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Effectiveness of packaging waste management systems in selected countries: an EEA pilot study

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Acknowledgements

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The detailed comments and suggestions received have been a valuable input to this report. Our best efforts have been made to integrate these, and to ensure that data are accurate, but the analysis presented in the final report remains the responsibility of the EEA.

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Executive summary

Packaging waste is an important and growing waste stream. The amended Packaging and Packaging Waste Directive has recently been adopted, and work is underway to develop EU thematic strategies on waste prevention and recycling and on the sustainable use and management of natural resources. The Packaging and Packaging Waste Directive (hereafter: packaging directive) is one of the few environmentally-related directives to contain directly measurable, quantitative targets. It has now been in place for ten years and this is an opportune time to take stock of this important policy area. The EEA has conducted a pilot study of the effectiveness of packaging waste management systems in five EU Member States with the aim of gaining practical and concrete experience of *ex-post* policy effectiveness evaluation, and to track progress in this policy area.

This pilot study is a comparative evaluation of the effectiveness of packaging waste management systems in Austria, Denmark, Ireland, Italy and the United Kingdom. It makes an *ex-post* analysis of the effectiveness of the systems in terms of their contribution to fulfilling the environmental objectives specified in the EU directive, and national targets where applicable. It primarily covers data from 1997 to 2001. Direct comparison between countries' waste generation is not possible because of differences in data-reporting methodologies. Rather than being a simple 'ranking' exercise, the study aims to provide a deeper analysis of how these national systems work, highlighting elements that work well.

It is an objective of the sixth environment action programme (6EAP) to achieve a significant reduction in the volumes of waste generated, and prevention has also been given top priority in the waste hierarchy. The packaging directive's overall objective is to reduce waste generation. However, the targets are for recovery and recycling, not reduction: full compliance with the targets does not mean achievement of the policy's wider objective of reducing waste volumes. Measures at national level are primarily aimed at increasing recovery and recycling, with prevention measures being limited

Table 1 Key figures

	Austria	Denmark	Ireland	Italy	UK	EU-15
Total packaging waste generation 2001, 1 000 tonnes	1 097	1 029	820	11 262	9 314	64 876
Generation incl./excl. wood 2001, kg/capita	135/122	192/161	214*)	194/151	159/148	172
Change in generation, 1997–2001, %	– 1.0	+ 2.0	+ 36.0	+ 18.2	– 7	+ 8.4
GDP change 1997–2001, %	+ 11.0	+ 9.8	+ 41.0	+ 8.5	+ 12.4	+ 11.4
Change in per capita household consumption, 1997–2001, %	+ 11.2	+ 1.2	+ 27.7	+ 8.7	+ 13.3	–
Change in the number of households, 1998–2000, %	+ 4.1	+ 2.2	+ 3.2	+ 9.0	+ 2.9	–
Change in the population, %	+ 0.7	+ 1.4	+ 4.6	+ 0.7	+ 0.6	+ 0.8
Recycling (EU target 2001, 25 %), %	64	50	27	46	42	53
Recovery (EU target 2001, 50 %), %	73	90	27	51	48	60

*) Excl. wood.

Note: The key figures cover response indicators 2–7 on effectiveness (see main text). GDP and household consumption expenditure are in 1995-prices.

Source: Member State reports on packaging waste generation for 1997–2001 to DG Environment in accordance with Directive 94/62/EC on packaging and packaging waste, and Eurostat.

to awareness-raising campaigns, some deposit-refund systems and some taxes. Prevention is difficult to deal with and to measure because of constantly changing consumer demand, distribution systems and packaging materials.

Although costs are not directly comparable, some useful observations on cost-effectiveness are made. The analysis shows that in some countries, the current waste management system is reaching its upper limit for recycling**.** In general, economic instruments have an overall efficiency advantage for society since they can achieve environmental objectives and targets at a relatively low cost.

Countries have different approaches to creating packaging waste management systems. Four of the five countries investigated have chosen a scheme that makes producers responsible. Some countries include all packaging waste in the system, while others focus primarily on commercial waste. In general, the systems include a number of measures and aim mainly at increasing recovery and recycling, while efforts on prevention of packaging waste are clearly less embedded in the systems.

There are big differences in the amounts of packaging waste generated in the **EU-15** (Table 1), from less than 100 kg per capita per year in Greece and Finland to more than 200 kg in Ireland and France. However, inconsistencies of approach mean that national figures may not be directly comparable. The amounts of packaging waste in 10 of the 15 EU countries increased between 1997 and 2001, and by 7 % in the EU as a whole. Amongst the countries examined in this study, generation in Austria has stabilised but continues to increase in the other countries investigated. These increasing quantities create problems from an environmental perspective since packaging waste leads to a number of environmental impacts and waste of resources. Despite absolute increases in packaging waste generation, all case study countries except Italy achieved a relative decoupling of generation and economic growth.

Looking at target achievement alone, the picture looks good: most of the EU-15 countries met the minimum 50 % recovery target in 2001, and seven have already met the 60 % target to be achieved by 2008. All the EU-15 countries met the target of a minimum of 25 % recycling by 2001 and seven countries have already met the 2008 target of 55 %. The achievement of high recovery rates was to some extent determined by pre-existing arrangements for the collection and treatment of waste. Of the five countries examined, those with initially high levels of recycling are maintaining their level while the others are steadily increasing it.

Austria had a system in place before the directive was agreed in 1994. Their producer responsibility scheme for packaging waste (ARA) was established in 1993. It has managed to reach very high levels of recovery and recycling, much higher than required by the directive, and already fulfils the targets for 2008 in the revised directive. ARA is a full-cost system, covering more of the costs of collection, sorting and recovery than the other countries investigated. Consequently it is relatively expensive.

In **Denmark**, local authorities are responsible for establishing the necessary collection and recycling schemes. The deposit-return system for beverage packaging is one of the cornerstones of waste prevention. When the directive came into effect, recycling levels were already well on the way to meeting its targets. To meet the new obligations, it was decided to focus on transport packaging rather than household packaging, and the 2001 targets were successfully met with the exception of 15 % recycling of plastics waste which was missed by 1 %.

The main policy measure in **Ireland** is the producer responsibility scheme Repak. Ireland has a derogation, requiring it to achieve the directive's recycling and recovery targets by 2005, with a minimum recovery rate of 25 % by 2001. Packaging waste per capita (214 kg) is higher than in any other EU country, with growth following that of GDP. With extensive dependence on landfill, recycling is the only current recovery operation, and this reached the 2001 target of 25 %. Ireland's packaging waste management system is 'work in progress': extensive development of household waste management infrastructure and the impact of the landfill directive are likely to have a significant impact in the coming years.

The main measure in **Italy** for meeting the targets of the directive is the CONAI

producer-responsibility scheme. CONAI pays the local authorities for the additional cost associated with the increase in collection of packaging. Total quantities of packaging waste increased by 19 % between 1997 and 2001. The directive's recovery and recycling targets were met in 2001 as recovery rates increased to 50 % and recycling rates to 46 %. There are large differences between the amount of packaging waste collected separately for recycling and recovery in northern and southern Italy.

The main measure in the **United Kingdom** is the producer-responsibility scheme (Packaging Waste Recovery Notes). This focuses on commercial waste, aiming to meet the directive's targets in a cost-effective, competitive manner. Responsibility is shared along the packaging chain, obliging business to take responsibility for a certain amount of packaging according to their activities. Recent figures reveal increasing quantities of packaging. The recycling rate in 2001 was 42 %, exceeding the directive's targets, but the 50 % recovery target was missed by 2 % in 2001. The financing need fluctuates widely from year to year due to PRN (Packaging Recovery Notes) price fluctuations. Measured per tonne packaging recovered, the system appears to have achieved its goal of meeting the targets at the lowest possible cost to industry. However, because the turnover of the PRN system only shows part of the total costs, it is uncertain whether the system operates at lowest possible cost to society. Although competitive, this industry-orientated approach has resulted in a lack of public involvement and awareness of packaging waste issues.

The report discusses each of these systems in detail, including analysis and discussion of institutional factors. Supplementary information and data are available in separate Annexes, which are available from the website of the EEA's Topic Centre on Resource and Waste Management (http://waste.eionet.eu.int/etcwmf).

1 Setting the scene: the EEA and policy effectiveness evaluation

1.1 Meeting our clients' information needs

The sixth environment action programme of the European Community (6EAP) highlights the need to undertake '*ex-post* evaluation of the effectiveness of existing measures in meeting their environmental objectives'. Such evaluations require a better understanding of policy measures and an examination of the mechanisms that lead to their observed effects. What measures have been implemented in response to the given directive, what were their effects and what is the national context in which they are supposed to operate?

For a number of years, the European Parliament has clearly expressed its wish for the EEA to provide information on the implementation of policies in Member States and to analyse the effectiveness of past policies in the EU. The Parliament is particularly interested in information on and analysis of the implementation of EU legislation in the Member States.

The European Commission is also in need of analysis and knowledge on the extent to which directives and measures are working in Member States. Reporting by Member States on the implementation of directives seldom covers information on the effectiveness of the measures put in place in the countries. The EEA can help to fill this knowledge gap, and the current EEA Strategy addresses this (Box 1).

EEA member countries, including all 25 EU Member States, face increasing demands for information and knowledge about the extent to which the policies they put in place give 'value for money'. They are also very interested in knowing what policies have worked under what conditions in other countries, and what did not work. This is particularly the case for the 10 new Member States who now face a significant challenge to implement EU directives as soon as possible, without repeating the mistakes and problems that the older EU Member States have encountered.

Box 1 Policy effectiveness evaluation in the EEA strategy

The EEA strategy, adopted in 2003, sets out the main priorities of the Agency for 2004–2008. It identifies *ex-post* policy effectiveness analysis as one of its priorities for the future.

In his foreword to the Strategy, the Chair of the EEA Management Board Mr. Lars-Erik Liljelund states that:

Increased emphasis will be placed on evaluation of policy effectiveness. Environmental policy is no longer a free ride. In order to be able to convince politicians and the public alike that environmental policies are necessary and good for society as a whole, we must be able to demonstrate that they are delivering real results in an effective way. I welcome the fact that the European Commission also sees a clear role for the EEA in this field. We will work closely with the Commission to deliver real results.

The Strategy identifies the following outputs of EEA work on policy effectiveness in 2004–2008:

- Pilot studies (e.g. urban wastewater and packaging policies) including economic aspects;
- Analyses of effective policy mixes and cross-compliance;
- Support for the network of European Protection Agencies, including analyses of specific policy implementation in member countries;
- Establishment of a network of policy analyst professionals to support the development of a methodological guide and framework for undertaking policy effectiveness evaluations.

1.2 EEA's reporting on environmental measures (REM) project and the genesis of its pilot studies

In the past, the focus of much of the EEA's work has been to provide information on and analysis of the state of the environment in Europe, including the underlying driving forces and the pressures on the environment from economic activities. As a result, the Response dimension of the DPSIR framework (Driving Force-Pressures-State-Impact-Response) has often received less attention.

The EEA report 'Reporting on environmental measures — are we being effective?' (EEA, 2001a) concluded that little is known about the extent to which past environmental policies and instruments have had an effect on the environment.

In 2003, the EEA initiated two pilot studies on policy effectiveness to gain experience on undertaking such evaluations and their methodologies by analysing the effectiveness of policy measures in a few areas and countries.

The first pilot study (EEA, forthcoming 2005) evaluated the effectiveness of **wastewater policies** in six member countries since the 1970s. For some countries, policies had been in place for 30 years and the wastewater framework directive had also been in place for a number of years. Some information on the effectiveness of economic instruments in this area was already available in a few countries.

This second pilot study focuses on the effectiveness of **packaging waste management systems** in five EU Member States. The Commission and member countries are currently placing much emphasis on waste and resource policies, and this analysis is closely linked to EU Directive 94/62/EC of 20 December 1994 on packaging and packaging waste (hereafter called the packaging directive). The directive includes objectives and quantitative targets for the recycling and recovery of packaging waste, and for many Member States it therefore became the starting point for separate management of that waste stream. Some countries had already implemented management systems before the adoption of the directive. The directive has been in effect for a decade with annual national reports since 1997 and 2001 as a target year ([1]), making the packaging directive a good candidate for a policy effectiveness analysis.

1.3 Objective of the study

A packaging waste management system comprises the set of national regulations and measures established to ensure the achievement of the objectives and targets of the directive and any national targets.

The objective of this pilot study is to make an *ex-post* analysis of the effectiveness of the systems in selected countries in terms of their contribution to meeting the environmental objectives of the directive and national targets, if any. In doing this, the study aims to examine the policy consequences of meeting the directive's quantitative targets.

The study analyses the effectiveness of the systems in Austria, Denmark, Ireland, Italy and the UK. Each country is considered in turn before conducting a comparative analysis. The focus is mainly on 1997–2001 because of data availability.

([1]) Data for 2001 were to be reported to the European Commission in June 2003.

2 Packaging waste in the EU: quantitative assessment and policy development

2.1 The general objectives of the packaging directive

The directive aims to harmonise national measures for managing packaging and packaging waste. The aim is to prevent or reduce impacts on the environment of all Member States and other countries, thus providing a high level of environmental protection, and to ensure the functioning of the internal market, avoiding obstacles to trade and distortion and restriction of competition within the Community.

The directive lays down measures aimed primarily at preventing the production of packaging waste and, as an additional fundamental principle, at reusing packaging, and recycling and other forms of recovery of packaging waste, hence reducing the need for disposal.

This project focuses on the measures aimed at prevention, reuse, recycling, recovery and reducing final disposal of packaging waste. It does not cover harmonisation or the functioning of the internal market. DG Internal Market is conducting a study of the functioning of the internal market as part of the Commission's review of the directive (Perchards, FFact and SAGIS, 2004).

2.2 The directive's specific targets

In addition to the general objectives, the directive has three sets of **specific targets** ([2]): quantitative targets for recycling and recovery; essential requirements to be fulfilled in order to place packaging on the European market; and targets for the concentration of heavy metals in packaging.

The **recycling and recovery** targets are shown in Table 2. Although the 15 % target is to be achieved for all packaging materials (not just those listed), the reporting system focuses on several particular packaging materials.

Table 2 Recycling and recovery targets of the packaging directive

Material	Recycling target 2001*) %	Recovery target 2001*) %	Recycling target 2008**) %	Recovery target 2008**) %
Glass	Min. 15		60	
Paper and board			60	
Metals			50	
Plastic			22.5	
Wood			15	
Total packaging	25–45	50–65	Min. 55, Max. 80	Min. 60

*) Targets are by weight.

**) Targets are by weight, and to be achieved no later than 31 December 2008 ([3]).

Sources: EU Commission: Article 6 of Directive 94/62/EC of 20 December 1994 on packaging and packaging waste, and Article 6 of Directive 2004/12/EC of 11 February 2004 amending Directive 94/62/EC on packaging and packaging waste.

([2]) Articles 4, 9, 11 and Annex II of the Directive also deal with Member State and industry obligations for both quantitative and qualitative prevention. However, these measures are voluntary and are thus not considered by this study which aims to examine the policy consequences of meeting the obligatory, quantitative targets.

([3]) The transition period for GR, IRL and P is 2011, for CZ, CY, EE, HU, LT, SK and SI 2012, MT 2013, PL 2014, and LV 2015.

Due to specific conditions in Greece, Ireland and Portugal the recovery target for 2001 has been set at 25 % for these countries, which must meet Table 2's 2001 targets by 2005.

The targets were revised in the amended packaging directive which were adopted on 11 February 2004, and now include material-specific targets for recycling.

Box 2 Environmental protection, or market harmonisation? Development of the packaging and packaging waste directive

Packaging policy: a story of different objectives

Developing policies for the management of packaging waste means reconciling several different sets of objectives. **Environmental aims** involve reducing resource and raw material use, minimising greenhouse gas emissions and reducing sources of pollution. **Internal market aims** include taking the necessary steps to encourage the development of a viable market for recyclables, avoiding distortions of trade and fostering the necessary stability. These sets of aims are not only different: they are potentially conflicting, particularly when the best country-level solution does not fit with the ideal EU-level solution.

Packaging serves many functions as well as being an important marketing tool, including protection of the product during transport, keeping the product fresh, conveying information to consumers and ensuring ease of use and storage. The optimal solutions for each of these functions are different, and trade-offs are therefore necessary, both in packaging design and in systems for managing waste packaging. Conflicts also arise within waste policies in dealing with disposal alongside the need to manage waste as a resource.

The first directive on liquid beverage cartons

The Commission introduced a directive on the management of packaging of liquid beverage containers in the early 1980s (Directive 85/339/EEC). However, this had limited impact. Diverging national packaging waste policies appeared, producing a partial protection of the EU environment but also a fragmentation of the internal market. In the first discussions on a new directive, environmental protection was the primary goal. Draft versions all contained three environmentally ambitious elements:

1. A maximum output of packaging waste per capita of 150 kg per year to be achieved within ten years;
2. A mandatory minimum recovery rate of 60 % and a recycling rate of 40 % to be achieved within five years, rising to 90 % and 60 % in ten years;
3. A binding hierarchy of disposal options (prevention, reuse, recycling, etc.)
   These targets encountered strong resistance by Member States and industrial pressure groups. The Commission's new proposal (July 1992) **upheld the ambitious targets for recovery and recycling** of packaging waste but **dropped the per-capita limit** of packaging volume and the binding waste hierarchy. Due to the multiple functions of packaging, there was reluctance within industry to accept such constraints.

Environmental protection, or market harmonisation?

The proposal sparked many reactions from industry, environmentalists and the European Parliament. Negotiations centred on the targets and on whether the directive should be adopted according to **Article 130S** (prioritising environmental protection) or **Article 100A** (prioritising harmonisation). The producers of packaging and some Member States lobbied heavily for changes to the proposal, and industry-sponsored research was an important and valuable source of data for Commission officials. Greenpeace, Friends of the Earth and the European Parliament opposed the proposal, but failed in achieving their demands. On 20 December 1994, the Council of Ministers accepted the revised proposal, which became **Directive 94/62/EC**. The directive was adopted under article 100A (harmonisation directive).

The recycling and recovery targets of the directive were revised in 2004, with the introduction of material-specific targets.

The new material targets are based mainly on a cost-benefit analysis carried out in 2003 for the European Commission (European Commission, 2003b). As a new option, the recovery of plastics can be achieved using feedstock recycling. Delegations representing EU governments and the European Parliament ([4]) have agreed that the EU will continue to allow packaging incinerated with energy recovery at waste incineration plants to count as recovery in order to achieve the new targets.

