packaging waste are collected for reprocessing. The only barrier to increased recycling appeared to be the quantity of metal collected. More metal could be recycled provided it could be collected economically.

Steel

91) In 1998 182,000 tonnes of steel packaging were recycled in the UK and overseas. In order to achieve 50% material recycling in steel packaging, an additional 181,000 tonnes of

steel packaging would need to be recycled. Representing only 2.5% of total UK ferrous scrap arisings, this is unlikely to affect steel scrap markets significantly and the industry does not anticipate any difficulty in recycling new arisings. The only barrier to increased recycling appeared to be the quantity of metal collected. More metal could be used provided it could be recovered economically.

92) Energy from Waste plants yield some steel packaging waste for recycling but the increases will be restricted by the delays in commissioning new EfW capacity. Magnetic extraction equipment would be routinely installed at new EfW plants. British Steel has established a national infrastructure for processing steel cans extracted from EfW plants to render them suitable for recycling. Other independent steel manufacturers have also established upgrading systems for reprocessing magnetically extracted steel cans. Future increases are based on the assumption that EfW plants will be commissioned, generating an extra 7,500 tpa. A similar tonnage could be achieved by commissioning magnetic extraction systems at "wet" and "dry" material recovery facilities. Installing magnetic extraction systems at an additional four waste transfer stations could provide an extra 8,500 tonnes per annum for recycling, bringing the total additional capacity to 23,500 tonnes annually. The extent to which these plans will be realised will depend on the willingness of operators to invest in recovery systems and to do so by 2001. They will also depend on the amount of investment, whether from PRNs or otherwise, which is raised.

93) The increases in recycling depend amongst other things on kerbside collections being extended from the 1996 level of 7.5% of households to 30% of households by 2001. This would collect an extra 20,000 tonnes per annum. They also depend on increases in ’bring systems’ tonnages by 50% in 2001. If this materialised, an extra 5,000 t per annum of steel packaging waste would be collected. However, there is a notable absence of multi-material recovery schemes to achieve these increases which must place some doubt on the achievement of the forecast levels of recycling (ie. total estimated recycling).

Glass

94) As cullet recycling increases, there is also a need to improve cullet quality in terms of better colour separation and reduced contaminants. This must be done to maintain new container quality while incorporating ever higher recycled contents. A current concern is the variation in quality of collected cullet. Some sources provide excellent sorting while others offer poor mixtures which have to be rejected. In addition, there is a tendency amongst the public not to deposit jars as well as bottles for recycling, which reduces the amount of flint glass collected.

95) One barrier to increasing glass recycling is the inconsistent quality of cullet and, in particular, the need for alternative applications for green cullet. The colour imbalance is a result of the large amount of green glass imported into the UK and clear glass exported. As glass collection increases, the excess of green cullet for which there is no capacity in the glass container industry could rise to 200,000 t by 2001. The green colour in glass is due to the presence of chromium, and the British Glass Manufacturers Confederation have investigated the possibility of using decolourisation techniques to remove chromium from a glass melt using electrolysis. However, although this is theoretically possible, tests have shown that it is not a practical option.

96) In addition, the introduction, under the packaging Regulations, of the PRN system for packaging waste recycling, has had an effect on the costs of recycling in the UK. Current very low PRN costs mean that funds are not available to subsidise exports of green cullet. Possible solutions include a reduction in imports of green glass and the development of alternative markets for green cullet. The main alternative use for cullet is as an aggregate substitute in

building and construction applications. Applications such as brick manufacture, tile manufacture, clay pipe manufacture, road building, foam block manufacture and cement manufacture have all been identified as possible alternative uses of cullet.

97) However, it appears debatable whether such applications would be economically viable. In addition to the costs of collecting the cullet, most such applications require the glass to be ground finely before use and this is an expensive operation. Since the cullet would generally be substituting for low cost aggregates, it is debatable whether the price that could be obtained for the material would be higher than the cost of preparing the cullet.

98) In the UK it was attempted to compare the likely costs of using glass cullet in alternative applications with the prices which are likely to be paid by the users (*Draft Waste Strategy for England and Wales*). Collection costs for cullet vary widely depending on a number of logistical and geographical factors. A typical range would be £20-£40 per tonne. The British Glass Manufacturers Confederation estimate that grinding and pulverisation costs range from around £8 per tonne to around £50 per tonne depending upon quantities processed. Aggregates are valued at around £4-£8 per tonne, but this could change with the possible introduction of a tax on virgin aggregates. This indicates the lower end of prices obtainable and reflects the prices paid for virgin aggregates. Cullet ground down and sold for decorative effects in DIY stores could retail at £150-£200 per tonne if sold in small unit quantities. The supplier might receive perhaps half this figure for his ground cullet.

99) In conclusion, the costs of producing ground cullet are likely to be in the range of £25-£90 per tonne whilst prices paid are likely to be in the range of £4-£100 per tonne. It is clear that some applications are viable but others are not, and that the possibility of extra support from recycling credits and PRNs is critical.

100) It is noted that the fineness of grind has a major effect on grinding costs. For example, for uses such as glasphalt (glass mixed with asphalt to produce a road surfacing material), which can use coarser material, grinding costs are estimated at around £5 to £10 per tonne. Such costs are still considerable, however, and can only be offset economically if the cullet is supplied free of charge to roadstone companies. Local authorities, could, however, obtain income from recycling credits, making glasphalt a viable option. Research in the USA has shown that glasphalt is in no way inferior to conventional asphalt, and it is understood that in the USA a few hundred thousand tonnes of cullet are used as glasphalt every year. Thus, glasphalt could be a significant market for excess cullet and might be an area in which further work could be carried out.

101) In addition to price, a further barrier to the use of cullet in construction and building applications is compliance with existing standards. Many British standards for construction materials are currently written in terms of recipe rather than performance.

Plastics

102) The main barrier to increased recycling was the lack of sustained competitive pricing, compared both with virgin polymer and with recyclate from commercial and industrial sources but also resistance to the use of recyclate.

103) Recyclate must be price competitive with virgin polymer in order to stimulate the use of increased volumes of recyclate. As many recyclers of plastics are SMEs, they are particularly vulnerable to rapid changes in the price at which recycled flake or pellet can be sold, as they lack the cash reserves and asset value to sustain long term pricing in a depressed market.

104) Not only must plastics recyclate produced from the household waste stream be long term price competitive with virgin material, it must also be competitive with recyclate sourced from commercial and industrial scrap sources. Industrial scrap grades tend to be more economically desirable to users due to the lower requirements for cleaning and segregation of such materials.

105) The problem of maintaining competitive pricing and the development and dissemination of innovative recycling processes are discussed in the *Draft Waste Strategy for England and Wales*. A third party financing organisation might take on the risk of variations in the value of recyclate for a specified duration, at a known premium. This would enable the recycler to offer fixed term price guarantees to collectors of materials.

106) The use of a hedging mechanism could allow the price to fluctuate within a defined price band. For example, where prices in the market fell below the lower guaranteed price, the financing organisation would fund the deficit, enabling the recycler to maintain a competitive price on recyclate sales, and where prices rose above the upper guaranteed price the financing organisation would retain any surplus. Recyclate prices might be index linked, for example, to identified virgin price indexes or, where possible, to a basket of relevant company share prices or other recognised performance indicators. Large financial institutions with long term approaches to financial risk management such as banks might be willing to offer such a service.

107) Further investigation is suggested, with financial institutions and others, of the

- feasibility of mechanisms for private companies to sell a price underwriting service for recyclate, as a hedging mechanism, and with a view to running a pilot scheme, and of the
- feasibility of mechanisms for index linking the price of recycled plastic sourced from household waste to virgin material prices in long term contracts.

108) Improvements in technology can lead to cost savings in the reprocessing of waste materials, the capability to handle a wider quality of input plastics and an increase in the quality of the end product, all of which should improve the competitiveness of recyclate.

109) It is difficult to secure funding for individual research and development projects which, by their nature, do not guarantee long term benefits since they may not result in a commercially viable product. At present such projects are considered outside the scope of compliance schemes, as their focus is on immediate least-cost plastics compliance. Opportunities for funding under the Landfill Tax Credit Scheme are be explored.

4 Further Development

110) While there are pressures in the UK to deliver interim business targets at least cost and on a year by year basis, current decisions need also to take account of the future more challenging obligations. In particular, this is so for the most urgent current challenge, which is to set the necessary infrastructure in place - particularly the collection infrastructure. If this year continues to see no account being taken of the lead-in time for establishing new systems, whether local authority collection systems for the additional tonnages of steel, aluminium and plastic that will be needed, or new reprocessing capacity, or additional end-use markets for recyclate, then obligated parties will face real difficulties in complying in 2001.