Member States were also to ensure that by 20 December 1997, packaging may only be placed on the market if it complies with a list of essential requirements on the composition and the reusable and recoverable (including recyclable) nature of the packaging (listed in Annex 2 of this document). The directive also specifies targets for concentrations of heavy metals ([5]): Member States were to ensure that the sum of the concentration levels of lead, cadmium, mercury and hexavalent chromium present in packaging or packaging components did not exceed 600 ppm by weight by June 1998, declining to 100 ppm by weight by June 2001.

2.3 Member States' reporting to the European Commission

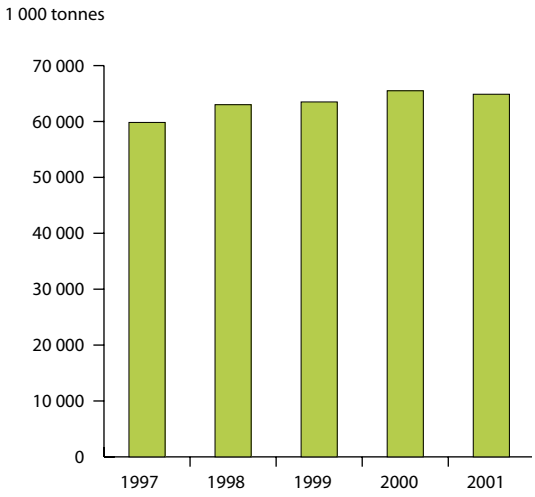
According to Article 12 of the packaging directive, Member States are obliged to provide the Commission with their available data. Since 1997, EU Member States have made annual reports ([6]) on the total quantity of packaging placed on the market, and on the quantities of recovered and recycled packaging waste. For each of the four categories of packaging materials (paper, glass, metals and plastic), data have been reported on the quantity of packaging placed on the market and on recycled packaging waste.

The data were to cover the whole of each calendar year, and to be provided to the Commission within 18 months of the end of the relevant year. A new Commission Decision is expected, to reflect the new requirements in the amended packaging directive.

2.4 Packaging waste trends in the EU-15

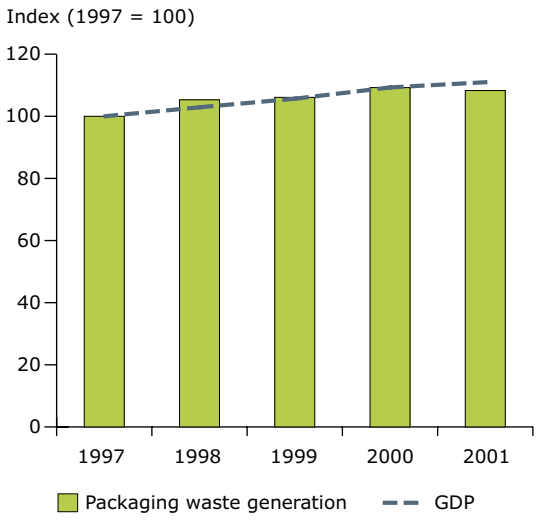
Generation of packaging waste in the EU-15 increased slightly between 1997 and 2001 (Figure 1), indicating that the waste prevention objective of the directive has not been met. However, it is not possible to draw a firm conclusion because of the short time-series. Many Member States already had an established packaging waste system in 1997, and it is therefore possible that a decrease in packaging waste amounts was achieved pre-1997. Another possibility is that countries focused on meeting the targets for recycling and recovery, rather than the waste prevention objective, since there are no quantitative targets for prevention in the directive.

Figure 1 Packaging waste generation in EU-15 1997–2001



([4]) Environment Daily 1568, 05/12/03.
([5]) The concentration levels do not apply to packaging entirely made of lead crystal glass.
([6]) 97/138/EC: Commission Decision of 3 February 1997 establishing the formats relating to the database system pursuant to European Parliament and Council Directive 94/62/EC on packaging and packaging waste.

Figure 2 **EU-15 packaging waste generation and GDP, 1997–2001**



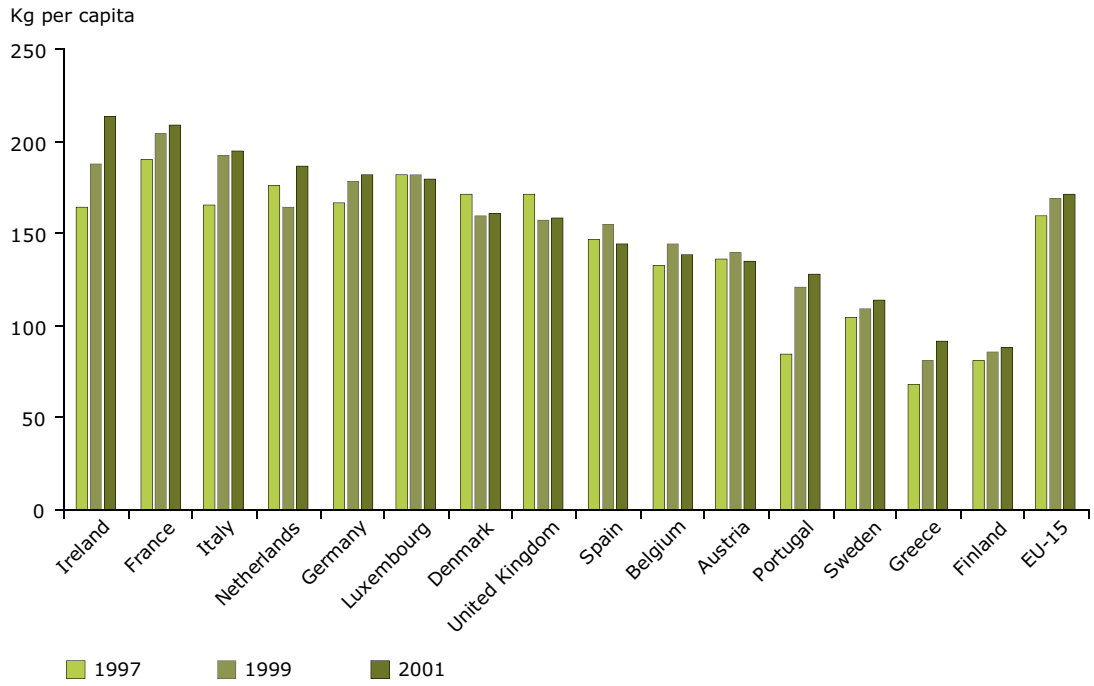
Generation of packaging waste has followed growth of GDP very closely (Figure 2). Between 1997 and 2001, packaging waste generation increased by 8.3 % and GDP by 11 %.

There is remarkable variation in generation per capita between Member States (Figure 3), from more than 200 kg a year in Ireland and France to less than 100 kg in Greece and Finland. The EU-15 average is about 170 kg. The differences are too large to be explained by differences in lifestyle and consumption patterns alone. One reason for the variation is that some Member States report all packaging waste, including wood and composites, while others report only quantities of the four mandatory materials paper, glass, plastics and metals. For Denmark, adding wood packaging to the quantities reported increased generation per capita from 160 kg (official data) to 192 kg in 2001.

The Commission is currently carrying out a study to explore the reasons for these variations, and Denmark, Finland, Norway and Sweden have recently finalised a joint study analysing the differences in methodologies for calculating packaging waste quantities in the Nordic countries ([7]). Denmark, Finland and Sweden use the definition of packaging in the packaging directive. However, the directive does not clearly establish when the individual product can be regarded as packaging ([8]), opening up possibilities for national interpretations of how packaging is defined. Denmark has the broadest definition and, in consequence, the largest quantities.

These differences in methodology are recognised by the Commission. The position of the Commission is that all the methods used in the Member States are

Figure 3 **Packaging waste generation per capita**



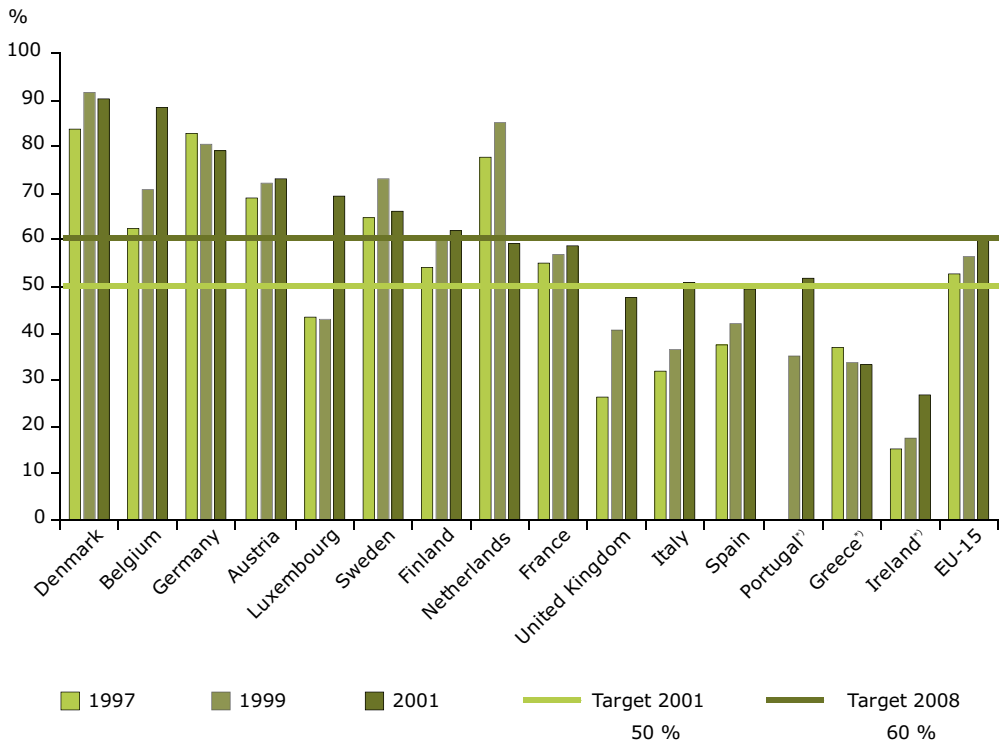
([7]) Kaysen and Jakobsen (2003).
([8]) Known examples are flower pot holders and farm plastics.

acceptable in principle, provided they are verified and checked in an appropriate way to make sure that the data are of a high quality and represent all packaging waste arisings.

2.5 Recovery of packaging wastes: distance to target

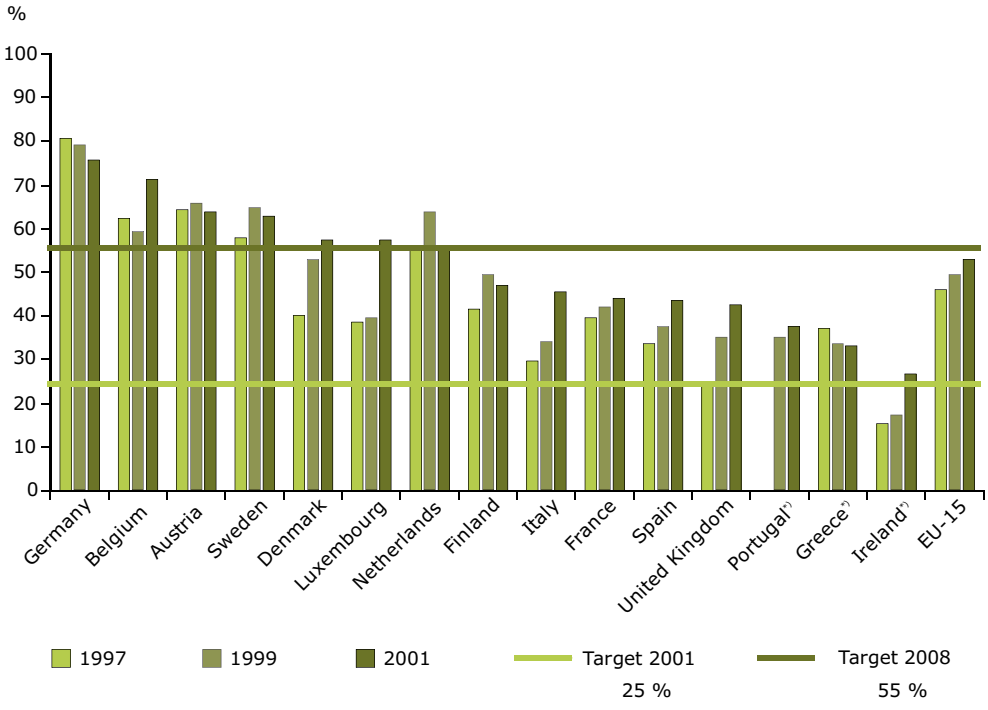
The directive required Member States to recover a minimum of 50 % of packaging

Figure 4 Recovery of packaging wastes



*) Due to their derogation, Ireland, Greece and Portugal's targets differ as follows: 25 % by 2001 and 50 % by 2005.

Figure 5 Recycling of packaging wastes



*) Due to their derogation, Ireland, Greece and Portugal's target differs as follows: 25 % by 2005.

waste by 2001. The 2001 target was set at 25 % in Greece, Ireland and Portugal because of the specific conditions for these countries, with 50 % recovery required by 31 December 2005. In the proposal for a revised packaging directive the general recovery target has been raised to 60 % by 2008.

The average recovery rate in the EU-15 is 60 %, and increased steadily between 1997 and 2001 (Figure 4). Denmark, Belgium and Germany have the highest recovery rates: between 80 and 90 %. The UK is the only country that did not meet the 50 % recovery target in 2001. More than half the EU Member States already fulfil the 60 % recovery target for 2008. Portugal, Greece and Ireland have all reached their 25 % target. The recovery rates have been reached in very different ways in different countries. For example Germany and Austria have reached their high levels almost entirely through recycling, while Denmark and the Netherlands have extensive incineration of mixed household waste in addition to recycling. Typically, no incineration takes place in the countries with the lowest recovery rates.

2.6 Recycling of packaging wastes: distance to target

The directive requires Member States to recycle a minimum of 25 % of packaging waste by 2001, increasing this to 55 % by 2008 in the revised directive. Greece, Ireland and Portugal received derogations for 2001. The average EU recycling rate between 1997 and 2001 increased steadily to 53 %, very close to the 2008 target. However, it is clear that some countries are still far from the target. Germany has the highest rate at about 75 % and Ireland the lowest at 27 %. The 25 % target has been reached for all Member States together and seven countries have already reached the 2008 target (Figure 5).

3 Methodology

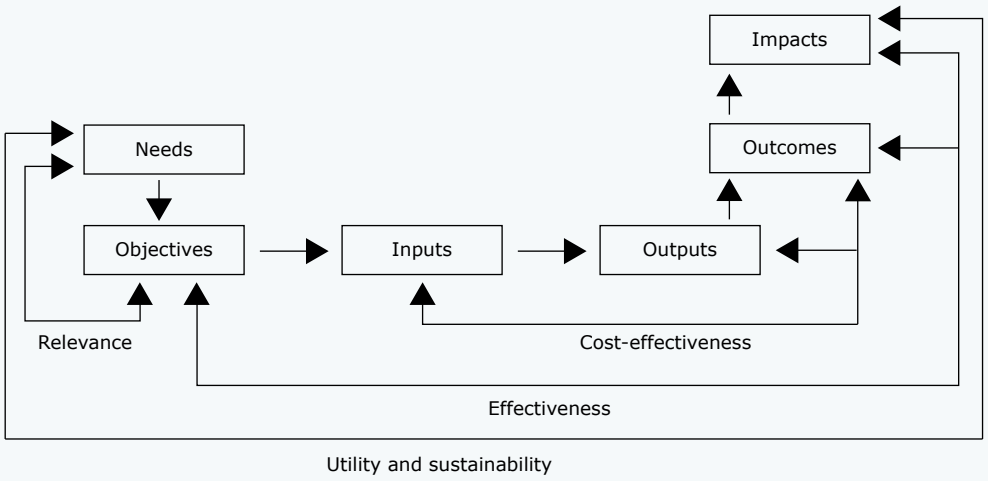
3.1 Starting point: the reporting on environmental measures (REM) evaluation framework

Studies of the effectiveness of environmental policies are complex, invoking a range of disciplines. They require a good understanding of the relationships between the formal policy aims, the tools available to implement them and the changes in environmental quality that have been achieved, as well as good knowledge of other independent developments that affect environmental quality and the outcome of policies.

Effectiveness evaluations aim to assess whether and to what extent policy measures have been able to meet their objectives, comparing the intentions with monitored performance. The methodological starting point for the EEA's pilot studies on

Box 3 Overview of the REM framework

The Reporting on Environmental Measures project presented a framework for evaluating the effectiveness of environmental policies, summarised in the flow chart below. The framework guides exploration of the relationship between the **needs** of society for a policy measure and its final **impact** on human behaviour and the environment.



The **effects** of an environmental policy are the *outputs* that can be directly attributed to its implementation. This requires a causal link between the policy action and its intended impacts on human behaviour and the environment. The **effectiveness** of a measure is a judgement about the *outcome*; whether or not the objectives and targets of the policy measure have been achieved. This requires comparing the effects of the measure with its intended objectives. Not all outcomes are direct consequences of the outputs: they occur as a chain with other influencing variables. The **cost-effectiveness** of a measure is a comparison of the effects of a set of measures with the costs of implementing them. A more cost-effective measure will have achieved greater results for less money.

A full evaluation comprises the following questions:

Relevance: Are the objectives justified in relation to the needs?

Effects: How has the measure affected behaviour, the environment and the economy?

Effectiveness: Are the outcomes and outputs meeting the objectives of the measure?

Cost-effectiveness (efficiency): Have these objectives been achieved at lowest cost?

Utility: Have the overall effects of the measure — intended and unintended, good and bad — contributed to a net increase in social welfare? This is the kind of question posed in a cost-benefit analysis (CBA).

effectiveness evaluation is the framework and methodology described in 'Reporting on environmental measures: are we being effective?' (EEA, 2001). The REM framework is a detailed, comprehensive framework for approaching such evaluations (Box 3), and the pilot studies aim to put it into practice.

Perhaps the biggest challenge in policy evaluation is the 'impact problem': establishing the outcomes of a policy (e.g. quantities recycled) may be straightforward, but establishing a clear causal link to the desired impacts (such as reduced depletion of abiotic resources such as fossil fuels, lower global warming potential, reduced acidificiation, nutrification and toxicity potential) is much more difficult. The effects of a policy mingle with the influence of other factors, including changes in private consumption expenditure, size of households, population and commercial prices of recycled materials. Separating the effects of policies from the effects of the many other confounding variables is a major difficulty. The wider issues of utility and sustainability, although important in gaining a full understanding of a policy's value, are also difficult to quantify.

As a result of these and other issues, some tailoring is required to apply the comprehensive REM framework to actual policy questions. In applying it to the case of packaging waste policy evaluation, a restricted version of the framework was used (Figure 6) and applied at the Member State level. Thus, the study does not include an analysis of wider environmental impacts, although it does include some specific inferences when the data allow. The directive's quantitative reporting requirements were a good source of data, and the methodological framework aimed to optimise this source of information.

3.1.1 Developing response indicators and mapping them onto the framework

In the EEA indicator system, response indicators refer to responses by groups (and individuals) in society, and government attempts to prevent, compensate, ameliorate or adapt to changes in the state of the environment. It follows that response indicators for evaluating the effectiveness of packaging waste management systems should describe and measure politically-induced efforts to achieve the objectives and targets of the packaging directive and national legislation. Response indicators can be defined and categorised in many ways. Three broad categories are suggested:

Table 3 Applied response indicators

Applies to:	Type of indicator	No. of indicator
Implemented measures	a	1. Types of measure in place in the system
Effectiveness	c1	2. Change in packaging waste generation 1997–2001, % 3. Change in GDP 1997–2001, % 4. Total packaging waste generation, tonnes 5. Packaging waste generated, kg/capita per year 6. Total recovery rate, % 7. Total recycling rate, % 8. Recycling of each packaging material, tonnes 9. Recycling rate for each packaging material, %
Cost-effectiveness	b	Total costs of packaging schemes: 10. Financing need, EUR/tonne packaging waste generated (or collected) 11. Change in financing need per tonne recovered, % 12. Revenue from taxes and similar instruments charged on packaging, EUR/capita
Other outcomes	b	13. Fraction of companies participating in compliance schemes, %

a. number/types of policies/instruments applied
b. indicators that measure the implementation of policies
c. indicators that measure the impact of the responses in terms of improved management of packaging waste:
   1. generic indicators
   2. policy-specific indicators (not used in this case).

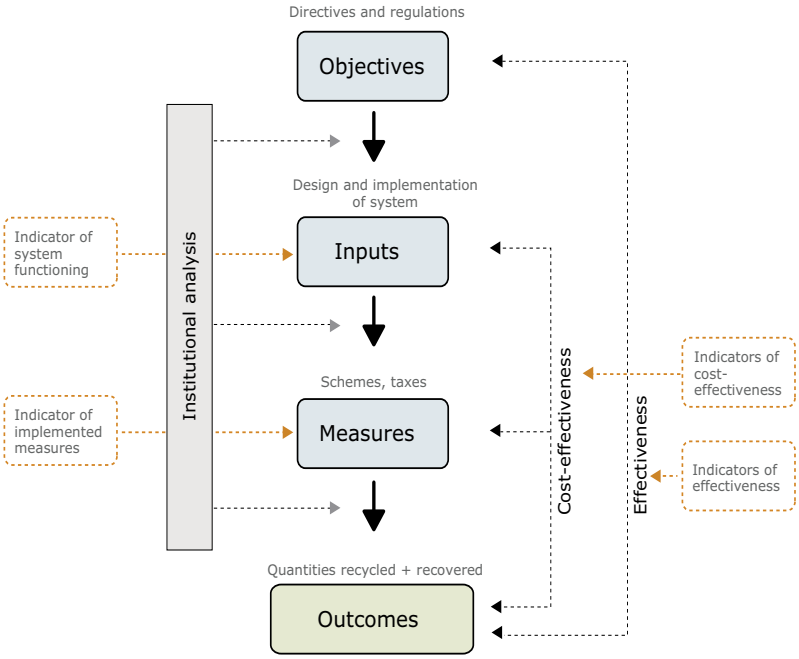
For the evaluation of the effectiveness of the national packaging waste management systems, the response indicators in Table 3 will be used.

The first response indicator shows the **types of measure** that have been implemented. It illustrates how a country has chosen to deal with packaging waste and implement the packaging directive. The second set of indicators aims to measure the **effectiveness** of the system. Indicators 2 and 3 apply to the decoupling of packaging waste from economic growth, 4 and 5 to the objective of prevention. Indicator 5, the quantity generated per capita, is included to enable comparison of the systems in the final phase of the analysis. Indicators 6 to 9 are directly linked to the quantitative targets in the packaging directive. Three **economic indicators** are suggested: the total costs of the entire system for all packaging materials, the costs per tonne of packaging waste recovered, the revenue from taxes on packaging (if any). **Other outcomes** include the fraction of companies participating in compliance schemes. The real aim of this indicator is to present the number of companies not participating in the scheme, i.e. self-compliers and free riders. As companies can usually chooses to transfer their obligation to a third party or to manage their own waste, it is generally difficult to get exact figures for non-participation. This indicator measures the actual implementation of policies.

3.2 Analysis: description of the system, effectiveness and cost-effectiveness

For each of five selected countries, the objectives of the packaging waste management system (directives and regulations), the inputs (resources for developing and putting measures in place), the measures themselves and the outcomes (for example quantities recycled) were investigated (Figure 6). It was decided that

Figure 6 Methodology development: building on the REM framework



In this overview of the analysis, **objectives** correspond to the EU-level policies influencing the national system, together with any national regulations and strategies that are in place. **Inputs** are the resources dedicated to the design and implementation of measures. The **measures** themselves can be legal, administrative or infrastructural. (In the REM framework, measures correspond to the outputs.) Finally, **outcomes** are the amounts recycled and recovered as a result of these measures. In this pilot study, examination of **effectiveness** relates objectives to outcomes Examination of **cost-effectiveness** relates inputs to outcomes. The institutional analysis contributes to an understanding of the system's development and implementation. **Response indicators**, listed in Table 3, help to quantify aspects of this system.

an analysis of the needs of society and the wider environmental impacts that result from the measures was beyond the scope of the project.

Institutional factors were considered in detail, feeding into a more thorough understanding of each country's system, in particular the process of transposition of the requirements of the directive into national legislation, the system's development and its implementation. The **effectiveness** and **cost-effectiveness** of the measures were assessed. Effectiveness relates objectives (the aims of directives and national strategies and regulations) to outcomes (e.g. achieving recycling targets). Examination of cost-effectiveness is limited to observations on the relationship between certain inputs (costs dedicated to the design and development of measures) and how well those measures are working, including target achievement. The study also presents a **comparative analysis** of the five countries studied, in order to analyse more fully any effective elements that have emerged and further inform improved policy actions in the future.

The examination of each country is structured according to the following sections.

3.2.1 Distribution of responsibilities, institutional arrangements

This section of each country chapter deals with the institutional and administrative arrangements in place to implement and administer the system, and the distribution of responsibilities among the relevant organisations. Each system comprises the pre-existing institutional arrangements that are in place, and specific features that have been introduced in response to the objectives of the directive.

Institutional arrangements are critically important if a measure is to succeed. Information on institutional structures is essential to gain a full understanding of the development and implementation of packaging waste management. Important institutional features include the distribution of responsibility, stakeholder involvement, cooperation between public authorities and various stakeholders, and the actors' perception of the efficiency of the system. Formal structures such as ministries and local authorities can be distinguished from informal features, such as values, norms and culture. Part of the analysis is to assess whether the institutional structure has helped or hindered implementation of the system.

The design of a system is a process that potentially involves various public authorities, institutions and organisations, which is why the involvement of such bodies should be analysed to assess the kind and degree of influence they exert. A comprehensive series of interviews was undertaken to obtain information on institutional factors in the design and implementation of the systems, with four to six interviews for each country (Annex 1). Some important points about the approach taken are:

- **Number of interviewees**. Although only a limited number of people were interviewed, they were — in most cases — the key people in the key institutions involved. The directive was adopted ten years ago, so there are not many people who were involved with the transposition process and are still working in the same area. Potential interviewees were identified by the topic centre partners in each case study country.

- **Presenting the results of the questionnaire**. The interviewees were asked how they wished their points to be presented, and these wishes were reflected as far as possible.

- **Importance of a thorough consultation process**. Inconsistencies were reconciled through a **two-stage consultation process**: following the drafting of the institutional analysis, each country section was sent to the interviewees in that country to ensure that it was accurate and balanced. Comments and feedback were provided and responded to. In November 2004, when the draft technical report was completed, a consultation process was conducted involving industry groups, a scientific peer review, the European Commission and contacts in each country. This resulted in extensive feedback. In addition to this two-stage consultation, an expert meeting was held in mid-2004 to discuss the first draft of the report and seek responses from a range of organisations.

3.2.2 Implemented measures

Legal and administrative measures are put in place by the Member States to implement the directive. Some countries had pre-existing measures that pre-date the requirements of the directive, others put measures in place directly in response to it. There are also measures that have been put in place in response to other objectives, such as those in the landfill directive. In the REM framework, measures and their outcomes — resulting change in recycling level, for example — correspond to 'effects'.

Important components of this stage of the evaluation include a mapping of local, regional and national responsibilities, a discussion of legal and economic policy instruments and a consideration of the combination of eco-efficient or end-of-pipe measures in place — is a balance between prevention and treatment being achieved? Overlap with policy responses to other drivers such as the landfill directive is also discussed.

Ideally, the evaluation should illustrate what happens after the implementation of the directive and the national system, i.e. describing the situation 'before' and 'after' implementation. Information on the 'before' situation is, however, difficult to obtain, particularly as regards quantities of generated and managed waste. In some cases, the analysis is limited to changes, for example in quantities and recycling rates, since data may not be available until one or two years after implementation.

3.2.3 Effectiveness

Effectiveness refers to the outcomes of the measures, examining goal-achievement and problem solving. These outcomes are measured in terms of quantities of generated, recovered or recycled packaging waste. This part of the evaluation asks whether the measures have resulted in the objectives and targets being achieved.

The directive's objectives and targets were set out and discussed in earlier sections. Some countries have set targets for recovery and recycling that are more ambitious than these, and the analysis includes these targets when the effectiveness of the system is assessed.

In a standard life-cycle analysis of packaging, a substantial portion of the environmental impacts are usually accounted for by the manufacturing process (ECOLAS-PIRA, 2005). Measures to minimise packaging therefore have a correspondingly important role in reducing the overall environmental impacts of packaging. Although the directive has no quantitative targets for prevention, particular focus will be given to the objective of **prevention** of packaging waste. The absence of targets may have resulted in less effort being devoted to prevention when implementing the national systems. Moreover, it is an objective of the sixth environment action programme (6EAP) to achieve a significant reduction in the volumes of waste generated. Prevention has also been given top priority in the waste hierarchy.

Another objective stressed in 6EAP and other strategy documents is to decouple environmental pressures from economic growth. The effectiveness analysis will also touch briefly on the decoupling of packaging waste from GDP during the period 1997–2001.

No national schemes, voluntary or compulsory, include all the companies in the targeted sectors. In some countries, companies can organise their own recovery schemes (**self-compliance**), and this is counted towards target achievement, but the companies do not report expenses ([9]). Some companies benefit from the system without paying (**free riders**). Other countries have thresholds, such as annual turnover, beyond which a company must comply with the legislation. A quantitative indicator of the share of companies that participate, relative to those that could but do not, can be a useful indicator of the effective functioning of the system. The aim is to check whether the degree of participation is correlated with the achievement of targets. In practice, however, the indicator will be presented as a best estimate of the number of free riders in a country.

3.2.4 Cost-effectiveness

Cost-effectiveness is a judgement of the 'value for money' of implementing and operating the system.

([9]) Here the costs equal the financing need for packaging compliance schemes in countries with producer responsibility.

A system should be as cost-effective as possible. If the same amount of recycling could be achieved by other, less costly, measures then there should be a switch to such measures. Beyond this general principle, decisions on how comprehensive a system should be and what financial obligations should be imposed on industry are political, and are often the factors that limit the degree of sophistication of the system. Some European countries have established a well-functioning system with good coverage (geographical and sectoral) and achieve very high recycling rates. Others have focused on achieving the targets in the directive at the lowest possible cost. The differences in the performance of the various systems will usually affect the costs of the systems.

A comprehensive assessment of the cost-effectiveness of a system would require detailed information on costs and expenditures, and on their comparability between countries. This level of detail is not available, so the assessment focuses on operating costs and the cost-effective elements, including the presence of competition, the use of economic instruments, the existence of hidden subsidies and the appropriate balance between these instruments and other measures.

Regarding the wider efficiency of the policies, from a socioeconomic point of view very high recovery/recycling rates may not be optimal; such rates could be estimated ([10]) and a higher rate would be a disadvantage for the society. The marginal costs of collecting and recycling packaging waste are increasing, so costs should be taken into account when comparing systems that are at different recovery/recycling levels.

This study uses expenditure (as far as available) on packaging waste systems to estimate costs, assuming that expenditure is a reasonable approximation of cost. This may be acceptable when comparing similar systems between countries, but expenditure and costs may differ: expenditure is closer to private and public investment, thus representing a close and instrumental consequence of policy action. Costs refer to all direct and indirect costs, shadow prices and opportunity costs associated with policy implementation and compliance, by private agents and eventually society at large.

Costs of producer-responsibility systems: a surrogate for financing need

For the purpose of the present study, financing need (total expenditure minus revenues from the sale of sorted materials and recovered energy) is considered to be the best available information for countries with a packaging compliance scheme financed by industry, local authorities or households. To make the recycling and recovery of packaging waste profitable in the short term from a recycler's point of view, subsidies are used in some cases. Financing need measures the amount of subsidy that needs to be injected into the system to render the system profitable. For countries with a producer-responsibility system where a non-profit organisation has been established to manage this responsibility on behalf of industry, the financing need is the net costs of that system.

Compliance systems may incur different kinds of expenses, so expenses in one country cannot be compared directly with those in another. Not all compliance systems necessarily cover all costs of meeting a given set of targets. Systems may differ: one may cover all collection and recovery/disposal costs while another only covers the extra costs associated with recycling and recovery. Systems may also have different focus on particular streams such as commercial or household packaging waste.

The administration costs of the public authorities and the costs of companies that do not participate in the compliance scheme (self-compliers or free riders) are not included in the financing need, and the costs of local authorities' collection may not be. From the point of view of society, the real net cost of achieving the packaging directive's targets is only the amount spent over and above what would have been spent anyway if waste had been managed as it would have been in the absence of the directive. This net overall cost (financing need less alternative disposal costs saved) seems to be more relevant to measuring the real costs of achieving the targets. However, estimating these alternative costs of disposal (or waste management) in a

([10]) This has been attempted in the study *Evaluation of costs and benefits for the achievement of reuse and recycling targets*, European Commission (2003b).

comparable manner proved to be beyond the scope of the study.

3.2.5 Comparative analysis

After assessing the effects, effectiveness and cost-effectiveness of the packaging waste measures in each country, a comparative analysis is presented to investigate the similarities and differences.

The comparative analysis focuses on the key features of each national system, including different national objectives, institutional arrangements and combinations of policy instruments (legal, economic), and the possible implications of such combinations on the ultimate success of the system.

3.3 Selection of countries

The five countries selected, Austria, Denmark, Ireland, Italy and the UK, encompass a wide range of recycling and recovery levels, and include one country that was granted a derogation from the directive's targets (Ireland). Geographic balance and variation in size were taken into account in the selection. The countries exhibit examples of systems which were implemented as a direct result of the directive, and those that were fully or partly implemented prior to the directive. Four are partners of the European Topic Centre on Waste and Material Flows (ETC/WMF), easing the gathering of information.

The selection was made to include different ways of implementing the directive. The systems vary with respect to whether:

- producer responsibility has been introduced or not;
- particular focus has been placed on commercial or household packaging waste;
- market orientation and competition have played a special role in the design of the system.

4 Austria

Summary

Austria's basic system for managing packaging waste was implemented before the packaging directive came into force. The directive only necessitated limited changes to the system. It could be argued that the Austrian (and German) system has had more influence on the contents of the directive than the directive has had on the Austrian system.

The system has reached very high levels of recovery and recycling, much higher than required by the directive. The total recovery rate in 1997 was already 69 % and the recycling rate was slightly lower at 64 %. These levels were maintained up to 2001, enabling Austria to fulfil all the directive's targets for 2008, except for recycling of wood. The directive sets maximum (as well as minimum) levels for recovery, and Austria actually exceeds these. However the Commission allows the full quantity to be taken into account, because the country has sufficient treatment capacity and therefore respects the important principle of self-sufficiency in waste management.

The quantity of packaging waste has decoupled from economic growth, and the quantity of packaging waste per household has been falling. Nevertheless, some stakeholders find that the environmental benefits do not match the costs of the system. Several stakeholders agree that too little attention has been given to preventing waste generation and that the directive's intentions may not have been fully transposed in this respect.

The ARA financing need shows the most complete cost estimate of the five countries in the study. In the past, the system's fees were claimed to be too high, and a measure of price control was introduced in 1996. License fees have been reduced several times since then, with a decrease of more than 40 % for several materials between 2000 and 2004.

The institutional analysis has shown that there are differing opinions on the involvement of stakeholders and the effectiveness of the system. It appears to have been decided at an early stage to introduce a producer-responsibility system without necessarily involving all stakeholders in the discussion. Foodstuff retailers and industry organisations had a major influence on the design of the system. The Chamber of Labour Noted that the Packaging Ordinance was adopted at a time when many other (waste) ordinances were being adopted. The local authorities were to pay for several other initiatives and were happy that somebody else was to do the financing in this case.

The most important measure for achieving the high levels of recovery has been the producer-responsibility obligation. This is an expensive system that covers all the costs of collection/sorting/recovery and an impressive performance has been achieved.

4.1 Introduction

The Austrian producer-responsibility scheme was established in 1993 on the basis of the Packaging Ordinance of 1992. The system was inspired by the German Packaging Ordinance, which came into force in 1991.

The Austrian ordinance requires producers, packagers/fillers, distributors, and importers that put packaging or packed goods on the market to take back their packaging free of charge and to reuse or recover it. The producers can manage this obligation themselves or transfer the obligation to a third party.

To fulfil the take-back obligation on a nation-wide basis, the industry created ARA AG and their Branch Recycling Companies (together called ARA). ARA authorises the 'green dot' logo 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 for the collection and recovery of material to ARA, which finances the collection, sorting and recovery of the packaging waste.

Note on the use of stakeholder views

Each country analysis includes the results of interviews with a small number of stakeholders. The views of these stakeholders reflect differing interests, perspectives and priorities and are individual opinions. As such, they should not be regarded as representative or official views of the country as a whole nor as consensus views of the stakeholders the individuals' organisations may represent. These aspects should be borne in mind when reading the sections on stakeholder views.

About 60 % of the packaging waste collected by ARA is from private households and 40 % from industry and commerce ([11]).

This analysis includes the results of interviews with five stakeholders: Christian Keri, Ministry of the Environment; Hermann Koller from the compliance scheme ARA; Werner Hochreiter, Chamber of Labour (representing Austrian employees and consumers); Prof. Gerhard Vogel, expert from the University of Vienna; and Wilfried Mayr from the Province of Salzburg.

4.2 Distribution of responsibilities

Overall responsibility for transposing the directive into national legislation lies with the Ministry of the Environment which is also responsible for monitoring whether the directive's and national targets are met.