111) More significant is the fact that some of the Material Organisations forecasts of recovery will only be achieved if a number of steps are taken to increase collection of packaging waste for reprocessing. In particular:

- new markets need to be found for the current excess of green glass cullet;
- greater amounts of aluminium packaging waste need to be collected from households - of the 105,000 tonnes or so in the waste stream, currently only around 15,000 tonnes are reported as being recycled (or circa 29,000 t according to the Alupro estimate);
- the forecast levels of steel recycling are dependent on kerbside collections being increased to cover 30% of households in 2001 (from 7.5% in 1996) to increase collection by an additional 20,000 tonnes a year; and on bring systems being developed by 50% by 2001 to bring in an extra 5,000 tonnes of steel packaging waste. As must be evident, urgent action now is required to allow an increase the collection of household packaging waste in 2001.
- current estimates for plastics suggest that insufficient material will be collected to meet the 15% material specific target. It has taken 5 years to develop the current post-consumer plastic bottle systems, which currently collect 11,000 tonnes, but forward estimates suggest that around 30,000 tonnes or so of plastic bottles will be required to meet the 2001 material-specific recycling target and action now will be needed to achieve this.

5 References

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The Packaging (Essential Requirements) Regulations 1998 transpose Article 9 and 11 of the EU Packaging Waste Directive

The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 as amended in SI 1361 and SI 3447 in 1999 ('the Regulations') transpose the European Packaging Waste Directive into UK law.

The Producer Responsibility Obligations (Packaging Waste) Regulations (Northern Ireland) 1999 came into effect on 1 June 1999. The legislation is almost identical to the original Great Britain regulations.

Waste Strategy 2000 for England and Wales Part 2

ANNEX II

Database for Scenarios

ANNEX II

Data Base for Scenarios

Austria

Belgium

Denmark

Finland

France

Germany

Greece

Ireland

Italy

Luxembourg

Portugal

Spain

Sweden

The Netherlands

United Kingdom

European Union

Austria

Data compilation is done by the Ministry for the Environment based on reports of compliance schemes and on reports from companies not participating in a collection and recycling system.

In general, the packaging market in Austria is regarded to be rather stable. Mid- or long-term projections for the development of packaging consumption are not available. Projections therefore can only be derived from general developments of consumption patterns and the extrapolation of consumption development in the last years.

- According to information of the European glass association FEVE the average growth rate between 1988 and 1998 of **glass** consumption in Austria was 1.9%. However, the more recent development shows a different trend: glass consumption between 1993 and 1998 has dropped by -3 % per year and a continued decrease of glass packaging consumption can be expected, especially due to the substitution of glass packaging with plastic packaging (PET in particular).
- **Paper and cardboard** packaging consumption increased from 1991 to 1998 by 1.2% per year and between 1993 and 1998 by 2.5%. A future increase as assumed in the scenario 2 seems a reasonable estimation.
- No data are available on **plastics** consumption in the past. In assessing the future plastic packaging consumption we considered information provided by APME and TNO[1]. As a result plastic packaging consumption tonnage will increase in future. The most relevant increase is expected to take place in the field of drinks packaging made of PET. The increase of plastic packaging may also be reinforced by structural changes in consumption patterns resulting from a higher consumption of convenience products.
- With regard to **metal** packaging a rather stable development is expected.

Considering the development of packaging consumption in recent years it seems likely that a slight increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. It is assumed that consumption will most likely lie in the lower area of the defined range. The results of the scenarios for Austria are given in the tables and figures below.

Table 1: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	531	443	1,0%	581	65%	377	610	75%	458
Glass	260	199	-2,0%	217	75%	163	196	75%	147
Plastics	180	36	2,0%	215	20%	43	238	60%	143
Metal	85	29	-1,0%	78	55%	43	74	75%	55
Total	1,056	707	0,4%	1,090		626	1,118		803

[1] *TNO, 1999: Chemical Recycling of Plastics Waste (PVC and other resins)*
APME, 1998: Potential for post-user plastic packaging recycling

Table 2: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Austria

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	531	443	3,0%	693	65%	450	803	75%	602
Glass	260	199	1,0%	284	75%	213	299	75%	224
Plastics	180	36	4,0%	256	20%	51	312	60%	187
Metal	85	29	1,0%	93	55%	51	98	75%	73
Total	1,056	707	2,6%	1,326		766	1,511		1,087

Belgium

When writing this report, only figures provided to the European Commission for 1997 were available for Belgium. These were estimated on the basis of figures from FOST Plus, the accredited body for household packaging waste. Figures for industrial packaging sent to the European Commission for 1997 were estimated from the compilation of various studies realised by industrial federations. Indeed, the take-back obligation for industrial packaging came into force only in 1998 and VAL-I-PAC, the organisation for industrial packaging, has been accredited in 1999 .

FOST Plus has gathered data on household packaging for several years but it continues to recruit members. It estimated covering about 85% of the household packaging Belgian market in 1997 and more than 90% in 1999. According to some indications, FOST PLUS estimated in 1999 that “economic growth leads to an increase in the number of units sold as well as tonnage” (FOST Plus, annual report 1999)

VAL-I-PAC, the accredited organisation for industrial packaging estimated covering about 28% of the market in 1998 and 50% in 1999. Besides, the take-back and declaration obligation for small retailers (i.e. shops with an overall sales surface of 200 m^2 and less) came into force only in 2000. Information is thus also lacking for a significant part of service packaging.

We miss thus information allowing to make a specific assessment of the evolution of the packaging consumption in Belgium. Assessment of the production evolution can only be made on the basis of the figures provided by the European Federations for glass and paper-cardboard. No other information was found for other materials.

- According to information of the European glass association FEVE, the consumption of **glass** packaging in Belgium increased by 10.4% between 1988 and 1998 which represents an average annual growth rate of 1.0%. This fits with our assumed range of growth rates. These figures are confirmed by the statistics published by the Belgian Glass Federation which in its annual report 1999 gives the following figures for hollow glass[2]:

[2] Hollow glass consists of bottles and flasks (the main part), domestic glass and lighting glass.

Table 3: Glass packaging production and consumption in Belgium from 1980 to 1999

	1980	1990	1998	1999	Growth rate*	Average Annual Growth Rate*
Production	429,401	336,249	368,616	186,000	-56.7%	-4.3%
Export	268,400	283,800	352,900	106,100	-60.5%	-4.8%
Import	210,800	335,400	381,300	360,200	70.9%	2.9%
Apparent consumption*	371,801	387,849	397,016	440,100	18.4%	0.9%

* calculated

- The development of **paper and cardboard** packaging consumption in Belgium between 1991 and 1998 was according to CEPI rather discontinuous. The total paper and cardboard packaging consumption increased by 155.9% during this period. This gives an average annual growth rate of 9.9%. We have found no other information neither to confirm or deny this rather surprising trend and we suggest keeping our assumed range of growth rate.
- No information is available on **plastics** consumption in the past. In assessing the future plastic packaging consumption we considered information provided by APME and TNO[3]. In addition, the development of plastic packaging consumption is affected by two reversed trends: the decrease of weight per packaging unit and the increase of number of units put on the market. Both trends are expected to continue in future but a lighter design will not be able to compensate the increase of packaging units. As a result plastic packaging consumption tonnage will increase in future.
- With regard to **metal** packaging a rather stable development is expected.

Due to the lack of official survey during the past years, we suggest to keep for Belgium our general growth rate assumptions defined for the European level. Considering the development of packaging consumption in recent years, it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and also for paper and cardboard packaging. The results of the scenarios for Belgium are given in the tables and charts below.

Table 4: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	547	416	1,0%	598	65%	389	629	75%	471
Glass	310	217	-2,0%	258	75%	194	234	75%	175
Plastics	208	53	2,0%	249	20%	50	274	60%	165
Metal	121	85	-1,0%	110	55%	61	105	75%	79
Total	1,185	770	0,3%	1,215		693	1,241		890

[3] TNO, 1999: Chemical Recycling of Plastics Waste (PVC and other resins)
APME, 1998: Potential for post-user plastic packaging recycling

Table 5: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Belgium

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	547	416	3,0%	713	65%	464	827	75%	620
Glass	310	217	1,0%	339	75%	254	356	75%	267
Plastics	208	53	4,0%	296	20%	59	360	60%	216
Metal	121	85	1,0%	132	55%	72	139	75%	104
Total	1,185	770	2,5%	1,480		850	1,682		1.208

Denmark

Waste treatment facilities are required to keep a register of the type, origin, and quantity of waste, including materials which are recycled, incinerated for energy recovery, or disposed of. The registration system is called ISAG (Information System for Waste and Recycling) and the data must be registered in a computer standard table. The data of the register is sent to the Danish Environmental Protection Agency (DEPA) annually. All producers, exporters, or importers of empty packaging or packaging containing products (filled packaging) submit information on packaging to DEPA.