The producers and importers supply data on the quantity of packaging placed on the market, either through ARA or directly to the Ministry of the Environment, which then monitors compliance with the legislation. ARA is not the only compliance scheme as there are several other collection and recovery systems in Austria. But ARA is the largest and covers about 95 % of packaging material for which the obligation has been passed to a third party. In the following, the obligations of ARA represent those of all the compliance schemes.

The obligation to provide information about the management of packaging waste rests with the Ministry of the Environment.

Table 4 Distribution of responsibilities in the packaging system

Activity	Responsible body
Transposition of directive into national legislation	Ministry of the Environment
Monitoring of meeting targets (national + directive)	Ministry of the Environment
Monitoring and control of compliance	Ministry of the Environment + ARA
Information on management of packaging waste	Ministry of the Environment + ARA
Supplier of packaging data	ARA + other compliance schemes + self-compliers
Collection of packaging waste	ARA + other compliance schemes + self-compliers
— from households*)	60 % of the packaging waste is collected from households.
— from industry/commerce*)	40 % of the packaging waste is collected from industry and commerce.
Recycling and treatment of packaging waste	ARA + other compliance schemes + self-compliers
Expenditures of packaging system covered by	ARA + other compliance schemes + self-compliers

*) These are figures from ARA. Of the total amount of packaging collected, 45 % originates from households and 55 % from industry and commerce (Keri, 2004).

([11]) ARA website, see also Table 4.

ARA also has a legal obligation to engage in information activities. In line with the producer-responsibility principle, collection and management of packaging waste are carried out by the producers and importers themselves, who also meet the costs of these activities. The distribution of responsibilities in the packaging system is presented in Table 4.

4.2.1 Transposition of directive into national legislation: stakeholder views

It is generally agreed that the packaging directive has been transposed into national legislation. Although waste prevention is one of the stated objectives of the directive, some of the interviewees seem to think that this was not actually the case. Thus, the Province of Salzburg and Prof. Vogel asserted that little attention was paid to prevention in the Austrian system. In line with this statement, the Chamber of Labour pointed out that the main focus lay with recovery and recycling targets rather than prevention. ARA referred to the national intentions being fulfilled: a reduction in landfilling and meeting of targets for recycling and recovery.

4.2.2 Stakeholder involvement in the design of the system

Stakeholders were involved in the design and implementation of the system to varying degrees. Among those interviewed, the Ministry of the Environment is naturally the stakeholder with the largest degree of influence, and ARA had discussions with the Ministry on the amendment of the Packaging Ordinance. Prof. Vogel was involved in a feasibility study on the implementation of a producer-responsibility system and co-authored the Packaging Ordinance. The Chamber of Labour and the Province of Salzburg were both members of an advisory committee established by the Ministry of the Environment and were thereby officially involved in the transposition process. Despite this, they both stated that the degree of actual influence was limited.

The distribution of roles and degree of influence in the Packaging Ordinance were more or less given beforehand. The Chamber of Labour mentioned that the Packaging Ordinance was adopted at a time when many other (waste) ordinances were being adopted. The local authorities were to pay for several initiatives and were therefore happy that the producers were called on to do so. Even so, the way in which the implementation of the system was conducted was subject to some disagreement among the interviewees. It was agreed, however, that the food and drink retailers and the industrial organisations had a large influence. Prof. Vogel highlighted that three supermarket chains had about 80 % of the total market. ARA was one of the main stakeholders and provided comments and advice on all questions regarding targets, producer responsibility, financing, etc.

The Chamber of Labour stated that the central authorities did not involve all stakeholders in the process and that the large influence of retailers had hampered open competition. Thus, it is suggested that large retailers seem to have favourable agreements with ARA, and thereby an incentive to promote licensing with ARA. The Chamber of Labour suggested that this could partially explain why the market share of competing compliance schemes was only about 5 %.

However ARA emphasised that it had no differentiating contracts with its clients and that it gives no preference to specific clients. Since 1993 ARA has provided the same contract to all clients with the same terms and tariffs. Equal treatment of all licence partners has been and continues to be one of the fundamental elements of ARA.

The large influence of the central authorities and industrial organisations was mentioned by all the parties questioned. Whether or not regional authorities had a significant influence is the subject of some disagreement.

4.3 Implemented measures

The main measure in the Austrian system is producer responsibility, and this was implemented in 1993, before the adoption of the directive. Moreover, Austria has set national targets for recycling of individual packaging materials to be achieved by 1996 that were more ambitious than those required by the directive (to be achieved in 2001).

Some companies chose to fulfill their obligations under the legislation individually (i.e. not transferring them to a compliance scheme). However,

companies not participating in a scheme and not complying with their obligations are considered as 'free riders', a generally acknowledged problem in producer-responsibility schemes. Although the Austrian Federal Environment Agency does not have specific figures for the number of free riders, it seems reasonable to conclude that they do exist, either by not joining a scheme or by not giving complete information on the amount of packaging put on the market. Companies that choose to manage the take-back obligation themselves are required to meet extremely high recycling targets: 95 % for metals and ceramics; 93 % for glass and 90 % for paper and cardboard. The targets are significantly higher than for companies that join a compliance scheme (which has to fulfil the national as well as the directive's targets). Such an initiative clearly creates an incentive to join a scheme, provided that the mechanism of control and monitoring works well. More than 400 individual enterprises are self-complying and recover about 108 000 tonnes of packaging. No exact information on the performance of self-complying companies relative to the targets is available.

The measures cover a broad range of instruments (Table 5). The majority are

Table 5 Measures for packaging waste in Austria

Measure	Year of introduction	Purpose/targets	Relation to the objectives of the directive
Deposit system for beverage containers	1990	Only mandatory for refillable plastic beverage bottles. The purpose is to ensure the reuse of beverage containers and prevention of packaging waste generation by reducing the use of disposable packaging. Quantitative targets have been set for refilling, recycling and energy recovery.	To support high collection rates as a prerequisite for high reuse/recycling rates. Prevention of packaging waste.
Regulation (Packaging Ordinance and Target Ordinance)	1992 and 1996	Producer-responsibility scheme. Management of packaging waste. Specific targets have been set for recycling and recovery for total packaging waste and individual materials.	To meet the recycling and recovery targets of the packaging directive.
Landfill tax	1996	To upgrade old landfills and ensure suitable pre-treatment of waste.	To reduce final disposal of waste and support the recovery targets.
Ban on landfilling of mixed waste	2004	To eliminate the landfilling of untreated waste.	To reduce final disposal of waste.

Note: The table equals response indicator 1: Types of measures applied in the system.

Table 6 General information on measures

	Aimed at prevention	Aimed at increased recycling
Administrative instruments		
Producer responsibility	√	√
Deposit systems for reusable beverage containers	√	
Prevention programmes	n.a.	
Awareness raising	n.a.	
Mandatory collection		√
Landfill ban for packaging waste		√
Economic instruments		
Landfill tax		√

administrative instruments aimed at increasing the recycling of packaging waste. The only direct economic instrument is the landfill tax. In addition, the costs to producers of managing packaging waste provide an economic incentive to limit the amount of packaging placed on the market. Other administrative instruments have been used, such as awareness raising, but no detailed information is available.

4.3.1 Waste prevention

The voluntary deposit system for beverage containers and producer responsibility are the only two measures with a clear preventative effect (Table 6).

The deposit system is aimed at preventing waste generation by the reuse of bottles. Precise information on the number of reused bottles is limited, but the systems seems to be under pressure: according to Lauber and Ingram (2000, p.116) there has been a large increase in non-refillable plastic bottles and a simultaneous decline in beverage deposit systems. Moreover, there are indications of a rapid decrease in refillables since the share of refillable beverage packaging has fallen from 59 % to 53 % in two years (2000–2002).

The ARA system provides an economic incentive in the form of a weight-based fee for packaging waste placed on the market to limit the quantity of packaging. The same applies to expenditure by self-compliers. Self-compliers also have to meet higher targets (than those in the packaging directive) which could be costly and thus provide an even greater incentive to reduce the total amount of packaging and the various kinds of materials put on the market.

4.3.2 Increased recycling

It is evident that the ARA system has been the most important measure for improving the environmental performance of packaging waste management.

The landfill tax and ban are not aimed directly at packaging waste since separated packaging waste is seldom landfilled (being either recycled or incinerated). However, the measures have a supportive effect on packaging waste that ends up, for example, in mixed household or commercial waste. The measures therefore mainly support diversion from landfill towards recovery of packaging waste. The landfill tax may have supported development in the past, but has hardly been the main driving force. The landfill ban, however, only entered into force in 2004 and cannot yet have had much effect ([12]).

4.4 Effectiveness

In addition to those in the packaging directive, Austria has three sets of targets:

Table 7 Key figures

	Austria	EU-15
Total packaging waste generation 2001, 1 000 tonnes	1 097	64 876
Generation incl./excl. wood 2001, kg/capita	135/122	172
Change in generation, 1997–2001, %	– 1.0	+ 8.4
GDP change 1997–2001, %	+ 11.0	+ 11.4
Change in per capita household consumption, 1997–2001, %	+ 11.2	–
Change in the number of households, 1998–2000, %	+ 4.1	–
Change in the population, %	+ 0.7	+ 0.8
Recycling (EU target 2001, 25 %), %	64	53
Recovery (EU target 2001, 50 %), %	73	60

Note: The key figures cover the response indicators 2–7 on effectiveness. GDP and household consumption expenditure are in 1995 prices.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste, and Eurostat.

([12]) The latest data presented here are for 2002.

- Targets for the management of packaging waste (maximum for landfilling in 1998 and 2001, and minimum for recycling of packaging materials)
- Recycling targets for companies with individual collection (self-compliers)
- Targets for refilling, recycling and energy recovery of beverage containers.

Less than 2 % of the total amount of packaging waste in the EU-15 is generated in Austria (Table 7). Austria also has a very low generation of packaging waste per capita of 135 kg. The EU average is 172 kg/capita. Austria succeeded in stabilising the generation of packaging waste between 1997 and 2001. Thus, despite an increase in GDP of 11 %, Austria seems to have **achieved relative decoupling**. More recent figures (2002) indicate that packaging waste quantities continue to decline, and absolute decoupling will be achieved if this continues.

Austria has a very high recycling rate (64 %) which is far beyond the 25 % minimum recycling target in the packaging directive and 11 percentage points higher than the EU-15 average. With a recovery rate of 73 %, Austria has exceeded the 50 % recovery target by 23 percentage points. The remaining 27 % of packaging waste is landfilled or incinerated without energy recovery.

As regards the recycling of the four packaging materials in the directive, Austria has reached recycling rates from 29 % to 82 % and thereby also exceeds the 15 % recycling target. Austria's national targets for packaging recycling have also been exceeded — often by between 10 and 20 percentage points. The same applies to the national targets for maximum landfilling of packaging waste. The Austrian measures have therefore been effective in terms of achieving the targets laid down.

Companies with individual collection (self-compliers) are obliged to take back at least 90 % of the majority of packaging materials placed on the market. In case of an inspection by the competent authority the company must be able to provide information on whether the company meets the recycling quotas. However, no statistics are available to assess how many self-compliers meet the target.

Targets for the 'refilling, recycling and energy recovery of beverage containers' are defined in the Target Ordinance of 1992. The targets for 1996 were reached in 1998. In 2000, the Target Ordinance was amended and one target was set for all refillables. Hence in 2001, 80 % of the beverage containers sold on the market had to be re-filled, recycled or energy-recovered. However, the Austrian Constitutional Court cancelled the threshold targets of the amended ordinance, so currently there are no targets for the 'refilling, recycling and energy recovery of beverage containers'.

4.4.1 Stakeholder views of system effectiveness

Opinions among the stakeholders on the effectiveness of the Austrian system differ. According to the Ministry of the

Table 8 Recycling of packaging materials in 2001 and targets

Packaging material	Recycling 1 000 tonnes	Recycling %	Target Ordinance, 1996 %	Packaging directive target, 2001 %
Paper and cardboard	402	81	60	15
Glass	181	82	70	15
Metals	43	61	50	15
Plastics	59.5	29	20	15
Wood	8.7	12	–	–
Other composites	10.5	27	10	–
Composite beverage containers*)	–	–	20	–
Total	704.7	64	–	25–45

*) In 2003 the Öko-box system recycled 7 600 tonnes of beverage cartons corresponding to 33 % of those put on the market.

Note: The table covers response indicators 8–9 on effectiveness.

Source: Austrian reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

Environment, the system is very effective both in economic terms and from an overall waste management perspective, and it yields a positive environmental impact. The ministry views the system as providing incentives for reducing the quantity of packaging put on the market, and ARA points to the reduction of packaging disposed of. ARA and Prof. Vogel rate the overall effectiveness of the system as fairly high. Prof. Vogel finds that a positive effect is the recycling of plastics packaging which will not take place without financial support (from the producer responsibility system). The positive perception of the system is somewhat contradicted by the Chamber of Labour and the Province of Salzburg. The Chamber of Labour rates the system as relatively poor on overall effectiveness, e.g. economic and environmental performance. The Province of Salzburg gives the system a more moderate rating, although it emphasises that the costs of the system are not fully matched by the environmental benefits.

The effectiveness of the measures and the operation of the system also gave rise to differing views. The Ministry of the Environment gives the mix of instruments a very high rating and appreciates especially the producer-responsibility system. The main problem according to the Ministry is that there are some free riders in the system. The Chamber of Labour also mentions the free rider problem and estimates that 45–50 % of plastics recycling is free riding. About 200 000 tonnes of plastics are put on the market, but only 110 000 tonnes seem to be paid for. The Ministry rebuts the figure on plastics, stating that the maximum percentage of free riders in 2003 only amounted to 35 % with 217 000 tonnes being introduced to the market and about 139 000 tonnes being cared for. ARA considers the issue of free riders to be overestimated and emphasises that an audit on license partners is performed on a regular basis. Concerning packaging which is not licensed with a compliance scheme, ARA stresses that in many cases, especially in the field of transport packaging, the packaging remains within the company. Many companies with large amounts of packaging are self-complying and therefore it makes no sense to license the packaging.

The Chamber of Labour estimates that about 50 % of paper packaging from households could be free riding, as no significant changes have been applied since 1996 when their calculations were made. It is furthermore stated that the apparent decoupling of packaging waste generation from economic growth is doubtful. The Chamber of Labour argues that the steady increase in the amounts of household waste contradicts the statement on decoupling. In addition, it considers the data on packaging supplied from ARA as somewhat inaccurate, thus implying that the overall picture on the system performance is distorted. Prof. Vogel states that no exact statistics on the size of the total packaging market exist, and that targets for ARA are based on licensed quantities only. Thus, ARA targets are based on the market share held by ARA and not the total quantities of packaging waste arising.

The Province of Salzburg states that the concept of producer responsibility is not really fulfilled, as ARA does not represent actual producer responsibility because producers have less influence than retailers. The Province of Salzburg advocates a deposit system (which seems to be opposed by the politicians) and praises the landfill tax and the ban on landfilling of mixed waste. These instruments are supported by the Chamber of Labour which says that these two measures would have been sufficient.

Opinions also differ when it comes to the implications of the structure of Austria's institutions on the implementation and operation of the system. The Ministry of the Environment sees no real negative impacts, and finds that cooperation between stakeholders has supported the efficiency of the established system. ARA agrees with this and adds that the system has implied a more thorough contact between authorities, and good cooperation between the state, commerce and industry. The Chamber of Labour, Prof. Vogel and the Province of Salzburg all seem to agree that the cooperation of authorities and the interplay between authorities and private organisations have been a barrier to the efficiency of the system. The Province of Salzburg adds the internal interplay between industrial organisations and enterprises to the list of barriers and states that the establishment of the system showed little respect for existing public structures.

The Chamber of Labour states that the Ministry of Financial Affairs had more or less settled on the producer-responsibility system beforehand and was not really

interested in discussing alternatives. It added that the Austrian system, especially within the field of household packaging, lacks in competition, which is reflected in ARA's fees for plastics. Where the fraction 'plastics, large' (e.g. industrial plastics waste) decreased by about 46 % in the period from 1993–2000 the fraction 'plastics, small' (e.g. from households) only decreased by about 5 %. It is moreover argued that high recovery ratios cannot be regarded as indicators of efficiency as long as there are outstanding issues with the lack of competition.

4.5 Cost-effectiveness of the measures

The following subsection shows the costs of the Austrian system, or rather the ARA system, since this is the only system for which information on costs is available.

4.5.1 Financing need of the ARA compliance scheme

The Austrian packaging waste system has been in operation for several years, so data on the revenues of ARA are available for a number of years, making it possible to analyse the development of the system. Table 9 below shows waste collection and recovery in relation to the financing need ([13]) of the system. No estimates of the public authorities' administrative costs (general administration, monitoring of packaging and packaging waste etc.) or the costs of the self-complying companies are available.

The recovered quantity equals the collected quantity after separation of non-packaging materials and other waste. Sorted beverage compound cartons are collected by Öko-Box.

Table 9 shows that the financing need has been reduced by 19 % since 1996. The ARA system covers all costs associated with collection, sorting and recovery of packaging waste.

The quantities collected increased by 5.6 % between 1997 and 2001, and 13 % between 1996 and 2003. The recovery rate remains very high for all years — more than 90 %. In 2001, ARA managed 63 % of total packaging waste in Austria.

The financing need has decreased per tonne collected as well as per tonne of recovered packaging since 1998. The same pattern applies if the financing need is measured per percentage point recovered.

The ARA system was strongly criticised in 1996 for being highly inefficient ecologically, economically and administratively. The

Table 9 Cost-effectiveness of the ARA compliance scheme

	1996	1997	1998	1999	2000	2001	2002	2003
Financing need*), mEUR	184	190	194	196	185	163	156	149
Collected quantity, 1 000 t	636	650	646	668	679	686	705	719
Recovered quantity, 1 000 t	607	609	606	623	634	645	645	661
Recovery rate, %	95	94	94	93	93	94	92	92
Financing need per t collected, EUR/t	289	292	301	293	272	237	221	207
Change in financing need, per tonne collected, %	–	0.8	3.0	– 2.4	– 7.2	– 12.8	– 6.6	– 6.7
Financing need per tonne recovered, EUR/t	303	311	321	314	292	252	242	225
Change in financing need, per tonne recovered, %	–	2.5	3.1	– 1.9	– 7.2	– 13.4	– 4.2	– 7.1
Financing need per % recovered, mEUR	1.93	2.02	2.07	2.10	1.98	1.73	1.70	1.61

*) Total revenue of ARA.

Note: The table covers response indicators 10–11 on cost-effectiveness.

([13]) As ARA is a non-profit system, the total revenue is used as an estimate of the financing need.

fees were claimed to be too high, and it was also claimed that the system was not open enough for competition. On the other hand, when ARA was established in 1993 significant investment was required over a short period. After some years and with the benefit of the experience gained, ARA was in a better position to optimise the system.

The license fees have subsequently been decreasing from 1995 up to 2004.

However, since the fees in the ARA system are also the main element for preventing the generation of packaging, reduced fees may also lessen the incentive to prevent waste generation.

5 Denmark

Summary

The packaging directive has had little effect on Denmark's recycling of cardboard and glass and recovery of packaging waste. The regulation on reusable beverage containers, glass packaging, and cardboard from industry was introduced several years before the adoption of the packaging directive, and all non-recycled mixed household waste was already being incinerated at municipal plants with energy recovery.

On reuse however, the directive's internal market requirements necessitated a change of Denmark's regulation in order to allow cans on the market. The country's deposit-return system is a cornerstone of its prevention effort, and all interviewed stakeholders agree that reuse arising from this system should be counted towards the achievement of recycling targets. The return system's preventative effect is strengthened and supported by the packaging tax, although this only covers some 20 % of packaging on the market.

There is no producer-responsibility scheme in Denmark. Based on past experience, neither industry nor local authorities wished to establish a new parallel scheme, so the existing system was kept and add-on solutions were introduced to adjust the system to fulfil the requirements of the directive. It was decided to focus efforts on transport packaging.

All targets in the packaging directive were met in 2001 except for the 15 % recycling of plastics waste, with only 14 % being recycled. The system achieved a total recycling rate of 57 % (50 % including wood) while recovery was 90 % due to the incineration of mixed waste. The generation of packaging waste increased by 36 % between 1994 and 2001 but only by 4 % between 1997 and 2001.

No information on the overall costs of the system exists. As packaging is not separated into a particular system or organisation, the costs are included in the general budgets of local authorities, and private companies have to pay for collection themselves. The tax on landfill and incineration acts to promote recycling: commercial packaging waste is recycled when this is cheaper than other waste management options, which are made more expensive by the tax. This tends to be the case for 50 kg of a given waste stream per month.

The Danish EPA emphasises the system's lack of focus on reuse and finds the directive problematic because it presents certain barriers, including an environmentally unsound focus on recycling. Two other interviewees stated that too much focus has been placed on packaging rather than materials or other waste streams. On the positive side, the Danish Plastics Federation finds it positive that the collection of plastics from transport packaging is now under control and that awareness among packers and fillers has reduced the amount of superfluous packaging.

As for the packaging waste management system's possibilities of meeting the packaging directive's targets in 2008, it is clear that plastics collection and recycling needs to be improved soon if Denmark is to achieve 22.5 % recycling. The same applies to metals and to some extent wood where little information is available on generation and recycling.

5.1 Introduction

Some systems for management of packaging and packaging waste were in place in Denmark before adoption of the packaging directive. Packaging waste from households was generally collected as mixed household waste and incinerated with energy recovery. The only exception was glass (and to a small extent cardboard) which is separated at

Note on the use of stakeholder views

Each country analysis includes the results of interviews with a small number of stakeholders. The views of these stakeholders reflect differing interests, perspectives and priorities and are individual opinions. As such, they should not be regarded as representative or official views of the country as a whole nor as consensus views of the stakeholders the individuals' organisations may represent. These aspects should be borne in mind when reading the sections on stakeholder views.

source and collected via municipal collection schemes — typically bring-banks or kerbside collection.

An important element of the system is the deposit system for beers and carbonated soft drinks. This was extended in 2002 to cover all packaging for beers and carbonated soft drinks, with reusable as well as disposable packaging.

Denmark decided to focus on collecting and recovering transport packaging in order to achieve the targets of the directive. This waste stream was considered to be made up of large, homogenous and relatively clean waste streams that are cheaper to manage than packaging from households. Packaging waste from commerce and industry has generally been collected by private companies.

Differentiated taxes are applied to certain types of packaging (including carrier bags) and waste treatment. Hence, packaging waste in Denmark is not subject to a producer-responsibility scheme.

This analysis of the Danish system includes the results of interviews with four stakeholders: Helge Andreasen from the Environmental Protection Agency; Lars Blom, the Danish Plastics Federation; Henrik Wejdling, Danish Waste Management Association (Dakofa) and Merete Kristoffersen from the Copenhagen EPA.

5.2 Distribution of responsibilities

The Ministry of the Environment is responsible for transposing the directive into national legislation. The tasks of supplying packaging data and monitoring also lie with the ministry or in practice with the Danish Environmental Protection Agency (EPA).

Because of past experience with insufficient waste treatment capacity being established on a private basis and the difficulty in funding treatment facilities, neither industry nor the local authorities were interested in transferring responsibility for packaging

Table 10 Distribution of responsibilities in the packaging system

Activity	Responsible body
Transposition of directive into national legislation	Ministry of the Environment (Danish EPA)
Monitoring of meeting targets (national + directive)	Danish EPA
Monitoring and control of compliance	Danish EPA/Local authorities
Information on management of packaging waste	Local authorities and Dansk Retursystem
Supplier of packaging data	Danish EPA
Collection of packaging waste:	
— from households	Local authorities and Dansk Retursystem (disposable beverage packaging)
— from industry/commerce	Mainly private operators
Recycling and treatment of packaging waste	Private operators (recycling) and local authorities (treatment)
Expenditure on packaging system covered by	Local authorities (via fees paid by households) and private enterprises

waste management from local authorities to industry. Local authorities were therefore given the responsibility of establishing the collection and to some extent recycling schemes necessary to fulfil the targets of the directive. Recycling activities are typically managed by private operators. Thus, local authorities also have responsibility for reporting on the management schemes for packaging waste.

Households are required to use the facilities for management of packaging waste established by the local authority, and pay for the services via a general waste fee. For enterprises, local authorities assign packaging waste either to a specific treatment facility or to recycling. Responsibility for collection and transport of the waste to treatment or recycling plants is assumed by the individual enterprise.

Since 2002, disposable beverage packaging for beer and carbonated soft drinks has been collected via the deposit-return system, Dansk Retursystem. The Ministry of the Environment has issued a Statutory Order defining the regulation and the user fees. The deposit-return system is responsible for information about the system. The distribution of responsibilities in the packaging system is shown in Table 10.

5.2.1 Transposition of the directive into national legislation: stakeholder views

The stakeholders seem to agree that the directive has been fully transposed, although Dakofa raised the question of whether the introduction of a producer-responsibility scheme was one of the objectives of the directive. If this is the case, the directive has not been transposed as intended, since Denmark does not have such a scheme.

The Danish EPA stated that the directive itself was a barrier to achieving its objectives for prevention and reuse, since it does not have, or allow for, any real instruments for achieving the objectives. This view is supported by the Copenhagen EPA. Dakofa and the Copenhagen EPA find that the directive has too much focus on packaging waste rather than materials. This implies that attention and resources are drawn away from other possibly more environmentally-harmful waste streams.

5.2.2 Stakeholder involvement in design of the system

The transposition of the directive into national waste regulation was carried out by the Danish EPA and so they (or the Ministry of the Environment) also had the final say. However, transposition was very much regarded as an add-on solution, particularly for plastics, as a certain amount of packaging waste was already being recovered and recycled before the adoption of the directive. The Danish Plastics Federation participated in the voluntary agreement on transport packaging and considers their influence as being fairly high. Dakofa provided information on the system. The Copenhagen EPA took part in the consultation process. They decided not to participate in the development of the CEN standards ([14]) due to lack of resources.

As regards implementation of the system, the Danish EPA generally finds that the stakeholders have had a positive influence. Since local authorities are responsible for the design of the municipal waste management system, the Copenhagen EPA had total influence on implementation of the regulation in the municipality, and it finds that only the regional authorities had a positive influence on the system. On the other hand, the Danish Plastics Federation stated that the involvement of regional authorities had a negative impact while all other stakeholders had a positive effect (except for the central authorities' introduction of the packaging tax which is a negative feature of the system). The Danish Plastics Federation's own involvement is exercised through participation in the steering group for the voluntary agreement.

5.3 Implemented measures

Cardboard and some metal and plastics packaging were being collected for recycling before the adoption of the directive (1994) due to their commercial value. Glass packaging was also collected from households before 1994. In addition, the majority of household waste, which is

([14]) Part of the essential requirements of the Annex II in the packaging directive.

not recycled, is incinerated with recovery of energy. Thus, Denmark already had a certain level of recycling and was on the way to meeting the targets of the directive. Table 11 summarises measures for packaging waste.

To fulfil the remaining part of the targets, it was decided to focus on transport packaging because it consists of large, relatively clean and homogenous waste streams which are cheaper to collect and recycle. The target for plastics waste was to be achieved solely through recycling of plastics transport packaging waste.

5.3.1 Waste prevention

The deposit system for beers and carbonated soft drinks in refillable containers has been in operation since the 1970s/1981. The return rate was extremely high, almost 98 % for beers, soft drinks, etc., thereby avoiding waste generation from these bottles. The Danish EPA has estimated that if all beer and soft drinks sold in reusable glass bottles were sold in disposable packaging glass, the generation of packaging glass in 2001 would have increased by 304 000 tonnes ([15]). The quantities of packaging glass waste generated would thereby have risen by 150 %.

Table 11 Measures for packaging waste in Denmark

Measure	Year of introduction	Purpose/targets	Relation to the objectives of the directive
Deposit-return system for beverage containers	1970s Revised in 2002	All beverage containers for beer and carbonated soft drinks. The previous system applied to refillable containers only. Quantitative targets are set.	Supports reuse and waste prevention. Since 2002, also recycling of disposable packaging.
Waste tax	1987	Tax rates raised several times. Differentiated tax rates (since 1993) reflecting the waste hierarchy.	Supports recycling and encourages incineration with energy recovery.
Regulation	1990	• Collection of glass packaging: voluntary since 1982 and mandatory since 1990. Mandatory collection from households in areas with more than a certain number of households. • Mandatory separation of cardboard from industry.	Supports recycling of packaging.
Voluntary agreement on transport packaging	1994	Recycling of cardboard and plastics transport packaging. Quantitative targets are set.	Supports prevention and recovery of paper, cardboard, plastics and metal.
Ban on landfilling of waste suitable for incineration	1997	To eliminate the landfilling of waste suitable for incineration.	Supports reduction of final disposal.
Tax on certain types of packaging	1998	To encourage reuse and the substitution of more environmentally harmful materials with less harmful. Differentiated tax rates.	Supports waste prevention.
Regulation	1998	• Mandatory separation of transport plastics packaging, • Mandatory separation of steel drums.	Supports recycling of packaging.

Note: The table equals response indicator 1: types of measures applied in the system.

([15]) Danish EPA (2003d).

Table 12 General information on measures

	Aimed at prevention	Aimed at increased recycling
Administrative instruments		
Agreement on transport packaging		√
Deposit systems for reusable beverage containers	√	
Prevention programmes	n.a.	–
Awareness raising	√	√
Mandatory collection		√
Landfill ban for waste suitable for incineration		√
Cleaner Products Support Programme	√	√
Economic instruments		
Packaging tax	√	
Landfill tax		√

The European Commission argued that the 'can ban' was in conflict with the internal market provisions of the packaging directive and brought the case to the European Court of Justice in 1997. No final verdict was reached, however, as the system was revised in 2002 to include disposable packaging, including cans, for beers and carbonated soft drinks.

Another preventative measure is the differentiated tax for certain types of packaging (Table 12). The tax, however, only covers 20–21 % of total packaging (including one-way packaging, carrier bags and refillables) placed on the market. The tax has been restricted to product groups which are easy to identify to facilitate administration. The objective is to generate tax revenue and reduce the generation of packaging waste. The tax depends on the volume, or the weight and material of the packaging.

The Cleaner Products Support Programme aims to stimulate the development of cleaner products by enhancing their environmental properties; making the environment a competition parameter on the market; and organising stakeholders' opportunities to reduce the environmental burden of production. The programme started in the late 1980s and ended on 1 January 2004.

5.3.2 Increased recycling

An agreement between the Danish Minister for the Environment and the Confederation of Danish Industries (CDI) was made in 1994 in which industry committed itself to providing data, supporting recycling, and establishing capacity for recycling. Responsibility for establishing collection or assignment schemes for transport packaging, however, lies with local authorities, as stipulated in the Statutory Order on Waste.

Local authorities are also required by regulation to establish collection schemes for packaging glass from areas with more than 2 000 households (since 1990) and cardboard from areas with more than 1 000 inhabitants (since 2003).

The tax on waste treatment, which has been in effect since 1987, and the ban on landfilling of waste suitable for incineration, since 1997, support increased recycling. The waste tax also provides an economic incentive to recycle waste by increasing the incentive to recycle compared with incineration and disposal.

5.4 Effectiveness

Generation of packaging waste per capita is 192 kg (including a best estimate for wood), 20 kg more than the EU average. Denmark produces less than 2 % of the total amount of packaging waste in Europe.

Where data were reported under the directive, the increase in waste arisings

Table 13 Key figures

	Denmark	EU-15
Total packaging waste generation 2001, 1 000 tonnes	1 029	64 876
Generation incl./excl. wood 2001, kg/capita	192/161	172
Change in packaging waste generation, 1997–2001, %	+ 2.0	+ 8.4
GDP change 1997–2001, %	+ 9.8	+ 11.4
Change in per capita household consumption, 1997–2001, %	1.2	–
Change in the number of households, 1998–2000, %	+ 2.2	–
Change in the population, %	+ 1.4	+ 0.8
Recycling*) (EU target 2001, 25 %) incl. Wood, %	50	53
Recovery (EU target 2001, 50 %), %	90	60

*) The recycling rate is not the data reported to the Commission. An estimated amount of wood packaging has been added to the reported data for supply of packaging. This reduces the recycling rate reported to the Commission (57 %) to 50 %.

Note: The key figures cover the response indicators 2–7 on effectiveness. GDP and household consumption expenditure are in 1995 prices.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste, and Eurostat.

between 1997 and 2001 was very modest, only 2 % compared with 8.4 % in the EU. This implies that relative decoupling was achieved during the period, since GDP increased by almost 10 %. However, if the period is extended to 1994–2001, the situation is reversed: packaging waste increased by 36 % and GDP by only 19 %. This is because of significant increases in packaging waste generation in 1995 and 1997.

Increases in the population and the number of households were modest, 1.4 % and 2.2 % respectively (Table 13). The quantity of packaging waste per household also increased by 2.2 %.

The recycling rate for packaging waste in 2001 was 50 %, slightly lower than the EU average, but the recovery rate was extremely high because waste that is not recycled is treated at waste incineration plants with energy recovery. All figures are presented in Table 13.

While the overall recycling and recovery targets of the packaging directive were achieved in 2001, the recycling target for plastics waste was not met as only 14 % was being recycled. All other material targets were more than met, by more than 61 percentage points for glass, 50 for paper and 25 for metal. Recycling of packaging is shown in Table 14.

Table 14 Recycling of packaging materials in 2001 and targets

Packaging material	Recycling 1 000 tonnes	Recycling %	National target, 2001 %	Packaging directive target, 2001 %
Paper and cardboard	316.7	65	–	15
Glass	139.6	76	65	15
Plastic	17.1	14	–	15
Metal	20.8	40	–	15
Wood	–	–	–	–
Total	494.5	50	–	25–45

Note: The table covers response indicators 8–9 on effectiveness.

Sources: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

National targets for packaging have been set in the form of a recovery target for glass, recycling targets for transport packaging made of paper, cardboard and plastics, and collection targets for beverage packaging for beer and carbonated soft drinks. The national recovery target for glass was achieved in 1998 and has remained well above the target since then.

Because some measures and systems were already set up before the directive, its targets were largely met through the recycling of transport packaging. The target of 80 % recycling of cardboard was achieved as planned in 2000. For plastics the target was reduced from 80 % to 40 % in 2000, but the actual recycling of plastics transport packaging was only 21 % ([16]). Lauber and Ingram (2000) conclude that it was difficult to assess the effectiveness of the voluntary agreement because of the lack of 1994 baseline data, and because it is difficult to distinguish the effect of the agreement from parallel municipal initiatives.

As regards the collection targets for beer and soft drinks in disposable packaging, the 90 % collection target was not met as only 82 % were collected by January 2004. However that was the first year of operation of the new system for disposable packaging.

According to the Danish Breweries Association, there has been a dramatic increase in the illegal sale of soft drinks. It is estimated that some 20 million litres of soft drinks were imported illegally (i.e. not paying taxes and VAT) for sale in kiosks and small supermarkets in 2002. This is not, however, a direct effect of the packaging directive but simply a result of the Danish packaging and taxation system.

5.4.1 Stakeholder views of system effectiveness

The Danish EPA emphasises the lack of focus on reuse and the extreme focus on recycling and recovery as negative effects of the directive. Another effect is the acceptance of one-way beverage containers for beers and soft drinks. The Danish Plastics Federation is more positive towards the effectiveness of the directive since the collection of plastics from transport packaging is now under control.

The Copenhagen EPA finds it positive that higher collection rates for recyclables have been achieved. The Danish Plastics Federation states that awareness of the use of superfluous packaging among packers and fillers has increased.

The Danish EPA finds the directive problematic in itself because it involves certain barriers, e.g. an environmentally unsound focus on recycling. The Copenhagen EPA emphasises that a producer-responsibility scheme would have been a barrier to implementation of better measures as it would have developed a 'dual-system'. Dakofa rates the effectiveness a little higher, because the system for refillable bottles is working very well. The Danish Plastics Federation also rates the effectiveness of the system as fairly high.

There is some disagreement about how the instruments and the system work in practice. While Dakofa and the Danish Plastics Federation rate the instruments fairly highly, the Danish EPA rates them fairly low. The reasoning behind the EPA's statement is twofold: the voluntary agreement on plastics did not achieve the expected results, and, because of the deposit-return system for refillables, the number of one-way plastic bottles is rather low, which makes it difficult to achieve the directive's targets for recycling. If the number of one-way plastic bottles was higher, there would be a large, relatively homogenous waste stream which would be easier and less costly to recycle. The Copenhagen EPA rates the system effectiveness low as regards prevention and the ability to achieve the overall objectives of the directive but gives fairly high ratings for other aspects. The Danish Plastics Federation's main concern is the packaging tax, since the revenue is not used for environmental purposes. There seems to be a mutual understanding that it should be possible to give credit for the reuse of packaging in the recycling/recovery targets (e.g. for the deposit-return system). Dakofa criticises the recent reduction in the packaging tax for refillable beverage containers as it is in contrast to the directive's intentions regarding prevention.

Implications of the structure of Denmark's institutions on the transposition and operation of the system are rated differently

([16]) 25% cf. (Danish EPA, 2003c).

by the stakeholders interviewed. The Danish Plastics Federation is generally positive towards the interactions between the institutions, but is sceptical when it comes to the decision on packaging tax. The Danish EPA states that the local authorities have given too low a priority to the collection and recycling of plastics but is not able to identify barriers to the efficiency of the established system.