- According to data from the Danish Centre for Waste & Recycling, **paper/cardboard** packaging has decreased from 1997 to 1998 by 36,000 tonnes (-7.7 %). However, according to information provided by CEPI the paper packaging market is fluctuating considerably. Nevertheless, as consumption is already high compared to other Member States it seems likely that future consumption will not be much higher than at present. We have revised our assumptions and future consumption is calculated for scenario 1 with annual growth rates of 0 % and 2 % for scenario 2.
- While there was a strong increase of **plastic** packaging consumption from 1994 to 1997, consumption has decreased from 97 to 98 by 11,000 tonnes (-6 %). As plastic packaging consumption is already high in Denmark compared to Member States it seems likely that future growth will not be that strong as we assumed. Growth rates are revised for scenario 1 (0 %) and scenario 2 (2 %).
- For **metal** and **glass** packaging the assumed growth rates seem reasonable.

The results of the scenarios for Denmark are given in the tables and charts below.

Table 6: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	463	297	0.0%	463	65%	301	463	75%	347
Glass	202	152	-2.0%	169	75%	127	152	75%	114
Plastics	183	15	0.0%	183	20%	37	183	60%	110
Metal	58	9	-1.0%	53	55%	29	50	75%	38
Total	907	473	-0.5%	868		493	849		609

Table 7: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Denmark

Material	Base year		Estimated development scenario 2						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	463	297	2.0%	553	65%	360	611	75%	458
Glass	202	152	1.0%	221	75%	166	233	75%	174
Plastics	183	15	2.0%	219	20%	44	242	60%	145
Metal	58	9	1.0%	63	55%	35	67	75%	50
Total	907	473	1.7%	1,057		604	1,152		828

Finland

The wholesale retail trade itself monitors registration by packers and importers. The ultimate responsibility for such monitoring lies with the Ministry of the Environment aided by the Finnish Environment Institute and its regional environment centres. The data are collected by the Finnish Environmental Institute (FEI) - Suomen Ympäristökeskus (SYKE), the Environmental Register of Packaging PYR Ltd - Pakkausalan Ympäristörekisteri PYR Oy and the Association of Packaging Technology and Research - Pakkausteknologia - PTR.

For all materials our assumptions seem reasonable and, as packaging consumption is generally very low in Finland, growth rates as predicted in scenario 2 appear more likely than those of scenario 1. The results of the scenarios for Finland are given in the tables and charts below.

Table 8: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	244	138	1.0%	266	65%	173	280	75%	210
Glass	52	25	-2.0%	43	75%	33	39	75%	29
Plastics	90	9	2.0%	108	20%	22	119	60%	71
Metal	31	3	-1.0%	28	55%	16	27	75%	20
Total	417	174	0.8%	446		243	465		331

Table 9: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Finland

Material	Base year		Estimated development scenario 2						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	244	138	3.0%	318	65%	207	368	75%	276
Glass	52	25	1.0%	57	75%	43	60	75%	45
Plastics	90	9	4.0%	128	20%	26	156	60%	94
Metal	31	3	1.0%	34	55%	19	36	75%	27
Total	417	174	2.9%	537		293	620		441

France

ADEME estimates that the production of household waste increased annually by 1.35% since 1993 (Source: Cercle National du Recyclage, personal communication). Surveys of the total production of packaging waste in France are too recent to allow drawing reliable trends on the packaging production growth rate per material.

- **Glass** packaging consumption in France is very high, estimates ranging between 50 and 56kg /inh/year (Source: FEVE and France report to the EC). This consumption lies significantly above the European average of 38 kg/inh/year. According to information of the European glass association FEVE the average annual growth rate of glass consumption between 1988 and 1998 in France was 4.2% (total growth rate: 50.9%). However, available information for the plastic sector shows that plastic packaging continues to increase its market shares and tends to replace other materials (L'industrie française de la plasturgie - Ministère français de l'économie des finances et de l'industrie, 2000). We believe, our assumed range of growth rates provides a reasonable estimation for France.
- The development of **paper and cardboard** packaging consumption in France between 1991 and 1998 was according to CEPI rather discontinuous, ranging from an increase of 19.1% from 1991 to 1992 to a decrease of –4.8% from 1992 to 1993, the average being a total growth rate of 37% and an annual growth rate of 3.2%. According to a report from the French Ministry of Economy,

Finances and Industry, the produced volume continued to increase between 1995 and 1998[4]. Our assumption on future paper and cardboard packaging consumption appears reasonable for paper-cardboard in France.

- According to a report from the French Ministry of Economy, Finances and Industry, the **plastic** processing sector in France has grown stronger for several years than other sectors. In 1999, the total turn-over of the sector progressed by nearly 5 percent even though the evolution varies between sectors. Plastic packaging industry, which represents 26% of the French plastic sector, follows a regular growth for several years[5] (about 4% per year[6]).
- According to a report from the French Ministry of Economy, Finances and Industry, production of **metal** packaging increased since the beginning of the nineties even though the market for aluminium packaging is decreasing. Indeed, aluminium continues to suffer from the competition of the steel cans for drinks. French consumption of metal packaging slightly increased in 1997. International exchanges of metal packaging remain poorly developed (26% of the turnover) and equilibrated. (L'Industrie française de l'emballage – Ministère de l'Economie, des Finances et de l'Industrie, 1998).

Considering the development of packaging consumption in recent years it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. The results of the scenarios for France are given in the tables and charts below.

Table 10: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,846	2,649	1.0%	4,206	65%	2,734	4,421	75%	3,316
Glass	3,296	1,388	-2.0%	2,748	75%	2,061	2,484	75%	1,863
Plastics	1,571	102	2.0%	1,877	20%	375	2,073	60%	1,244
Metal	677	331	-1.0%	618	55%	340	588	75%	441
Total	9,390	4,470	0.1%	9,450		5,511	9,566		6,864

[4] This increase may be partially due to exportations which are increasing even though imported quantities still represent more than twice the import. (Source: L'Industrie française de l'emballage – Ministère de l'Economie, des Finances et de l'Industrie, 1998)

[5] In this sector, exportation which represents 25% of the market is roughly equal to the importation. 80% of export is destined for the EC countries.

[6] Rough estimates

Table 11: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in France

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,846	2,649	3.0%	5,018	65%	3,262	5,817	75%	4,363
Glass	3,296	1,388	1.0%	3,605	75%	2,704	3,789	75%	2,842
Plastics	1,571	102	4.0%	2,236	20%	447	2,720	60%	1,632
Metal	677	331	1.0%	740	55%	407	778	75%	584
Total	9,390	4,470	2.4%	11,599		6,820	13,105		9,420

Germany

Packaging consumption in Germany is regularly assessed by the GVM (Gesellschaft für Verpackungsmartkforschung) on behalf of the Federal Environment Agency. The calculation of packaging consumption is mainly based on the evaluation of official statistics (production, foreign trade) and on regular panel-based consumption analysis. The most recent data for 1998 however differ from those of the previous years for some materials due to a change of definitions in the amended Packaging Ordinance. Furthermore, data for 1998 are provisional as they are based on estimates.

Table 12: Packaging consumption in Germany from 1991 to 1998 (without wood and other non-quoted packaging) (1,000 t)

Materials	1991	1992	1993	1994	1995	1996	1997	1998[1,2)]
Paper / cardboard pack. [3)]	5,791	5,605	5,333	5,425	5,398	5,380	5,472	5,570
Glass packaging	4,637	4,426	4,223	4,127	3,954	3,811	3,715	3,740
Plastic packaging [3)]	1,656	1,594	1,507	1,547	1,570	1,499	1,519	1,485
Metal packaging [3,4)]	927	876	812	813	829	813	807	832
Total packaging	13,010	12,502	11,875	11,912	11,751	11,504	11,513	11,627

1) Since 1998 definitions of the amended Packaging Ordinance were applied
2) Estimation of GVM (Gesellschaft für Verpackungsmarktforschung)
3) including composites on the basis of the particular material
4) Since 1998 aluminium-containing composites on the basis of plastics are include. Thus, data are not directly comparable to those of the previous years.