The Danish EPA states that it may be necessary to revise the collection of plastics in order to achieve the new targets, either through stricter regulation or by changing the allocation of responsibilities. The Danish Plastics Federation says that financial support is necessary to encourage plastics collection because raw materials for plastics are relatively cheap, and that some of the revenue from the packaging tax should be used to finance plastics collection.

5.5 Cost-effectiveness of the measures

For commercial waste, the Danish waste management system relies on market-based principles in the sense that waste is presumed to be recycled when that is cheaper than incineration or landfill. However, the waste tax has resulted in relatively high price increases for incineration (EUR 44 per tonne) and landfill (EUR 50 per tonne). The waste tax is thus an important instrument for defining the level of recycling, since an increase in the tax will lead to a higher recycling level. Furthermore, as there is no compliance scheme to manage packaging waste, there are no subsidies for the recycling of particular streams (e.g. plastics).

Most investments in infrastructure for collection and recycling of packaging waste were already made before adoption of the directive. Private enterprises pay the costs of collection and treatment of their waste (mainly cardboard, plastics and metal packaging) directly to the private operator or waste management company. Local authorities are responsible for financing the collection systems for households (mainly through the markets for glass and metal from incineration slag).

Estimates of public expenditure on the administration of the system are not obtainable, nor are data on the costs of managing it. Indicators 10–11 therefore cannot be shown. However, some information on costs in the Danish system can be found in the separate annexes on Denmark, available on the website of the EEA's Topic Centre for Resource and Waste Management (http://waste.eionet.eu.int/).

6 Ireland

Summary

The Irish system was established to fulfil the requirements of the packaging directive. Ireland has the highest reported packaging waste generation per capita in the EU-15, and before the introduction of a system in 1997, packaging waste recovery in Ireland is estimated to have been of the order of 10 %.

The directive initiated a process whereby the system is moving from landfilling towards recycling and recovery. Although landfilling is still the dominant option, it is decreasing: about 85 % of packaging waste and 91 % of all waste was landfilled in 1998, falling to 65 % of packaging waste and 79 % of all waste in 2002. Meanwhile, the recycling rate for packaging waste increased to 27 % in 2001, exceeding both the 2001 recovery target and the 2005 recycling targets. Ireland's derogation provided time to establish a system from the starting point of very limited infrastructure. There has been extensive investment in recent years to establish sufficient infrastructure to facilitate increased recycling, and to build a sound, long-term basis for waste management.

Responsibility for monitoring and control of the packaging regulations is divided between central government, 29 local authorities and 5 city councils. Such division could result in differing practices which could influence company decisions. However, while local differences can be a problem from the point of view of fairness, they are positive in that learning is possible. The number of free riders appears to have been reduced by some 350 companies (approx 30 %) between 2001 and 2004. Intensified enforcement efforts should bring about further improvements.

Producer responsibility — namely Repak — is clearly the most important single measure for implementing the packaging directive in Ireland. The farm plastics regulation covers only a minor part of total plastics placed on the market. The levy on plastic bags, while also an anti-litter measure, has apparently been very effective in raising awareness of waste issues. The landfill levy and the ban on landfilling particular wastes have been introduced relatively recently and their effect cannot yet be measured, although it is likely that they have contributed to the increase in packaging recycling rates since 2001. Based on data supplied by Repak post 2002, the indications are that these measures are having a significant positive impact on packaging waste recovery in the commercial sector. The requirement of the landfill directive to reduce landfill of biodegradable municipal waste (e.g. paper, cardboard and textiles) to 35 % in 2016 may be a major driver for the establishment of more recycling and recovery facilities.

6.1 Introduction

Waste management in Ireland is governed principally by the Waste Management Act, 1996, amended in 2001 and 2003. The 1997 Packaging Regulations which transpose the requirements of the packaging directive are subsidiary to this Act.

Producer-responsibility obligations were first imposed on all producers of packaging following the introduction of the 1997 Packaging Regulations, which were amended in 1998 and replaced in 2003.

One compliance scheme for the collection and recycling of packaging waste has been established: Repak Ltd. It is the only scheme approved under the Waste Management (Packaging) Regulations of 1997. It commenced operations in 1997 as a result of a voluntary agreement between industry and the Department of the Environment, Heritage and Local Government and represents industry's response to the obligations of the directive.

The generation of packaging waste has increased with the country's economic boom: during the five-year period

Note on the use of stakeholder views

Each country analysis includes the results of interviews with a small number of stakeholders. The views of these stakeholders reflect differing interests, perspectives and priorities and are individual opinions. As such, they should not be regarded as representative or official views of the country as a whole nor as consensus views of the stakeholders the individuals' organisations may represent. These aspects should be borne in mind when reading the sections on stakeholder views.

1997–2001, GDP per capita increased by 36 %, household consumption expenditure by 28 %, the population by 4.6 %, the number of households by 3.2 % ([17]) and the quantity of packaging placed on the market per capita by 30 %. Ireland has received a derogation, obliging it to meet the directive's 25 % recovery target by 2001, and the article 6a and 6b targets by December 2005 ([18]).

This analysis of the Irish system includes the results of interviews with four stakeholders: Brendan O' Neill, Department of the Environment, Heritage and Local Government, Bill Dolan from the compliance scheme Repak, Carla Ward from the county council of Dun Laoghaire Rathdown and Dorothy Maxwell from Enterprise Ireland (a government agency responsible for the development of Irish industry).

6.2 Distribution of responsibilities

The Department of the Environment, Heritage and Local Government (DoEHLG) is responsible for adopting legislation and developing overall policy on prevention, minimisation and recovery of packaging waste. The department also ensures that compliance schemes meet the targets for recycling and recovery and manages the reporting obligations to the EU.

In the context of supervision of compliance, the DoEHLG is responsible for sanctioning applications for approval of Compliance Schemes and has legislative powers to impose conditions on the scope and operation of such schemes.

The Environmental Protection Agency (EPA) is responsible for reporting figures on packaging consumption and rates for recycling and recovery to DoEHLG. The data are collected from various sources, mainly recycling organisations, local authorities, landfill operators and the compliance scheme Repak. EPA is responsible for licensing the major recovery operators. The EPA has supervisory control over all local authorities under Section 63 of the Environmental Protection Agency Act, 1992 and has been assigned a role in

Table 15 Distribution of responsibilities in the packaging system

Activity	Responsible body
Transposition of directive into national legislation	DoEHLG
Monitoring of meeting targets (national + directive)	DoEHLG
Monitoring and control of compliance	DoEHLG+ EPA
Supplier of packaging data	EPA (recyclers, local authorities, Repak)
Collection of packaging waste	
— from households	Local authorities/private operators/Repak
— from industry/commerce	Waste producers/private operators/Repak
Recycling and treatment of packaging waste	Repak + self-compliers
Expenditures of packaging system covered by	Repak + self-compliers

([17]) Data on the number of households are only available for 1998–2000.
([18]) According to the terminology of the revised Packaging Directive, the 2005 targets for Ireland are those referred to in Article 6/1a and 1c.

building national expertise in the area of producer responsibility on a range of waste streams, including packaging.

Local authorities are responsible for the collection of household waste, with many choosing to provide the service via private operators (Table 15), and for licencing commercial waste collectors and small waste treatment and recovery operators. Responsibility for arranging the collection and managing commercial waste lies with the waste producers themselves. Local authorities monitor the reuse and recovery of waste from obligated producers who choose not to join Repak (self-compliers). Ultimately local authorities have the powers to ensure that all major producers comply with their obligations.

6.2.1 Transposition of the directive into national legislation: stakeholder views

All parties agree that the directive has been fully transposed into Irish law. The compliance scheme — Repak — and Enterprise Ireland find that the intentions of the directive are not fully transposed, as prevention and reduction of packaging amounts are not included in the regulation. Dun Laoghaire Rathdown county council points to an apparent loophole in the system, as major producers can pay waste contractors a price equivalent to recycling the amount of packaging they supplied in the previous quarter and never have to accept packaging waste back from customers or the public.

6.2.2 Stakeholder involvement in the design of the system

Responsibility for transposition of the directive into national law lies with the Department of the Environment, Heritage and Local Government. In 1994, an industry Task Force was set up to examine the optimum means by which industry could secure compliance with the directive, culminating in an application for approval by Repak Ltd. In 2002, the Department formed a Task Force of the key stakeholders in the packaging management chain to review the original packaging regulations of 1997 in the light of experience gained in the intervening years. This process culminated in the issuing of revised regulations in 2003. Repak was consulted during the transposition process, and contributed to the Government Task Force on the revision of the 1997 regulations. The Dun Laoghaire Rathdown county council participated in the network of packaging regulation enforcement officers coordinated by DoEHLG. They had one month to provide formal comments on draft regulations, but they feel that this was insufficient.

As for implementation of the system, Repak has 100 % involvement, being the only government-approved compliance scheme in Ireland. The Dun Laoghaire Rathdown county council is also directly involved as it manages applications and coordinates reports from self-compliers, carries out inspections and enforcement activities, manages the register and conducts awareness and education programmes for business waste management. Enterprise Ireland provides support and advice to companies and financial support to develop packaging with environmental benefits ('Eco-design'). DoEHLG has provided financial support to assist in the development of waste infrastructure by local authorities, e.g. Bring Centres, Civic Amenity Facilities and Material Recovery Facilities. A major 5-year programme of more concerted enforcement of the waste code has been launched at the local authority level by the DoEHLG. EUR 7 million is being provided from the Environment Fund to support the first year of operation of this programme, and further funding will follow. This effort to provide strong, visible local authority enforcement is supported by networks established by the EPA's Office of Environmental Enforcement.

All parties agree on the positive influence of central authorities, industrial organisations and enterprises. They agree that the central authorities had the largest influence, but views differ with respect to the influence of industrial organisations and regional authorities. Enterprise Ireland stresses that an imbalance exists as large companies have advantages compared with SMEs: the Irish Business Employers Confederation (IBEC), predominantly comprising large industries, had a powerful influence.

6.3 Implemented measures

The measures cover a broad range of instruments, most of which are administrative, aimed at increasing the recycling of packaging waste. The producer-responsibility scheme Repak is the main

measure in the system. Table 16 summarises the measures for packaging waste.

Repak was introduced in 1997 to impose producer responsibility on all producers of packaging, with more stringent requirements on major producers. The regulations were amended in 1998 and replaced in 2003. The new regulations lowered the turnover threshold for major producers — thereby broadening the base of obligated producers — and introduced a mandatory obligation on all producers to segregate specified backdoor packaging waste materials arising on their own premises and have it collected by authorised operators for recycling. This was complemented by a ban on the landfill of the specified commercial packaging waste materials.

Rather than joining Repak, companies may self-comply, subject to satisfying detailed requirements, which include registering annually with the local authority, payment to the local authority of a fee per tonne of packaging handled (subject to upper and lower thresholds), and the provision of statistics on each type of packaging placed on the market. Self-complying companies must make publicised arrangements to take back used packaging similar to what they placed on the market. They must also submit plans to the local authority showing how they propose to comply with the regulations, and report on the steps taken to comply and the results of these steps. The number of self-compliers has increased by a factor of seven during the past three years, from 17 in 2001 to 121 in 2004. Meanwhile, the estimated number of companies not complying with their obligations is declining: Repak estimates that the number of free riders was about 1 050 in 2001, declining to an estimated 700 in 2004. Some of this can be attributed to stepped-up enforcement activity by the authorities.

Two economic instruments have also been implemented: the landfill levy and the plastic bag levy. It can also be argued that companies have an economic incentive to reduce the quantity (and perhaps types of materials) of packaging either in the fees to be paid to the compliance scheme, Repak,

Table 16 Measures for packaging waste in Ireland

Measure	Year of introduction	Purpose/targets	Relation to the objectives of the directive
Producer responsibility/ Repak	1997	To help member companies meet their packaging waste management obligations.	To meet the recycling and recovery targets of the packaging directive.
Farm plastics	1997	To promote the collection and recovery of waste arising from the use of farm plastics.	To reduce final disposal of plastics and support the recovery/ recycling targets.
Awareness-raising campaigns	1999–2002, 2003	To raise awareness.	To promote a greater appreciation of the impact of personal behaviour and highlight steps to reduce the impact on the environment.
Plastic bag levy	2001	To reduce the number of plastic bags used annually.	Prevention of plastics waste.
Landfill levy	2002	To achieve national targets for the diversion of waste away from landfill towards recycling options.	To reduce final disposal of waste and support the recovery/ recycling targets.
Ban on landfilling of particular wastes	2003*)	To divert waste away from landfill as there is a shortage of landfill capacity.	To reduce final disposal of waste and support the recovery/ recycling targets.
Obligation on producers to segregate packaging waste and have it recycled	2003	To ensure that packaging waste materials are not mixed and that all packaging waste generated by producers (as defined in the legislation) is recycled.	To support recovery/recycling targets.
National Waste Prevention Programme	2004	To promote waste prevention and minimisation through a broad range of instruments.	Prevention of waste.

*) Some local authorities have started earlier.

Note: The table equals response indicator 1: Types of measures applied in the system.

or the expenditures to cover self-compliance (see below). Some of the instruments are targeted at waste in general, and therefore also encompass packaging waste.

6.3.1 Waste prevention

The producer-responsibility scheme, awareness campaigns and the plastic bag levy are the main measures aimed at prevention (Table 17). In 2004, the National Waste Prevention Programme was established within the Environmental Protection Agency with the objective of promoting the prevention of waste, including packaging waste. It integrates a range of initiatives that address awareness-raising, technical and financial assistance, training and incentive mechanisms. The Programme is assisted by a National Waste Prevention Committee made up of all relevant stakeholders, including those concerned with the prevention of packaging waste and reduced use of packaging materials. However, the late implementation of the programme means that the effects are not included in this report.

The weight-based Repak fee is an incentive for prevention, since it makes companies responsible for the amount of packaging placed on the market.

Awareness campaigns are aimed at waste prevention and recycling. Many organisations at various levels are involved in awareness-raising, including DoEHLG, Repak and local authorities. In 1999, DoEHLG launched a National Environmental Awareness campaign. Its themes included sustainable development, prevention and minimisation of waste, reuse and recycling, water quality and conservation, air quality/climate change and production/consumption activities. In 2003, DoEHLG launched a new campaign entitled '*Race against Waste*' (www.raceagainstwaste.ie) which focuses on the individual, highlighting that everyone is responsible for the waste that they produce and is required to make an effort to reduce, reuse and recycle.

The plastic bag levy aims to reduce the amount of plastic bags used and thus has a clear preventative objective. Before the introduction of the levy, plastic bags accounted for about 8 % of the total amount of plastics placed on the market and 1.7 % of total packaging. The levy has been extremely successful, resulting in a 90 % decrease in the sale of plastic bags. However, it has not been investigated whether the reduction in use of lightweight disposable bag has been offset by heavier weight reusable bags, which generally use more tonnes of plastics overall.

The Farm Plastics Levy, the Landfill Levy and restrictions on the landfill of specified materials are all considered by DoEHLG to represent prevention measures, as they directly impose additional costs and/or deterrents on producers who create wastes.

6.3.2 Increased recycling

Producer responsibility is the measure which is likely to be responsible for a large proportion of the increase in recycling and recovery of packaging waste. Repak is the only compliance scheme for packaging waste, and the figures on recycling and recovery show how the system has led to a steady increase in the amounts collected.

Table 17 General information on measures

	Aimed at prevention	Aimed at increased recycling
Administrative instruments		
Producer responsibility	√	√
Farm plastics	√	√
Ban on landfilling of particular wastes	√	√
Awareness campaigns	√	√
Economic instruments		
Landfill levy	√	√
Plastic bag levy	√	

The landfill levy and the ban on landfilling of particular wastes is aimed at packaging waste since specified packaging materials arising on a producer's premises cannot generally be landfilled under Article 5 of the Waste Management (Packaging) Regulations, 2003. Nevertheless, the measures will have a supportive effect as they provide an incentive to reduce the amounts of packaging ending up in the mixed waste stream for landfill. The effect of these measures cannot yet be estimated since they were only introduced a few years ago (2002 and 2003 respectively). Data show that packaging recycling increased by 34 % in 2002 ([19]) and 42 % in 2003 ([20]).

The farm plastics measure aims to decrease the amount of plastics packaging from farms being landfilled, thus promoting recycling and recovery. However, it is estimated that the contribution of the farm plastics measure amounts to only 2.3 % of the overall target for plastics for 2001.

6.4 Effectiveness

A total of 820 000 tonnes of packaging waste were generated in 2001. This corresponds to 214 kg per capita, significantly higher than the EU average of 172 kg. However, Ireland bases its estimates of packaging consumption on packaging entering the waste stream, a methodology that is prone to errors. The different approaches of Member States mean that it is very unsafe to make comparisons with Irish packaging consumption. The growth in the amount of packaging waste followed the growth of GDP between 1997 and 2001. The increase in household consumption expenditure was even higher than the increase in GDP. Growth in GDP and household consumption are about four and two times higher respectively than that in the EU-15. However, less than 1.5 % of European packaging waste is generated in Ireland.

The packaging statistics are based partly on compositional analysis of landfilled household and commercial waste and questionnaire surveys among recycling (and recovery) companies. In keeping with the need for continuous improvement, and to address concerns about the reliability of the methodology, the EPA is testing a new methodology. 70–80 % of the packaged goods consumed in Ireland are imported, mostly from the UK, showing that Ireland's estimated per capita packaging consumption, 40 % above that of the UK, may well be an overestimate. A consultancy study led by Perchards consultancy, London suggests that the previous methodology used in Ireland has resulted in some over-estimate of arisings (Perchards, FFact and SAGIS, 2004). A research project is in progress with the aim of developing a methodology for determining quantities of packaging placed on the market.

Table 18 Key figures

	Ireland	EU-15
Total packaging waste generation 2001, 1 000 tonnes	820	64 876
Generation (excl. wood*) 2001, kg/capita	214	172
Change in packaging generation, 1997–2001, %	+ 36.0	+ 8.4
GDP change 1997–2001, %	+ 41.0	+ 12.4
Change in per capita household consumption, 1997–2001, %	+ 27.7	–
Change in the number of households, 1998–2000, %	+ 3.2	–
Change in the population, %	+ 4.6	+ 0.8
Recycling** (EU target 2001, 25 %), %	27	53
Recovery** (EU target 2001, 50 %), %	27	60

*) No data for wood have been reported.

**) Targets due to derogation: 2001: 25 % recovery; 2005: 25 % recycling.

Note: The key figures cover the response indicators 2–7 on effectiveness. GDP and household consumption expenditure are in 1995 prices.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

([19]) Irish EPA (2004a) — National Waste Database 2002 Interim Report.
([20]) Irish EPA (2004b) — National Waste Database 2003 Interim Report.