As shown in Table 12 packaging consumption in Germany has decreased significantly from 1991, when the Packaging Ordinance was adopted, to 1996 by about 1.5 million tonnes (-11.6). All packaging materials were affected by this development, the decrease having been strongest for glass with –18 %. From 1996 to 1998 consumption began to increase again slightly. It seems as though packaging consumption declined as a result of the adoption of the Packaging Ordinance and reached a standstill in 1996. In spite of the slight restarting increase, packaging consumption in 1998 lay for all materials clearly below the level of 1991.

In general, the packaging market in Germany is regarded to be rather stable. Mid- or long-term projections for the development of packaging consumption are not available. Projections therefore can

only be derived from short-term prognoses on sales packaging, general developments of consumption patterns and the extrapolation of consumption development in the last years. However, it has to be taken into account that the market of drinks packaging is strongly influenced by the German regulation in favour of refillable bottles (re-use quota). A change of policies in this respect would clearly affect the choice of packaging material for drinks and would very likely result in a decrease of glass packaging consumption.

- According to the figures determined by GVM **glass** packaging consumption declined from 1991 to 1998 almost continuously with an average of -3 % per year. In short term (up to the year 2000) a further decrease of glass packaging consumption is expected especially due to the increase of PET bottles.
- **Paper and cardboard** packaging consumption declined from 1991 to 1996 to recover subsequently slightly by less than 2 % per year. Projections on future packaging consumption are not available. A slight future increase as assumed in the scenario 1 seems a reasonable estimation.
- From 1991 to 1996 **plastic** sales packaging has decreased discontinuously and increases since then by about 2 % per year. The consumption in 1997 lay about 4 % below the level of 1991. This development is the result of two reversed trends:
    - the decrease of weight per packaging unit (the average weight per unit has decreased from 1991 to 1997 by ca. 13 %)
    - the increase of number of units put on the market

  Both trends are expected to continue in future but a lighter design will not be able to compensate the increase of packaging units. As a result plastic packaging consumption tonnage will increase in future, reinforced by structural changes in consumption patterns, especially due to a higher consumption of convenience products. (Schüler, 1999)[7] The most relevant increase is expected to take place in the field of drinks packaging made from PET. In Germany up to present PET consumption is very low compared to other MS. According to PETCORE consumption of PET-bottles in Germany lay around 60,000 tonnes in 1997 and is expected to increase in the coming years by appr. 20 % per year. As PET-bottles are mainly used for soft drinks and mineral water PET competes especially with glass bottles.
- Since 1991 **metal** packaging consumption has decreased by about 2.3 % per year. While for tinplate packaging a further decrease is expected in the short term aluminium packaging consumption is reckoned to remain on the current level.

It is assumed that consumption will most likely lie in the lower area of the defined range. The results of the scenarios for Germany are given in the tables and figures below.

Table 13: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	5,448	4,659	1.0%	5,958	65%	3,873	6,262	75%	4,697
Glass	3,750	3,147	-2.0%	3,127	75%	2,345	2,826	75%	2,120
Plastics	1,502	731	2.0%	1,795	20%	359	1,982	60%	1,189
Metal	1,121	920	-1.0%	1,024	55%	563	974	75%	731
Total	11,822	9,457	0.1%	11,905		7,140	12,045		8,736

[7] Schüler, GVM, 1999; Verbrauch von Kunststoffkleinverpackungen: Strukturelle Entwicklungen und ihre Ursachen. Vortrag im Rahmen des Expertenworkshops "Kunststoffkleinverpackungen: Grüner Punkt oder Rote Karte?" vom 9.11.199 in Wiesbaden. Veranstalter BKV

Table 14: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Germany

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	5,448	4,659	3.0%	7,108	65%	4,620	8,240	75%	6,180
Glass	3,750	3,147	1.0%	4,102	75%	3,076	4,311	75%	3,233
Plastics	1,502	731	4.0%	2,138	20%	428	2,601	60%	1,561
Metal	1,121	920	1.0%	1,226	55%	675	1,289	75%	967
Total	11,822	9,457	2.4%	14,574		8,799	16,441		11,941

Greece

Data on packaging consumption in Greece are not available. We have used information provided by European material association and extrapolations from comparable countries to estimate the present and the future packaging consumption. As no other information were available our general assumption on growth rates are applied. The results of the scenarios are shown in the tables below.

Table 15: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Greece

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	317	n.a.	1.0%	347	15%	52	364	65%	237
Glass	154	n.a.	-2.0%	128	15%	19	116	75%	87
Plastics	219	n.a.	2.0%	262	15%	39	289	20%	58
Metal	90	n.a.	-1.0%	82	15%	12	78	55%	43
Total	780	n.a.	0.6%	819		123	848		425

Table 16: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Greece

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	317	n.a.	3.0%	414	15%	62	479	65%	312
Glass	154	n.a.	1.0%	168	15%	25	177	75%	133
Plastics	219	n.a.	4.0%	312	15%	47	379	20%	76
Metal	90	n.a.	1.0%	99	15%	15	104	55%	57
Total	780	n.a.	2.7%	992		149	1,139		577

Ireland

As Ireland has not yet submitted official data on packaging consumption and recovery to the European Commission, the scenarios are based on data from the Irish Environment Protection Agency for the year 1998. The data from EPA are estimates and are based on information obtained from National Waste Database surveys of local authorities, industries, waste contractors and recycling organisations and the results of waste composition surveys conducted on household and commercial waste streams.

According to the EPA's National Waste Database Report for 1998 the total arising of packaging waste has considerably increased from 1993-1998. In general, the quality of information on packaging arisings is continuously improved. It is likely that the increase in estimated arisings since 1995 is due in part to improved data collection and reporting. Material-specific data on the development of packaging consumption or packaging waste arising are not available. The results of the scenarios are shown in the tables below.

Table 17: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland

Material	Base year		Estimated development scenario 1						
	1998		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	300	45	1,0%	325	15%	49	342	65%	222
Glass	111	36	-2,0%	95	15%	14	86	75%	64
Plastics	169	4	2,0%	198	15%	30	218	20%	44
Metal	41	3	-1,0%	38	15%	6	36	55%	20
Total	622	88	0,7%	656		98	682		350

Table 18: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Ireland

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	300	45	3,0%	380	15%	57	441	65%	287
Glass	111	36	1,0%	121	15%	18	127	75%	95
Plastics	169	4	4,0%	231	15%	35	281	20%	56
Metal	41	3	1,0%	45	15%	7	47	55%	26
Total	622	88	2,6%	777		116	896		464

Italy

Since 1998 packaging producers, distributors and fillers must submit annual data on the tonnages of packaging material placed on the market, reused and recycled. A National body (called Osservatorio nazionale sui rifiuti - National observatory on waste) is in of charge data compilation and monitoring. Istituto Italiano Imballaggio (National Institute of packaging), a private association whose members are the most important packaging producers and users, monitors on a yearly basis the packaging production in Italy.

Based on provisional data from packaging companies and associations CONAI has estimated the consumption trend of packaging. These data show an increase of packaging consumption from 1996 to 2002 of 10 %. According to these data, the growth rate for glass assumed in scenario 2 (rather stable market) appears to be more likely than the decrease of -2% as assumed in scenario 1. For all other materials the development estimated in scenario 1 seems to be the more realistic one according to Istituto Italiano Imballaggio (National Institute of packaging).

The results of the scenarios for Italy are given in the tables below.

Table 19: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy)

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,246	1,178	1.0%	3,550	65%	2,308	3,731	75%	2,798
Glass	2,248	750	-2.0%	1,874	75%	1,406	1,694	75%	1,271
Plastics	1,777	170	2.0%	2,124	20%	425	2,345	60%	1,407
Metal	456	25	-1.0%	417	55%	229	396	75%	297
Total	7,727	2,123	0.4%	7,965		4,367	8,166		5,773

Table 20: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Italy

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,246	1,178	3.0%	4,235	65%	2,753	4,910	75%	3,682
Glass	2,248	750	1.0%	2,459	75%	1,844	2,584	75%	1,938
Plastics	1,777	170	4.0%	2,529	20%	506	3,077	60%	1,846
Metal	456	25	1.0%	499	55%	274	524	75%	393
Total	7,727	2,123	2.6%	9,722		5,377	11,095		7,860

Luxembourg

For Luxembourg the country report to the European Commission according to Decision 138/97/EC was not available to the project group. The data on current packaging consumption were taken from a study of ECO Conseil Agency referring to the year 1996. To estimate the future development of packaging consumption we have used information provided by European material association. As no other information on the future development of packaging consumption were available our general assumption on growth rates are applied. The results of the scenarios for Luxembourg are given in the tables below.

Table 21: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Luxembourg

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	12	n.a.	1.0%	13	65%	9	14	75%	10
Glass	17	n.a.	-2.0%	14	75%	11	13	75%	10
Plastics	7	n.a.	2.0%	8	20%	2	9	60%	6
Metal	3	n.a.	-1.0%	2	55%	1	2	75%	2
Total	39	n.a.	-0.1%	38		22	38		27

Table 22: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Luxembourg

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	12	n.a.	3.0%	16	65%	10	18	75%	14
Glass	17	n.a.	1.0%	19	75%	14	20	75%	15
Plastics	7	n.a.	4.0%	10	20%	2	12	60%	7
Metal	3	n.a.	1.0%	3	55%	2	3	75%	2
Total	39	n.a.	2.3%	47		28	53		38

Portugal

There are no official statistics on the amounts of packaging put on the market in Portugal. The Ministry of Environment (Instituto dos Residuos) made a questionnaire for the declaration of those figures as well as of the amounts of used packaging recovered and reused or sent to final disposal. These questionnaires were sent for the first time to Portuguese companies in 1999.

Assessment of the production evolution can be made on the basis of the figures provided by the European Federations for glass and paper/cardboard. No information has been found on specific consumption and production trends for other materials even though the packaging production and consumption is rapidly evolving in Portugal. According to Ponto Verde, the packaging waste of glass, paper/cardboard and plastics represented in 1980 around 20% of the household waste. At the beginning of 1990, this percentage increased to about 45%. (Ponto Verde, Gestao Integrada de Residuos de Embalagens em Portugal).

In a report on the market for packaging in Portugal published in 1998 by the French Direction of Foreign Economic Affairs in Portugal, this department assessed the total annual consumption of packaging in Portugal to 1.0 million tonnes that is approximately 100 kg/inh/year. Packaging production by the Portuguese industry represented at this date approximately 1.3 million tonnes and produced an annual turnover of 366 M° €
Relations Economiques extérieures – Ambassade de France au Portugal, septembre 1998).

According to this, the packaging market has profoundly been altered since the beginning of the nineties. It evolved from a situation where the country produced and consumed only “functional” packaging used to keep and protect goods to the development of the packaging as a communication tool for the producer. This has lead to a restructuring of the Portuguese offer and to an increasing competition from plastic producers.

According to information of the European **glass** association FEVE the consumption of glass packaging in Portugal increased by 19.8% between 1988 and 1998 which represents an average annual growth rate of 1.8%. Considering a more general trend of glass substitution by plastic packaging (PET in particular) we believe, our assumed range of growth rates provides a reasonable estimation for Portugal.

The development of **paper and cardboard** packaging consumption in Portugal between 1991 and 1998 was according to CEPI rather discontinuous. The total paper and cardboard packaging consumption increased by 8.8% during this period. This gives an average annual growth rate of 0.8% which is quite close the lower limit of our assumption.

No information is available on **plastics** consumption in the past. In assessing the future plastic packaging consumption we considered information provided by APME and TNO[8]. As a result plastic packaging consumption tonnage will increase in future.

With regard to **metal** packaging a rather stable development is expected.

Considering the development of packaging consumption in recent years, it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. The results of the scenarios for Portugal are given in the tables and charts below.

Table 23: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	436	n.a.	1.0%	477	15%	72	501	65%	326
Glass	266	n.a.	-2.0%	222	15%	33	200	75%	150
Plastics	225	n.a.	2.0%	269	15%	40	297	20%	59
Metal	85	n.a.	-1.0%	78	15%	12	74	55%	41
Total	1,012	n.a.	0.4%	1,045		157	1,073		576

Table 24: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Portugal

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	436	n.a.	3.0%	569	15%	85	659	65%	429
Glass	266	n.a.	1.0%	291	15%	44	306	75%	229
Plastics	225	n.a.	4.0%	320	15%	48	390	20%	78
Metal	85	n.a.	1.0%	93	15%	14	98	55%	54
Total	1,012	n.a.	2.6%	1,273		191	1,453		790

Spain

In its notification to the European Commission, Spain declared 5,879 kilotonnes packaging put on the market in 1997 of which 5,800 became waste[9]. Though, it has to be considered that the obligation for packers, traders and importers to declare the packaging placed on the market came into force only

8 TNO, 1999: Chemical Recycling of Plastics Waste (PVC and other resins)
APME, 1998: Potential for post-user plastic packaging recycling,

9 The difference is due to reusable plastic packaging. For glass, it is estimated that the quantities of packaging in reutilization process equilibrate the quantities of reusable packaging which become waste during that year.

in1998 with the Packaging and Packaging Waste Act. Figures provided to the European Commission for 1997 were estimated on the basis of extrapolation to the whole Spanish industrial and retail sectors of the data provided by producers adhering to the Integrated Packaging Waste Management systems. These were the only available data when writing this report.

Assessment of the production evolution can be made on the basis of the figures provided by the European Federations for glass and paper-cardboard. For other materials, information on the production and the evolution of the market have been found mainly from reports published by the Economic Growth Department of the French Embassy[10] in Spain. This department assessed the total consumption of packaging in 1995 in Spain to more than 7 million tonnes.

- Information form the European **glass** association FEVE allows estimating the average annual growth rate of glass consumption in Spain between 1988 and 1998 to 1.4%. The Economic Growth Department of the French Embassy in Spain estimated that the future of glass packaging in Spain was promising because of the good image of glass in Spain. This should lead to a growth in the number of glass packaging units. However, it is expected that due to a decrease in weight per packaging unit and the increasing competition of PET packaging the market share should stay at the same level Our assumption on future glass packaging consumption appears thus reasonable for Spain.
- The development of **paper and cardboard** packaging consumption in Spain between 1991 and 1998 followed, according to CEPI, an average annual growth rate of 3.3%. Our assumption on future paper and cardboard packaging consumption appears reasonable for Spain even though the higher growth rate scenario appears more likely than the lower one.
- The **plastic** packaging production and consumption in Spain evolved as follows:

Table 25: Plastic packaging production and consumption evolution

	1994	1995	1996	% variation	1998*
Packaging production	961,315	968,965	1,014,388	+4.7	
Packaging imported					
half finished	76,341	87,647	95,335	+8.8	
finished	58,643	81,335	77,351	-4.9	
Packaging exported					
half finished	54,026	54,096	54,758	+1.2	
finished	44,415	55,257	67,637	+22.4	
Packaging consumption	997,858	1,028,594	1,064,679	+3.5	1,220,893

Source: Fiche de synthèse – Emballages en plastique- June 1998
* Source: Fiche de synthèse – La transformation des matières plastiques en Espagne- May 2000

According to this source, the Spanish market for some kind of plastic, and especially PET bottles, should increase notably due to the increase of user markets (as hardware shop or pharmacy products). Indeed, a survey from the same source of May 2000 showed that, between 1994 and 1998, PET gained about 45% of market shares for water bottles.

- The market for metal packaging is awaited to remain rather stable.

The results of the scenarios for Spain are given in the tables below. The Spanish Law by the Packaging and Packaging Waste Act (Law 11/1997 of April 24, 1997) stipulates in art. 5 that before 30th June 2001 all packaging waste generated shall be reduced by at least 10 % by weight, taking 1997 as a reference year. Up to now, it can not be assessed, how the Spanish prevention regulation will affect future packaging consumption and which materials will be concerned most. Accordingly, the possible effects of the prevention target were not considered in the scenario and may lead to lower growth rates for packaging consumption.

[10] Fiche de synthèse – Le secteur de l'Emballage en Espagne- Service de l'Expansion Economique de l'Ambassade de France en Espage, May 1997

Table 26: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	2,255	1,262	1.0%	2,466	65%	1,603	2,592	75%	1,944
Glass	1,398	521	-2.0%	1,166	75%	874	1,054	75%	790
Plastics	1,215	76	2.0%	1,452	20%	290	1,603	60%	962
Metal	340	77	-1.0%	311	55%	171	295	75%	222
Total	5,208	1,937	0.4%	5,395		2,939	5,544		3,918

Table 27: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Spain

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	2,255	1,262	3.0%	2,942	65%	1,912	3,411	75%	2,558
Glass	1,398	521	1.0%	1,529	75%	1,147	1,607	75%	1,205
Plastics	1,215	76	4.0%	1,729	20%	346	2,104	60%	1,262
Metal	340	77	1.0%	372	55%	205	391	75%	293
Total	5,208	1,937	2.7%	6,573		3,610	7,513		5,319

Sweden

Projections on future packaging consumption in Sweden are not available. In contrast to the development in other countries, plastic packaging consumption in Sweden didn't increase in recent years, but may even have decreased[11]. Based on this development and the general trend of an increase of plastic packaging consumption in EU we have reduced growth rates for the scenarios, assuming that plastic packaging consumption will stay on the same level or increase with 3 % per year at maximum. For all other materials trends in the recent years seem to match quite well with our general assumptions on growth rates.