Table 19 Recycling of packaging materials in 2001 and targets

Packaging material	Recycling 1 000 tonnes	Recycling %	Recycling for Ireland targets, 1996 %	Packaging directive target, 2001 %
Paper and cardboard	89	24	25	15
Glass	41	39	25	15
Plastics	20	12	25	15
Metals	29	37	25	15
Other	42	43	–	–
Total	221	27	33	25–45

Note: The table covers response indicators 8–9 on effectiveness.

Source: Irish reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

The Council of EU Member States determined that a derogation was warranted for Ireland, requiring a longer lead-in time to achieve the higher targets ([21]). Ireland is consequently required to achieve the article 6 recycling and recovery targets of the packaging directive by 2005 and a minimum recovery rate of 25 % by 2001.

The total recovery rate met the 25 % target in 2001, as did the recycling rate (Table 18), thus meeting the target for 2005. Currently, recycling is the only recovery operation in place, which is why the recovery figures are identical to the recycling figures (2002: packaging waste generated: 899 125 tonnes; recovered: 296 389 tonnes; recovery rate: 33 %. 2003: packaging waste generated: 1 006 016 tonnes; recovered: 419 600 tonnes; recovery rate: 42 %).

However, as shown in Table 19, the recycling rates for paper and cardboard and plastics did not meet the national targets set in the strategy 'Recycling for Ireland' from 1996, nor was the total recycling target of 33 % met. However, 'Recycling for Ireland' was superseded by the outcome of the 'Industry Task Force Report' on packaging (1996) and 'Delivering Change' (2002). The 'Delivering Change' report provides a commentary on the reasons why the ambitious 1994 targets proved to be over-optimistic and were subsequently shown to be unrealistic.

6.4.1 Stakeholder views of system effectiveness

In general, all parties recognise that the instruments implemented in Ireland work quite well, and there is agreement on the system's high environmental performance. The positive effects highlighted by respondents all concentrate on the increased recovery of packaging waste. Repak emphasises an effective framework within which industry is able to meet its obligations cost-effectively under the directive, while Enterprise Ireland stresses an improved infrastructure and segregation of waste collected, and increased awareness among companies dealing with packaging. DoEHLG mentions that industry is now responsible for the recycling and recovery of marketed packaging waste.

On the negative side, recovery of packaging waste is a costly obligation for industry — Enterprise Ireland and the Dun Laoghaire Rathdown county council rate the cost-effectiveness and economic fairness of the system as relatively low. The functioning of the system receives a low rating from Dun Laoghaire Rathdown county council, which states that more than one scheme should be available. Repak gives the system's waste prevention a low rating, as does Enterprise Ireland, which points out that the weight-based payments give little motivation to reduce the volume of packaging produced, and that opportunities to benefit financially from packaging prevention and reduction strategies are not clear to companies. The Department of the Environment argues that the scale of membership fees has been designed to relate directly to the amount and type of packaging placed on the market. If less is placed on the market, membership fees will decrease correspondingly: an implicit waste prevention measure.

([21]) Article 5, no. 5 explains this by 'the large number of small islands, the presence of rural and mountain areas and the current level of packaging consumption'.

Table 20 Cost-effectiveness of compliance scheme (Repak)

	2001	2002	2003	2004
Financing need*), mEUR	11.1	13.9	15.8	18.5
Collected quantity, 1 000 t	237	323	415	470**)
Financing need per t collected, EUR/t	47	43	38	39
Change in financing need, per t collected, %	–	– 8	– 11	+ 1

*) Total turnover.

**) Provisional Repak estimate, September 2004.

Note: The table covers response indicator 10 on cost-effectiveness. Data for 1997–1998 are not available. Data for 1999–2000 are not directly comparable with the ones in the table.

Source: Repak, personal communication.

Repak is concerned that standards of compliance are not equitable: not all major companies are obligated, and among those who are, some are getting away without paying. Moreover, self-complying companies may not be addressing the objectives of the directive. Dun Laoghaire Rathdown county council further mentions that in some areas the waste charges levied by local authorities for commercial refuse collection favour disposal over recycling, effectively subsidising disposal and thus making recycling collection more expensive for private companies. DoEHLG is satisfied, but there is always room for improvement and further optimisation of instruments that have been implemented. The fact that Ireland did not have a system in place before the adoption of the directive means that there is more to be learned about the effective use of instruments, and efforts are continuing to refine arrangements where appropriate.

As regards the institutional structures, DoEHLG, the Dun Laoghaire Rathdown county council and Enterprise Ireland generally find that there have been no major problems due to structural organisation. Repak, however, sees a problem with the responsibility being fragmented among central government and 34 politically independent local authorities, with the Irish EPA overseeing their actions. Repak also finds that packaging is given low priority since it only makes up about 1 % of total waste.

6.5 Cost-effectiveness of the measures

Only partial information on the costs of the various measures is available.

Householders pay a fee to the relevant local authority or a private-sector operator, either annual or pay-by-lift, for the provision of a collection service including packaging waste. (From 1 January 2005, all household waste collection are to be on a pay-by-use basis ([22])).

As increasing volumes of household waste, which are more expensive to collect than commercial waste, are collected as a result of the implementation of local authority waste management plans, it is anticipated that compliance costs will further increase in the years ahead. No specific estimates of the public authorities' administrative costs (general administration, monitoring of packaging and packaging waste, etc.) or the costs of the self-complying companies are available.

The available and comparable figures for the financing need of the compliance scheme Repak are shown in Table 20 which shows that Repak increased the quantity collected by 98 % over the four years 2001–2004. The rather dramatic increase in waste collected in 2002 and 2003, 36 % and 28 % respectively, was higher than the incremental increase in financing need, leading to a decrease in the financing need per tonne. Indications are that the 2005 fee will increase still further, showing that future increased recycling and recovery rates imply higher marginal costs.

([22]) See press release: 'Cullen announces nationwide move to pay-by-use waste charges', March 2004. http://www.environ.ie/DOEI/DOEIPub.nsf/wvNavView/PressReleases?OpenDocument&LatNews=2&Lang=en

7 Italy

Summary

The packaging waste management system was implemented in 1997 in order to fulfil the requirements of the packaging directive. However, some degree of packaging waste collection already existed, as glass, plastic and metal beverage containers had been collected since 1988. Nevertheless, since the transposition of the directive in 1997, the overall recovery level for packaging waste has increased by 24 percentage points (in 2002).

The packaging directive was not transposed within the 30 June 1996 deadline. APAT admits that the reason for this was the difficulty in organising the new system. The subsequent producer-responsibility scheme was created in 1998 by the establishment of the non-profit organisation CONAI. Membership of CONAI is mandatory for all actors in the packaging chain regarding plastic, glass, steel, aluminium, paper/cardboard and wood. Nearly 1.4 million companies are now members.

Generation of packaging has exceeded the rate of economic growth and decoupling of packaging waste generation from GDP has not been achieved.

Recycling and recovery rates are increasing steadily. Recycling reached 46 % and recovery 50 % in 2001, both meeting the 2001 targets in the directive, and the latest figures, for 2002, show that levels are continuing to increase. However, implementation is uneven: there are huge differences between north and south in terms of separate packaging waste collection for recycling and recovery.

The system includes several measures to promote prevention, but their effects have not yet been quantified.

7.1 Introduction

The Italian system is based on the principle of producer responsibility. It was set up according to Legislative Decree 22/97 (transposition of the packaging directive) and took effect in 1998.

CONAI was created in 1998 as part of the introduction of producer responsibility according to Legislative Decree 22/97 as the consortium that coordinates the system. It is based on the activities of six material consortia representing steel, aluminium, paper, wood, plastics, and glass. Producers, importers and users of packaging material share a joint responsibility for recycling and recovery, implying that they must join CONAI ([23]), paying an environmental contribution for each package introduced into the market.

The collection of packaging waste is carried out by local authorities working under voluntary agreement with CONAI (agreement ANCI ([24])/CONAI). Italy has no national deposit system for refillable beverage containers.

This analysis of the Italian system includes the results of interviews with three stakeholders ([25]): Fabrizio De Poli, Ministry for the Environment and Territory; Rosanna Laraia, Agency for Environmental Protection and Technical Services (APAT); and Walter Facciotto, CONAI.

([23]) Legislative Decree 22/97.
([24]) ANCI: National Associations of Municipalities.
([25]) More stakeholders were contacted during the project, but the ETC/WMF did not succeed in conducting interviews with these.

Note on the use of stakeholder views

Each country analysis includes the results of interviews with a small number of stakeholders. The views of these stakeholders reflect differing interests, perspectives and priorities and are individual opinions. As such, they should not be regarded as representative or official views of the country as a whole nor as consensus views of the stakeholders the individuals' organisations may represent. These aspects should be borne in mind when reading the sections on stakeholder views.

7.2 Distribution of responsibilities

The Ministry for the Environment and Territory is responsible for transposing the packaging directive into Italian legislation (Table 21) and is in charge of the provision of data to the European Commission.

The Agency for Environmental Protection and Technical Services (APAT) continuously monitors implementation of the system by collecting, elaborating and disseminating data, and supports the Ministry in fulfilling the EU reporting obligations.

Producers and users of packaging are obliged to submit annual data on the amounts introduced, reused and recycled. ONR (National Observatory on Waste) subsequently compiles and monitors these data.

Provincial authorities are responsible for checking that producers and users of packaging materials join CONAI and are empowered to impose financial penalties on companies that fail to join. CONAI continuously carries out inspections to ensure that all relevant packaging companies have joined and are correctly reporting the quantities of packaging placed on the market. European Packaging and Waste Law (2002c) states that the estimated number of free riders in Italy is 5–10 % but APAT is not able to confirm this.

7.2.1 Transposition of the directive into national legislation: stakeholder views

APAT and CONAI find that the directive has been entirely transposed into national legislation and that the intentions of the directive are being fully satisfied.

The Ministry for the Environment and Territory is slightly hesitant regarding the status of the transposition. It asserts that the only real problem is a lack of planning in some regions. About 80 % of all regions fulfil their obligations but a few do not. However, the Ministry finds that the intentions of the directive have been satisfied.

7.2.2 Stakeholder involvement in the design of the system

The involvement of stakeholders in the design of the system varies. The Ministry

Table 21 Distribution of responsibility in the packaging system

Activity	Responsible body
Transposition of directive into national legislation	Ministry for the Environment and Territory
Monitoring of meeting targets (national + directive)	National Observatory on Waste + APAT
Monitoring and control of compliance	National Observatory on Waste + APAT + Provincial Authorities + CONAI
Information on management of packaging waste	Local authorities + CONAI
Supplier of packaging data	Producers (manufacturers/converters/ importers) + users (wholesalers/distributors/fillers)
Collection of packaging waste:	
— from households	Local authorities under contract with CONAI
— from industry/commerce	Material specific consortium
Recycling and treatment of packaging waste	Material specific consortium
Expenditures of packaging system covered by	Producers (converters) and importers

Table 22 Measures for packaging waste in Italy

Measure	Year of introduction	Targets	Relation to the objectives of the directive
Landfill tax	1996	Taxation in accordance with local conditions and environmental costs.	Reduce final disposal of waste and support the recovery targets.
Producer responsibility scheme	1998	Management of packaging waste. Targets have been set for recycling and recovery, which are similar to the targets in the packaging directive.	To meet the recycling and recovery targets of the packaging directive.
Ban on landfilling of packaging waste	1998	Reduce the amount of unsorted packaging waste going to landfill.	Reduce final disposal of waste.

Note: The table equals response indicator 1: Types of measures applied in the system.

for the Environment and Territory was responsible for transposing the directive, and thus had the final say. According to the Ministry they are in charge of general control and provision of data. APAT was not involved in the transposition of the directive but has a role in implementation.

All parties agree that authorities, industrial organisations and businesses are contributing positively to the implementation of the system. However, it appears that experts (e.g. from universities) and NGOs have not been involved as much as the authorities and industry, because their involvement and influence in the implementation and establishment of the system are rated differently by the three interviewees.

The influence of businesses is emphasised by the Ministry for the Environment and Territory since they rate the influence of enterprises on the system higher than that of the authorities. APAT states that the system is based on cooperation between the public authorities (municipalities) and industry/commerce, which has had a positive impact on the transposition of the directive.

7.3 Implemented measures

The packaging legislation framework is the most important measure for meeting the objectives and targets of the directive. Disposal of packaging waste in landfills has been prohibited since 1998, except for waste derived from sorting, recycling and recovery operations. A landfill tax was introduced in January 1996 and CONAI was established in 1998. Table 22 summarises the measures for packaging waste.

A CONAI recovery consortium is established for each packaging material, which has to ensure that the packaging waste is recovered and recycled. The producers of the packaging must pay a fee (environmental contribution) to CONAI, which is levied at the point where the packaging is transferred from the producer to the user/filler and is first used to contain goods. The fee is then reimbursed by

Table 23 General information on measures

	Aimed at prevention	Aimed at increased recycling
Administrative instruments		
Producer responsibility	√	√
Deposit systems for reusable beverage containers	n.a.	
Prevention programmes	√	
Awareness raising	√	
Mandatory collection		√
Ban on landfill		√
Economic instruments		
Landfill tax		√

the filler of the packaging material, who is then reimbursed by the next buyer and so on. In this way, the environmental contribution is internalised in the packaging cost. The material-specific consortia have to reimburse the municipalities for the additional separate collections that they have to make to collect and deliver packaging waste to the consortia. These fees therefore cover these extra costs of collecting packaging waste, and the total amount of fees paid by companies cannot therefore be linked directly to the actual costs of managing the packaging waste.

7.3.1 Waste prevention

Italian local authorities are formally responsible for information on packaging waste. CONAI also carries out information activities, including a range of instruments to promote prevention. Some examples are:

- The fee to CONAI is paid when the packaging is transferred from the producer to the user. The invoice contains information on the contribution to be paid to CONAI, and is directly proportional to the quantities of packaging produced and sold. The contribution cost is therefore an incentive to optimise the use of packaging.
- Packaging which is part of a **deposit-refund** or **closed loop** system is exempt from the fee.
- CONAI is active in promoting a 'culture of environmental sustainability', encouraging companies to use and recover materials from separate collection schemes.
- In 2001 CONAI prepared a '**prevention dossier**' which has reached more than 6 000 companies and other stakeholders. A second edition was published in 2004 (CONAI, 2004a).
- In cooperation with the Italian Packaging Institute, CONAI is organising a '**Prevention award**', a prize for companies that invest in producing or using environmentally-compatible packaging and packaging systems.
- A material-specific consortium must set up a specific prevention plan every year.
- CONAI aims to define 'prevention indicators' on a technical basis (CONAI, 2004b).

7.3.2 Increased recycling

CONAI has presumably had a large ability to affect the levels of packaging waste being recycled and recovered, since it has been responsible for packaging waste management since 1998. The packaging legislation framework, including CONAI, is the most important measure on packaging waste in Italy and the increasing recycling/recovery rates can be attributed mainly to this framework, which reduced the amount of packaging waste going to landfill between 1998 and 2002 by more than 20 % (1.5 million tonnes).

The legislation on landfill tax allows each region to set the tax rate in accordance with local conditions and environmental costs. However, the rates per tonne of waste must fall within specific ranges. The tax is not aimed only at packaging waste, but can be seen as helping to increase the amounts of packaging waste being recycled (Table 23). Its contribution to the development of

Table 24 Key figures on packaging waste

	Italy	EU-15
Total packaging waste generation 2001, 1 000 tonnes	11 262	64 876
Generation incl./excl. wood 2001, kg/capita	194/151	172
Change in generation, 1997–2001, %	+ 18.2	+ 8.4
GDP change 1997–2001, %	+ 8.5	+ 11.4
Change in per capita household consumption, 1997–2001, %	+ 8.7	–
Change in the number of households, 1998–2000, %	+ 9.0	–
Change in the population, %	+ 0.7	+ 0.8
Recycling (EU target 2001, 25 %), %	46	53
Recovery (EU target 2001, 50 %), %	50	60

Note: The key figures cover the response indicators 2–7 on effectiveness.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

recycling is not however likely to be as significant as that of CONAI.

7.4 Effectiveness

The effectiveness of the Italian measures is evaluated with regard to the targets set in the directive, which are the same as those in national legislation. Full implementation of the system, including the establishment of CONAI, should therefore lead to full achievement of the EU target.

About 17 % of EU-15 packaging waste is generated in Italy. Generation per capita is fairly close to the EU-15 average (Table 24).

Generation has increased much more than GDP and was especially large in 1997 and 1998. A possible explanation is that the legislative framework was not fully in place until 1998, and reporting for 1997 was thus not as reliable as for subsequent years. Generation between 1998 and 2001 increased by 7.9 % while GDP increased by 6.4 %, so decoupling from economic growth had still not been achieved. Generation growth, however, did not significantly exceeding that of GDP.

Recycling of packaging waste reached 46 % in 2001, meeting the targets in the Legislative Decree 22/97 and the directive. All the material-specific recycling targets were also reached (Table 25).

However, there are big differences between the amount of packaging waste collected separately for recycling and recovery in northern and southern Italy. Thirty-eight provinces have separate collection above 50 kg per capita. Of these, 34 are in the north and 4 in the centre of Italy. Performance in the southern provinces is very poor: of the 36 provinces, only 5 collect between 25–50 kg per capita, 27 collect 10–25 kg per capita and the others collect less than 10 kg per capita. (CONAI, 2004b). To what extent these differences are due to income disparities or consumption pattern variation is difficult to say.

7.4.1 Stakeholder views of system effectiveness

The Ministry for the Environment and Territory finds that the low cost of the system and the high level of recovery and recycling are positive features. However, the results are uneven, particularly between north and south. The Ministry rates the effectiveness of the directive as rather high and cost-effectiveness in particular as very good.