Scenario 1, which results in a rather stable level of packaging consumption in Sweden, is assumed to be the most probable development.

[11] Swedish Environment Protection Agency 1998 and 2000

Table 28: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	526	348	1.0%	575	65%	374	605	75%	453
Glass	177	134	-2.0%	148	75%	111	134	75%	100
Plastics	150	21	0.0%	150	20%	30	150	60%	90
Metal	70	32	-1.0%	64	55%	35	61	75%	46
Total	923	535	0.2%	937		550	949		689

Table 29: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in Sweden

Material	Base year		Estimated development scenario 2						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	526	348	3.0%	686	65%	446	796	75%	597
Glass	177	134	1.0%	194	75%	146	204	75%	153
Plastics	150	21	3.0%	196	20%	39	227	60%	136
Metal	70	32	1.0%	77	55%	42	80	75%	60
Total	923	535	2.5%	1,153		673	1,307		946

The Netherlands

We have tried to confirm the assumed trends with figures provided in the annual reports of the Packaging Committee. Indeed, the Industry agreed in the Covenant II to reduce the quantity of packaging introduced on the market in the year 2001 by 10% with reference to the quantity of packaging in the year 1986, corrected for the development of the Gross National Product (GNP) since 1986[12] and for the increase in the weight of packaging resulting from the application of secondary materials[13].

The annual report of the Packaging Committee of October for the year 1997 gives the RIVM (Rijksinstituut voor Volksgezondheid en Milieuhygiene) assessment of absolute quantities of packaging waste (from households, from office, shop and services sectors –OSS and from the industrial sector) including recycled packaging waste for the years 1986 and 1991 to 1997. The table below reproduces these figures and gives the total and the annual growth rate for this period[14].

[12] In the correction based on the development of the GNP, the trend in the GNP at market prices in volume units is applied, as published each year by the Central Statistics Bureau (CBS) in the National Accounts.

[13] With these corrections of the quantity of packaging in the year 1986, the reference value is determined for prevention during the monitoring year.

[14] During this period the Gross National product increased approximately by 35%.

Table 30: Development of packaging waste arising in the Netherlands

	Absolute quantities of packaging waste (from all sectors) including recycled packaging waste (1,000 tonnes)								Growth rate	
Packaging material	1986	1991	1992	1993	1994	1995	1996	1997	Total Growth rate	Average Annual Growth rate
Glass	515	558	523	504	461	453	474	469	-8.9%	-0.8%
Paper-cardboard	1,111	1,688	1,658	1,500	1,408	1,359	1,413	1,449	30.4%	2.4%
Plastics	520	645	647	538	606	596	618	611	17.5%	1.5%
Ferrous	184	263	325	201	187	198	207	196	6.5%	0.6%
Non ferrous	17	46	49	18	18	20	18	20	17.6%	1.5%
Total	2,347	3,200	3,202	2,761	2,680	2,626	2,730	2,745	17.0%	1.4%

(Source : Packaging Committee, annual report – October 1998)

Beside this assessment, Pricewaterhouse Coopers (PwC) studied the quantity of packaging materials added to products by industry in 1997 and the previous years. This study was performed through a questionnaire sent to about 2,000 enterprises[15].

The table below, shows the PwC survey index figures. The total weight of packaging added to products in year 1986 is applied as 100. The trends are determined by comparing the figures over the years 1991 through 1997 to those for 1986.

Table 31: Index figures since 1991 as indicated by Pricewaterhouse Coopers (1986 = 100)

Packaging material	1991	1992	1993	1994	1995	1996	1997	Total Growth rate	Average Annual Growth rate
Glass	99	99	97	96	93	97	95	-4.0%	-0.4%
Paper-cardboard	122	124	120	122	124	129	134	9.8%	0.9%
Plastics	123	128	129	131	131	135	137	11.4%	1.0%
Ferrous	113	118	110	110	113	112	118	4.4%	0.4%
Non ferrous	108	116	104	100	115	112	121	12.0%	1.0%
Total	113	116	113	114	114	117	120	6.2%	0.5%

(Source : Packaging Committee, annual report – October 1998)

- According to information of the European **glass** association FEVE, the consumption of glass packaging in The Netherlands decreased by nearly 7% between 1988 and 1998, which gives a negative average growth rate of -0.7%. Figures from RIVM and Pricewaterhouse Coopers for the period 1986 - 1997 give respectively - 0,8 % and -0,4%. These confirm, for the Netherlands, our assumed range of growth.
- The growth of **paper and cardboard** packaging consumption in the Netherlands between 1991 and 1998 according to CEPI amounted to 31.1% which gives an average annual growth rate of 2.7%. The average annual growth calculated on the basis of figures from RIVM and Pricewaterhouse Coopers for the period 1986 - 1997 is respectively of +2.4 % and + 0.9% and confirm, for the Netherlands, our assumed range of growth.
- The only information available on **plastics** consumption in the past comes from the annual reports from the Packaging Committee. Assessments from RIVM and Pricewaterhouse Coopers for the period 1986 - 1997 give a calculated average annual growth of respectively +1.5 and + 1.0 %. Based on the general trend of an increase of plastic packaging consumption we assume that the growth rate for scenario 1 is the most likely development in the Netherlands.

[15] In 1997, the average coverage based on the number of packaging introduced on the market in the Netherlands was estimated to 46%.

- Assessments from RIVM and Pricewaterhouse Coopers for the period 1986 - 1997 give average annual growth for ferrous **metals** between +0.6 % and + 0.4 %. For non ferrous metals this average annual growth varies between+1.0 % and +1.5 % .

The Packaging Covenant and the Commitment of Dutch industry to reduce the quantity of packaging put on the market (in comparison with the growth of Gross National Product) has allowed limiting the average growth of the Packaging put on the market to 1,4 %[16] per year (RIVM assessment). It seems likely that the increase of overall packaging consumption will continue, growth rates being strongest for plastic packaging and for paper and cardboard packaging. Besides, since the prevention target covers the total amount of packaging, it is likely that the perceived decrease of glass packaging will continue at the benefit of lighter concurrent materials as plastics and beverage cartons. The results of the scenarios for the Netherlands are given in the tables below.

Table 32: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	1,449	941	1.0%	1,585	65%	1,030	1,666	75%	1,249
Glass	469	354	-2.0%	391	75%	293	353	75%	265
Plastics	611	76	2.0%	730	20%	146	806	60%	484
Metal	216	145	-1.0%	197	55%	109	188	75%	141
Total	2,745	1,516	0.7%	2,903		1,578	3,013		2,139

Table 33: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in The Netherlands

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	1,449	941	3.0%	1,891	65%	1,229	2,192	75%	1,644
Glass	469	354	1.0%	513	75%	385	539	75%	404
Plastics	611	76	4.0%	870	20%	174	1,058	60%	635
Metal	216	145	1.0%	236	55%	130	248	75%	186
Total	2,745	1,516	2.8%	3,509		1,917	4,037		2,869

United Kingdom

The data submitted to the Commission according to Article 5 of Commission Decision 97/138/EC has been compiled on the basis of information submitted by obligated businesses to the Environment Agency and the Scottish Environmental Protection Agency, as required by the Producer Responsibility Obligations (Packaging Waste) Regulations 1997. This data cover all stages of the packaging chain, as well as importers and exporters. In 1998, an assessment for the packaging handled in Northern Ireland is included, estimated to be around 2.5% of the packaging placed on the market in the UK.

[16] 0.5% per year according to the survey made by Pricewaterhouse Coopers.

The quality of data submitted to the UK Agencies by businesses obligated under the Regulations was improved after 1997 following discussions with relevant parties, including the Materials Organisations ("MOs") and the Agencies. However, the figures reported to the Agencies do not incorporate the tonnage of packaging produced and handled by businesses first obligated under the Regulations in 2000, nor the packaging produced and handled by businesses which do not have an obligation under the UK Regulations.

Some research into this area has begun and is continuing. Final figures for such tonnages are not yet available, but UK MOs have estimates which suggest that in 1999 there is around 9.2 million tonnes of packaging (including wood and others) flowing into the UK waste stream. We have therefore used data referring to the year 1999.

- According to information of the European **glass** association FEVE the average growth rate of glass consumption in the United Kingdom was 1.2% between 1988 and 1998. A higher growth rate of 2.8% was observed between 1993 and 1998, however, taken account of a more general trend to substitute glass packaging with plastic packaging (PET in particular) we believe, our assumed range of growth rates provides a reasonable estimation for UK.
- The development of **paper and cardboard** packaging consumption in UK between 1993 and 1998 was according to CEPI rather discontinuously, ranging from an increase of 4.8% from 1993 to 1994 to a decrease of -3% from 1997 to 1998, the average being an annual growth rate of 1.9%. Our assumption on future paper and cardboard packaging consumption appears likely for UK..
- No information is available on **plastics** consumption in the past. In assessing the future plastic packaging consumption we considered information provided by APME and TNO[17]. As a result plastic packaging consumption tonnage will increase in future.
- With regard to **metal** packaging a rather stable development is expected.

Considering the development of packaging consumption in recent years it seems likely that an increase of overall packaging consumption will take place, growth rates being strongest for plastic packaging and possibly for paper and cardboard packaging. The results of the scenarios for UK are given in the tables below.

Table 34: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK

Material	Base year		Estimated development scenario 1						
	1999		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,855	1,769	1.0%	4,133	65%	2,687	4,344	75%	3,258
Glass	2,155	451	-2.0%	1,871	75%	1,403	1,691	75%	1,268
Plastics	1,600	161	2.0%	1,838	20%	368	2,029	60%	1,218
Metal	859	139	-1.0%	801	55%	440	761	75%	571
Total	8,469	2,520	0.3%	8,642		4,898	8,826		6,315

[17] TNO, 1999: Chemical Recycling of Plastics Waste (PVC and other resins)

Table 35: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in UK

Material	Base year		Estimated development scenario 1						
	1999		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	1,000 t	1,000 t		1,000 t	%	1,000 t	1,000 t	%	1,000 t
Paper/ cardboard	3,855	1,769	3.0%	4,741	65%	3,082	5,496	75%	4,122
Glass	2,155	451	1.0%	2,310	75%	1,733	2,428	75%	1,821
Plastics	1,600	161	4.0%	2,105	20%	421	2,562	60%	1,537
Metal	859	139	1.0%	921	55%	507	968	75%	726
Total	8,469	2,520	2.5%	10,078		5,742	11,454		8,206

European Union

In this chapter the scenarios on Member State level are summarised, resulting in a scenario for the whole European Union. Tables 36 and 37 give an overview on the estimated future packaging consumption and the theoretical recycling requirements based of the assumed targets. The data are presented in detail according to materials in tables 38 to 47.

Table 36: Scenario 1 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in EU-15

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	ktons	ktons		ktons	%	ktons	ktons	%	ktons
Paper/ cardboard	23,474	14,145	0.9%	25,544	63%	16,029	26,823	75%	19,997
Glass	14,867	7,375	-1.9%	12,471	73%	9,086	11,273	75%	8,455
Plastics	9,707	1,454	1.9%	11,458	20%	2,255	12,616	57%	7,248
Metal	4,253	1,797	-1.0%	3,902	53%	2,067	3,711	74%	2,745
Total	52,302	24,771	0.3%	53,375	55%	29,437	54,422	71%	38,444

Table 37: Scenario 2 - Estimated development of packaging consumption and recycling requirements in 2006 and 2011 in EU-15

Material	Base year		Estimated development scenario 1						
	1997		annual growth rate of consum-ption	2006			2011		
	consumption	recycled		consumption	theoretical recycling requirement		consumption	theoretical recycling requirement	
	ktons	ktons		ktons	%	ktons	ktons	%	ktons
Paper/ cardboard	23,474	14,145	2.9%	30,278	63%	18,999	35,070	75%	26,144
Glass	14,867	7,375	1.0%	16,212	73%	11,811	17,039	75%	12,779
Plastics	9,707	1,454	3.8%	13,576	20%	2,672	16,481	57%	9,469
Metal	4,253	1,797	1.0%	4,633	53%	2,453	4,869	74%	3,602
Total	52,302	24,771	2.5%	64,698	56%	35,936	73,459	71%	51,994

Estimated development of packaging consumption

*Table 38: Estimated development of **total packaging** consumption in Member States (excluding wood packaging)*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	1,056	1,090	-	1,326	1,118	-	1,511
Belgium	1,185	1,215	-	1,480	1,241	-	1,682
Denmark	907	868	-	1,057	849	-	1,152
Finland	417	446	-	537	465	-	620
France	9,390	9,450	-	11,599	9,566	-	13,105
Germany	11,822	11,905	-	14,574	12,045	-	16,441
Greece	780	819		992	848	-	1,139
Ireland [1)]	622	656	-	777	682	-	896
Italy	7,727	7,965	-	9,722	8,166	-	11,095
Luxembourg [2)]	39	38		47	38	-	53
Netherlands	2,745	2,903	-	3,509	3,013	-	4,037
Portugal	1,012	1,045	-	1,273	1,073	-	1,453
Spain	5,208	5,395	-	6,573	5,544	-	7,513
Sweden	923	937	-	1,153	949	-	1,307
UK [3)]	8,469	8,642	-	10,078	8,826	-	11,454
EU-11 total	49,849	50,816	-	61,609	51,782	-	69,918
EU-15 total	52,302	53,375	-	64,698	54,422	-	73,459

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 39: Estimated development of **paper / cardboard packaging** consumption in Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	531	581	-	693	610	-	803
Belgium	547	598	-	713	629	-	827
Denmark	463	463	-	553	463	-	611
Finland	244	266	-	318	280	-	368
France	3,846	4,206	-	5,018	4,421	-	5,817
Germany	5,448	5,958	-	7,108	6,262	-	8,240
Greece	317	347		414	364	-	479
Ireland [1)]	300	325	-	380	342	-	441
Italy	3,246	3,550	-	4,235	3,731	-	4,910
Luxembourg	12	13		16	14	-	18
Netherlands	1,449	1,585	-	1,891	1,666	-	2,192
Portugal	436	477	-	569	501	-	659
Spain	2,255	2,466	-	2,942	2,592	-	3,411
Sweden	526	575	-	686	605	-	796
UK [3)]	3,855	4,133	-	4,741	4,344	-	5,496
EU-11 total	22,409	24,382	-	28,899	25,602	-	33,472
EU-15 total	23,474	25,544	-	30,278	26,823	-	35,070

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 40: Estimated development of **glass packaging** consumption in Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	260	217	-	284	196	-	299
Belgium	310	258	-	339	234	-	356
Denmark	202	169	-	221	152	-	233
Finland	52	43	-	57	39	-	60
France	3,296	2,748	-	3,605	2,484	-	3,789
Germany	3,750	3,127	-	4,102	2,826	-	4,311
Greece	154	128		168	116	-	177
Ireland [1)]	111	95	-	121	86	-	127
Italy	2,248	1,874	-	2,459	1,694	-	2,584
Luxembourg [2)]	17	14		19	13	-	20
Netherlands	469	391	-	513	353	-	539
Portugal	266	222	-	291	200	-	306
Spain	1,398	1,166	-	1,529	1,054	-	1,607
Sweden	177	148	-	194	134	-	204
UK [3)]	2,155	1,871	-	2,310	1,691	-	2,428
EU-11 total	**14,318**	**12,012**	**-**	**15,613**	**10,858**	**-**	**16,409**
EU-15 total	**14,867**	**12,471**	**-**	**16,212**	**11,273**	**-**	**17,039**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 41: Estimated development of **plastics packaging** consumption in Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	180	215	-	256	238	-	312
Belgium	208	249	-	296	274	-	360
Denmark	183	183	-	219	183	-	242
Finland	90	108	-	128	119	-	156
France	1,571	1,877	-	2,236	2,073	-	2,720
Germany	1,502	1,795	-	2,138	1,982	-	2,601
Greece	219	262		312	289	-	379
Ireland [1)]	169	198	-	231	218	-	281
Italy	1,777	2,124	-	2,529	2,345	-	3,077
Luxembourg [2)]	7	8		10	9	-	12
Netherlands	611	730	-	870	806	-	1,058
Portugal	225	269	-	320	297	-	390
Spain	1,215	1,452	-	1,729	1,603	-	2,104
Sweden	150	150	-	196	150	-	227
UK [3)]	1,600	1,838	-	2,105	2,029	-	2,562
EU-11 total	**9,088**	**10,721**	**-**	**12,703**	**11,802**	**-**	**15,419**
EU-15 total	**9,707**	**11,458**	**-**	**13,576**	**12,616**	**-**	**16,481**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 42: Estimated development of **metal packaging** consumption in Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	85	78	-	93	74	-	98
Belgium	121	110	-	132	105	-	139
Denmark	58	53	-	63	50	-	67
Finland	31	28	-	34	27	-	36
France	677	618	-	740	588	-	778
Germany	1,121	1,024	-	1,226	974	-	1,289
Greece	90	82		99	78	-	104
Ireland [1)]	41	38	-	45	36	-	47
Italy	456	417	-	499	396	-	524
Luxembourg [2)]	3	2		3	2	-	3
Netherlands	216	197	-	236	188	-	248
Portugal	85	78	-	93	74	-	98
Spain	340	311	-	372	295	-	391
Sweden	70	64	-	77	61	-	80
UK [3)]	859	801	-	921	761	-	968
EU-11 total	**4,034**	**3,701**	**-**	**4,393**	**3,520**	**-**	**4,617**
EU-15 total	**4,253**	**3,902**	**-**	**4,633**	**3,711**	**-**	**4,869**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

Theoretical future recycling requirements

*Table 43: Theoretical recycling quantities for **total packaging** in EU Member States (excluding wood packaging)*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	707	626	-	766	803	-	1,087
Belgium	770	693	-	850	890	-	1,208
Denmark	473	493	-	604	609	-	828
Finland	174	243	-	293	331	-	441
France	4,470	5,511	-	6,820	6,864	-	9,420
Germany	9,457	7,140	-	8,799	8,736	-	11,941
Greece	n.a.	123		149	425	-	577
Ireland [1)]	88	98	-	116	350	-	464
Italy	2,123	4,367	-	5,377	5,773	-	7,860
Luxembourg [2)]	n.a.	22		28	27	-	38
Netherlands	1,516	1,578	-	1,917	2,139	-	2,869
Portugal	n.a.	157	-	191	576	-	790
Spain	1,937	2,939	-	3,610	3,918	-	5,319
Sweden	535	550	-	673	689	-	946
UK [3)]	2,520	4,898	-	5,742	6,315	-	8,206
EU-11 total	**24,682**	**29,037**	**-**	**35,451**	**37,066**	**-**	**50,125**
EU-15 total	**24,771**	**29,437**	**-**	**35,936**	**38,444**	**-**	**51,994**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 44: Theoretical recycling quantities for **paper / cardboard packaging** in EU Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	443	377	-	450	458	-	602
Belgium	416	389	-	464	471	-	620
Denmark	297	301	-	360	347	-	458
Finland	138	173	-	207	210	-	276
France	2,649	2,734	-	3,262	3,316	-	4,363
Germany	4,659	3,873	-	4,620	4,697	-	6,180
Greece	n.a.	52		62	237	-	312
Ireland [1)]	45	49	-	57	222	-	287
Italy	1,178	2,308	-	2,753	2,798	-	3,682
Luxembourg [2)]	n.a.	9		10	10	-	14
Netherlands	941	1,030	-	1,229	1,249	-	1,644
Portugal	n.a.	72	-	85	326	-	429
Spain	1,262	1,603	-	1,912	1,944	-	2,558
Sweden	348	374	-	446	453	-	597
UK [3)]	1,769	2,687	-	3,082	3,258	-	4,122
EU-11 total	**14,100**	**15,848**	**-**	**18,785**	**19,202**	**-**	**25,104**
EU-15 total	**14,145**	**16,029**	**-**	**18,999**	**19,997**	**-**	**26,144**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 45: Theoretical recycling quantities for **glass packaging** in EU Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	199	163	-	213	147	-	224
Belgium	217	194	-	254	175	-	267
Denmark	152	127	-	166	114	-	174
Finland	25	33	-	43	29	-	45
France	1,388	2,061	-	2,704	1,863	-	2,842
Germany	3,147	2,345	-	3,076	2,120	-	3,233
Greece	n.a.	19		25	87	-	133
Ireland [1)]	36	14	-	18	64	-	95
Italy	750	1,406	-	1,844	1,271	-	1,938
Luxembourg [2)]	n.a.	11		14	10	-	15
Netherlands	354	293	-	385	265	-	404
Portugal	n.a.	33	-	44	150	-	229
Spain	521	874	-	1,147	790	-	1,205
Sweden	134	111	-	146	100	-	153
UK [3)]	451	1,403	-	1,733	1,268	-	1,821
EU-11 total	**7,339**	**9,009**	**-**	**11,710**	**8,143**	**-**	**12,307**
EU-15 total	**7,375**	**9,086**	**-**	**11,811**	**8,455**	**-**	**12,779**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 46: Theoretical recycling quantities for **plastic packaging** in EU Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	36	43	-	51	143	-	187
Belgium	53	50	-	59	165	-	216
Denmark	15	37	-	44	110	-	145
Finland	9	22	-	26	71	-	94
France	102	375	-	447	1,244	-	1,632
Germany	731	359	-	428	1,189	-	1,561
Greece	n.a.	39		47	58	-	76
Ireland [1)]	4	30	-	35	44	-	56
Italy	170	425	-	506	1,407	-	1,846
Luxembourg [2)]	n.a.	2		2	6	-	7
Netherlands	76	146	-	174	484	-	635
Portugal	n.a.	40	-	48	59	-	78
Spain	76	290	-	346	962	-	1,262
Sweden	21	30	-	39	90	-	136
UK [3)]	161	368	-	421	1,218	-	1,537
EU-11 total	**1,449**	**2,144**	**-**	**2,541**	**7,081**	**-**	**9,251**
EU-15 total	**1,454**	**2,255**	**-**	**2,672**	**7,248**	**-**	**9,469**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

*Table 47: Theoretical recycling quantities for **metal packaging** in EU Member States*

Member State	1997	2006			2011		
		minimum		maximum	minimum		maximum
	(1,000 t)	(1,000 t)		(1,000 t)	(1,000 t)		(1,000 t)
Austria	29	43	-	51	55	-	73
Belgium	85	61	-	72	79	-	104
Denmark	9	29	-	35	38	-	50
Finland	3	16	-	19	20	-	27
France	331	340	-	407	441	-	584
Germany	920	563	-	675	731	-	967
Greece	n.a.	12		15	43	-	57
Ireland [1)]	3	6	-	7	20	-	26
Italy	25	229	-	274	297	-	393
Luxembourg [2)]	n.a.	1		2	2	-	2
Netherlands	145	109	-	130	141	-	186
Portugal	n.a.	12	-	14	41	-	54
Spain	77	171	-	205	222	-	293
Sweden	32	35	-	42	46	-	60
UK [3)]	139	440	-	507	571	-	726
EU-11 total	**1,794**	**2,036**	**-**	**2,416**	**2,640**	**-**	**3,463**
EU-15 total	**1,797**	**2,067**	**-**	**2,453**	**2,745**	**-**	**3,602**

1) Scenario based on data from 1998
2) Scenario based on data from 1996
3) Scenario based on data from 1999

ANNEX III

Population Data in EU Member States

Table: Inhabitants in EU Member States: current data and forecasts for 2005 and 2010 (1.000 inhabitants)

Member State	1997	1998	1999	2005	2011
Austria	8.068	8.075	8.177	8.100	8.085
Belgium	10.170	10.192	10.152	10.295	10.284
Denmark	5.275	5.295	5.282	5.361	5.362
Finland	5.132	5.147	5.165	5.220	5.247
France	58.492	58.723	58.886	60.168	60.739
Germany	82.012	82.060	82.039	81.432	80.247
Greece	10.487	10.508	10.626	10.564	10.474
Ireland	3.652	3.693	3.705	3.872	3.995
Italy	57.461	57.563	57.343	56.950	55.876
Luxembourg	418	424	n.a.	458	470
Netherlands	15.567	15.650	15.735	16.167	16.286
Portugal	9.934	9.957	9.873	9.963	9.908
Spain	39.299	39.348	39.634	39.262	38.835
Sweden	8.845	8.848	8.892	8.805	8.725
UK	58.902	59.084	58.744	59.289	59.292
EU-11	**349.222**	**349.984**	**350.049**	**351.049**	**348.978**
EU-15	**373.713**	**374.566**	**376.252**	**377.911**	**375.835**

Source: Eurostat, 2000