APAT points to the achievement of the directive targets as the most important effect of the transposition of the directive. It rates the effectiveness of the directive as rather high but cost-effectiveness as only mediocre. It explains that the system is not yet completely cost-effective as the use of the CONAI environmental contributions should be improved. APAT points out that cooperation between public authorities and industry/commerce is well-founded in the agreement between ANCI (Italian National Association of Municipalities) and CONAI. The overall assessment of APAT is thus that the system is functioning well. However, cooperation between local authorities and industry/commerce should be improved, in order to

Table 25 Recycling of packaging materials in 2001 and targets

Packaging material	Recycling 1 000 tonnes	Recycling %	Packaging waste directive and decree 22/97, 2001, %	Packaging directive target, 2001 %
Paper and cardboard	2 169	52	15	15
Glass	962	48	15	15
Plastic	372	19	15	15
Metal	279	44	15	15
Wood	1 343	53	–	–
Total	5 125	46	25–45	25–45

Note: The table covers response indicators 8–9 on effectiveness.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

Table 26 Cost effectiveness of compliance scheme, CONAI

	1998	1999	2000	2001	2002
Financing need*), mEUR	200.00	216.51	227.87	231.08	232.02
Generated quantity, 1 000 t	10 435	10 907	11 168	11 262	11 367
Recovered quantity, 1 000 t	3 659	4 079	4 751	5 720	6 327
Recovery rate, %	34	37	43	51	56
Financing need per tonne generated, EUR/t	19	20	20	21	20
Change in financing need per tonne generated, %	–	4	3	1	– 1
Financing need per tonne recovered, EUR/t	55	53	48	40	37
Change in financing need per tonne recovered, %	–	– 3	– 10	– 16	– 9
Financing need per percentage point recovered, mEUR	5.88	5.85	5.30	4.53	4.14

*) Fees paid by companies.

cover all the costs of waste collection. APAT also emphasises problems in southern Italy, where waste management systems are not yet as developed as in other areas, and points out that regional planning for waste prevention in particular should be improved.

The Ministry for the Environment and Territory considers CONAI to be a very important instrument and does not find major problems. The ban on landfill, however, is not considered a satisfactory solution since it does not really work as intended. Italy has postponed the implementation of the ban year after year. The Ministry also points out that the landfill tax would have to be very high to be effective. CONAI finds that the system operates well and sees no major problems. As regards the instruments that have been introduced, CONAI assesses that they have motivated industry and retailers slightly more than households and waste management operators to take responsibility for achieving the targets.

7.5 Cost-effectiveness of the measures

It has not proved possible to obtain a full picture of the costs of the entire system. As a result, only partial information on the costs of the various measures can be presented. The only information on costs is CONAI's direct financial costs. Financing per tonne of recovered waste fell by about one third between 1998 and 2002. Conversely, total financing need is increasing slightly but is much less pronounced than the 73 % increase in packaging waste generation.

CONAI's fees have remained constant since 1998. However, the financial cost of CONAI is not the total cost of packaging collection and recovery since CONAI pays municipalities for the additional costs incurred for the increase in collection of packaging and not the total costs of collection of the total packaging collected by municipalities. Table 26 shows the suggested indicators for CONAI.

CONAI's financing need increased slightly between 1998 and 2002, from 200 million EUR to about 232 million. Even though financing need is more or less constant over time, financing need per tonne of waste recovered is declining. Financing need per percentage point recovered is also declining, from 5.88 million EUR in 1998 to 4.14 million EUR in 2002.

Households pay a fee to the relevant local authority for the provision of a collection service including packaging waste. Such cost information, and the share of packaging waste in the total cost of municipal waste management, is in general very difficult to obtain. In addition, no estimates of the public authorities' administrative costs (general administration, monitoring of packaging and packaging waste, etc.) or the costs of the self-complying companies are available.

8 United Kingdom

Summary

The UK waste management system includes several measures that deal with packaging waste. The producer-responsibility scheme, with the PRN/PERN system, is the primary measure, and it includes business targets set specifically to fulfil the requirements of the directive. Introduced in 1997, this scheme provides a legislative framework for the market-based management of packaging waste. Other measures, such as the landfill tax, may also have been influential in the system's development.

It is a particularly complex system, and according to SEPA, this is due to DEFRA's attempts to design a system that was supported by as many branches of industry as possible. The system was designed to enable businesses to comply with their obligations at the lowest possible cost, and this aim appears to have been fulfilled: the financing need per tonne of packaging waste recovered is low compared with other countries. To achieve this, PRN prices are governed by supply and demand for the recycling and recovery of packaging. If recovery capacity falls below that needed to meet recovery targets, PRN demand exceeds supply and prices rise. However, prices are very unstable and do not include other costs such those associated with data collection, registering with the Agencies and dealing with fraud.

During the five-year period 1997–2001, reported recycling and recovery levels increased by 18 and 21 percentage points respectively. In addition, the generation of packaging waste decreased by about 7 % compared with increase in GDP of more than 12 %: relative decoupling, despite uncertain data. Recent figures show that the quantity of packaging is increasing.

The recycling rate in 2001 reached 42 %, exceeding the target set by the directive. Nevertheless, the recovery target of the directive was not met, as recovery only reached 48 % (target 50 %). Overall recycling and recovery rates are significantly lower than the EU-15 average. By 2003 the recycling rate had increased to 47 % and overall recovery to 53 %. In order to meet the targets in 2008, packaging waste from households will have to be included far more than it is today, thus increasing the costs of the entire system.

The way the PRN system is organised will in some cases provide an incentive to down-cycle materials, as this is occasionally a cheaper option compared with higher grade recycling options.

General awareness of the initiatives among the population is low. The issue of waste prevention is not directly regulated through UK legislation, and relatively little attention is paid to preventative efforts.

8.1 Introduction

The packaging waste directive is implemented by the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended), and the Packaging (Essential Requirements) Regulations 2003 (as amended), revoking previous regulation from 1998 which first took full effect in January 1999.

The producer-responsibility obligations require obligated companies and compliance schemes to demonstrate compliance with their recovery and recycling obligations through presentation of Packaging Waste Recovery Notes (PRNs) or Packaging Waste Export Recovery Notes (PERNs). The term 'PRN' in the following covers both PRNs and PERNs.

The PRN books are supplied by the Environment Agencies to reprocessors accredited by them. Reprocessors are private companies which recover and recycle packaging waste, but do not have any

Note on the use of stakeholder views

Each country analysis includes the results of interviews with a small number of stakeholders. The views of these stakeholders reflect differing interests, perspectives and priorities and are individual opinions. As such, they should not be regarded as representative or official views of the country as a whole nor as consensus views of the stakeholders the individuals' organisations may represent. These aspects should be borne in mind when reading the sections on stakeholder views.

obligation to do so under the Regulations. Accredited reprocessors can issue PRNs to certify that a particular quantity of packaging waste has been recycled or recovered. Obligated companies and compliance schemes on behalf of their members purchase these Notes as evidence.

The government supports local authorities in the promotion of best practices in the area of waste management. In addition, it provides funding to a number of organisations, including Envirowise, which supports cleaner technology and the Waste & Resources Action Programme (WRAP), which aims at decreasing the quantities of waste generated while increasing the quantities recycled.

This analysis of the UK system includes the results of interviews with six stakeholders: James Biott, Department for Environment, Food and Rural Affairs (DEFRA); Jeff Cooper, the Environment Agency: Karen Riddick, Scottish Environment Protection Agency (SEPA); Adrian Hawkes, the compliance scheme Valpak; Alice Roberts, Local Governments Association; and Doreen Fedrigo, Waste Watch, an environmental organisation promoting sustainable resource use.

8.2 Distribution of responsibilities

The main responsibility for transposing the packaging directive into UK legislation lies with the Department for Environment, Food and Rural Affairs (DEFRA) which also monitors the fulfilment of national and directive related targets (Table 27).

Monitoring and control of compliance in England and Wales is the responsibility of the Environment Agency (EA). The Scottish Environment Protection Agency (SEPA) is required to monitor compliance with the regulations in Scotland, and Northern Ireland is monitored by the Northern Ireland Environment and Heritage Service (NI EHS). Each UK country has worked out National Waste Strategies which are considered to be one of the major driving forces behind minimising waste disposal and increasing recovery of all wastes.

Table 27 Distribution of responsibility in the packaging system

Activity	Responsible body
Transposition of directive into national legislation	DEFRA
Monitoring of meeting targets (national + directive)	DEFRA
Monitoring and control of compliance	EA, SEPA, NI EHS (e.g. inspections and accreditation) Local authorities (e.g. essential requirements)
Information on management of packaging waste	Compliance schemes + self-compliers + accredited reprocessors/exporters
Supplier of packaging data	Compliance schemes + self-compliers
Collection of packaging waste	
— from households	Local authorities through waste management companies (public and private)
— from industry/commerce	Waste management companies (often also in charge of public collection)
Recycling and treatment of packaging waste	Accredited reprocessors and exporters
Expenditures of packaging system covered by	Compliance schemes + self-compliers

The fulfilment of the essential requirements of the packaging directive is enforced by local authorities, which are also responsible for collecting packaging waste from households, which is done by both public and private waste management companies. Waste from industry/commerce is collected to some extent using the same companies. Most of the packaging waste recycling that is counted towards recovery/recycling targets is carried out by Agency-accredited reprocessors (a similar accreditation system is in place for exporters who wish to recover packaging waste overseas). The EA, SEPA and NI EHS administer the accreditation system and audit the technical and environmental operating standard of the reprocessors.

8.2.1 Transposition of the directive into national legislation: stakeholder views

The interviewees generally agree that the packaging directive has been transposed into national legislation. However there seem to be some issues that still need to be addressed. The Local governments association states that no incentives for waste minimisation are operational, so in this respect the packaging directive is not fully transposed. DEFRA acknowledges that the objectives for prevention in the directive are not met, and is currently working on improving prevention activities. As far as SEPA is concerned it is difficult to assess whether the UK legislation has resulted in a reduction in packaging placed on the market, since what would have happened if the directive had not been introduced is not known. SEPA also states that very little has been done to promote the reuse of packaging.

According to SEPA, under the UK system reused packaging is exempted from recovery obligations. However, because of the relatively low costs of compliance, there may be little incentive for producers to reuse packaging. There is also the risk that companies may prefer to recycle rather than reuse packaging since this helps to meet their recovery obligations (reuse of packaging cannot be used to fulfil recovery obligations). SEPA's position on reuse is backed by Waste Watch saying that, except for commercial and industrial recycling, hardly any recycling and reuse is taking place. Waste Watch also states that the general UK view is that the directive targets could be met mainly through the recovery of industrial packaging wastes, which is hardly the spirit of the directive. In contrast Valpak states that the UK has sensibly implemented regulations that cover both household and commercial/industrial packaging waste. In particular, glass and metals from households are reprocessed in considerable volumes.

8.2.2 Stakeholder involvement in the design of the system

The involvement of stakeholders in the design of the packaging waste management system varies. DEFRA had the main responsibility for the establishment of the system while the Environment agencies (EA and SEPA) to some extent assisted in the development of the rules. As the government strategy was intended to create a system that was supported by industry, Valpak was fundamental in the development of the concept, design and implementation. According to Valpak, the close collaboration between government and industry had a very positive influence on the design of the system. SEPA, as the body responsible for protection of the environment in Scotland, had considerable input to the development of the UK legislation.

DEFRA emphasises that the Advisory committee on packaging (ACP) provided them with advice on how to implement the system, which was to a large extent used by them in the process of establishing the system. The ACP is an industrial body that underpins the influence of industry.

The Local governments association also tried to influence implementation but did not have much success. The Association states that even though the producer-responsibility scheme was meant to ensure that all costs and management should be covered by the producers, local authorities were given responsibility for collect packaging waste from households, and consequently the taxpayers have been partly financing municipal collection. Valpak points out that local authorities are responsible for collecting all wastes from households including mixed packaging but not for meeting any packaging recycling targets. The additional costs of separately collecting household packaging waste are to some extent financed by PRNs.

Waste Watch was invited to provide a response to consultations on the development of the UK system, as a part of general UK Government approach on

consultations, but their influence was limited. There seems to be a general agreement on the issue of influence: central authorities and industrial organisations/ enterprises are generally seen as having the highest degree of influence on the development of the system.

SEPA points out that the original government intention was to create one large compliance scheme (Valpak) which would deal with all producers that did not want to self comply, and coordinate and drive UK progress towards meeting the directive's targets. However, this was

Table 28 Measures for packaging waste in the UK

Measure	Year of introduction	Purpose/targets	Relation to the objectives of the directive
Landfill tax	1996	Provides waste producers and local authorities with an incentive to reduce the quantities of waste sent to landfill and encourages the development of alternative waste management practices.	Incentive to promote recycling.
Packaging regulation/ packaging waste recovery notes (PRNs)	1997	PRNs represent the quantity of packaging waste recovered by accredited reprocessors. Compliance Schemes and self compliers purchase PRNs in order to meet share of targets. UK government intends that this ensures compliance at minimum cost to industry.	Directly intended to meeting the recycling and recovery targets of the packaging directive.
Envirowise	2000	Organisation aiming at improving environmental performance while increasing domestic competitiveness. Promotes waste minimisation and the adoption of cost-effective cleaner technology. An amalgamation of already-existing initiatives.	Supports the efforts for prevention of packaging waste and acts as incentive to promote recycling.
Local Authority Recycling and Composting Targets	2000	Statutory recycling targets and reviews to encourage the adoption of best practice.	Indirectly supports meeting the recycling and recovery targets of the packaging directive.
New Opportunities Fund/SEED	2001	Promotes community initiatives in recycling. Many recycling schemes involve packaging waste e.g. glass bottles/jars, cans, plastic bottles.	Indirectly supports meeting the recycling and recovery targets of the packaging directive.
Waste Minimisation and Recycling Fund	2001	Fund is set up to provide assistance to local authorities to improve waste management and increase recycling.	Indirectly supports meeting the recycling and recovery targets of the packaging directive and minimising waste production.
WRAP	2001	To promote sustainable waste management by creating stable and efficient markets for all recycled materials and products and not just packaging.	Incentive to promote general recycling and end markets for all materials and products.
Aggregates tax	2002	The aim of the tax is to reduce the demand for virgin aggregates, and encourage the use of recycled materials. Not aimed specifically at packaging waste.	Improving recycling.
Household Waste Recycling Act (HWR)	2003	Act requires local authorities In England to separately collect at least two recyclable materials by the end of 2010. Not aimed specifically at packaging waste.	If packaging materials are targeted, the fulfilment of recycling and recovery targets of the directive is supported.
Waste and Emissions Trading Act (WET)/Landfill Allowance Trading System	2003	Designed to help the UK meet the biodegradable waste diversion targets set by the landfill directive. The act may encourage the diversion of biodegradable packaging (mainly cardboard) for recycling.	Improving recycling.

Note: The table equals response indicator 1: Types of measures applied in the system.

Table 29 General information on measures

	Aimed at prevention	Aimed at increased recycling
Administrative instruments		
Producer responsibility	√	√
Deposit systems for reusable beverage containers		
Prevention programmes		
Awareness raising	√	√
Mandatory collection		√
Landfill ban for certain wastes		
Support to cleaner production	√	√
Improving markets for recyclables		√
Economic instruments		
Landfill tax		√
Packaging/plastic bag tax		
Tax on the use of certain resources (aggregates tax)	√	
Subsidy for collection of recyclables		√

deemed to be anti-competitive and the market was opened for other compliance schemes to register. Nonetheless, Valpak had the advantage of being the first registered compliance scheme and was thus able to secure the vast majority of the producer market. Valpak's market share has now been slowly reduced but with a membership of around 3 000, it remains some five times larger than the second largest scheme.

8.3 Implemented measures

The majority of instruments applied are administrative and aim at increasing the recycling of packaging waste (Table 28). The producer-responsibility scheme is the main measure. Producer responsibility requires those responsible for placing packaging or packaging materials on the market to pay a significant amount towards funding the recovery of packaging waste. The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 require self-compliers and compliance schemes to demonstrate compliance with their recovery and recycling obligations through presentation of PRNs, which certify that a particular quantity of post-consumer packaging has been recycled or recovered.

Two economic instruments have also been implemented although these have only an indirect effect and are unrelated to the packaging directive: the landfill tax and the aggregates tax. Waste going to landfill is taxed at a rate depending on whether the waste is classified as 'active' or 'inactive'. Active waste is taxed at a higher rate than inactive waste. The aggregates tax is targeted at virgin materials and aims at increasing the demand for recycled materials.

Apart from the packaging regulations themselves, the majority of instruments applied do not focus just on the recycling of packaging waste but are general measures which can have a beneficial effect on packaging. However, some instruments that focus on recycling also include aspects of waste prevention. Table 29 gives general information on the aims of the measures in terms of prevention and recycling.

8.3.1 Waste prevention

Waste prevention is not the subject of direct regulation, but the UK has implemented regulations under the Essential Requirements legislation in an attempt to ensure that suppliers use the minimum amount of packaging consistent with product protection and safety.

Plans are promoted at the individual company level through the Government-sponsored organisation Envirowise. Moreover, compliance schemes are required

to provide information and encouragement to their members to minimise packaging. It may also be argued that companies have an economic incentive to reduce the quantity of packaging since lower quantities of packaging handled results in lower obligations and a consequent reduction in PRN costs.

The Waste Minimisation and Recycling Fund was set up to provide assistance to local authorities in order to improve waste management and increase recycling. Local authorities submit bids for particular projects in order to obtain financing. The Fund supports programmes that not only focus on delivering short-term results but also build towards long-term waste management solutions. The funding does not concentrate specifically on projects dealing with the prevention of packaging waste streams, but is aimed at increased recycling and composting of MSW (municipal solid waste) in general.

The primary aim of WRAP was originally to promote recycling, but its remit has recently been expanded to include waste minimisation and raising of public awareness.

8.3.2 Increased recycling

The producer-responsibility scheme is the main measure that seeks to improve the environmental performance of packaging waste management and ultimately aims to ensure achievement of the directive's targets.

Several of the instruments that have been introduced are targeted at waste in general, and thus also involve packaging waste.

The landfill tax is aimed at waste in general, to provide waste producers and local authorities with a strong incentive to reduce the quantities sent to landfill. It should encourage the development of more environmentally-viable waste management practices. Although the measure is not aimed specifically at packaging waste, it is assumed that packaging waste is contained in the fractions that are reduced and diverted to alternative treatment options, although the effect is small for lighter packaging materials such as plastics and metal cans.

Money from the National Lottery is allocated through the Social, Economic and Environmental Development (SEED) Programme to promote community initiatives such as recycling. Many such recycling schemes involve packaging waste e.g. glass bottles/jars, cans, plastic bottles.

WRAP aims at promoting sustainable waste management by creating markets for recycled materials and products (not just packaging). WRAP has, among other things, worked for the development and adoption of material specifications for recycled waste.

Statutory composting and recycling targets are imposed on local authorities in order to encourage the adoption of best practice. The targets are set by weight, which favours the recycling of heavy waste streams such as newspapers, magazines and green waste for composting over lighter packaging materials such as plastics and metal cans.

The *Aggregates tax, the Household Waste Recycling Act* and the *Waste and Emissions Trading Act* are all aimed at increasing recycling. However, they were all implemented after 2001, which is the primary target year for this analysis and therefore did not influence the level of recycling in that year.

8.4 Effectiveness

This section discusses the effectiveness of the measures in meeting the targets in the packaging directive and national legislation. Two sets of targets have been established, one at the national and one at the business level. The national targets reflect the level of recycling and recovery needed to meet the targets of the directive. The business targets reflect the recycling and recovery that needs to be undertaken by obligated businesses. The business targets are somewhat higher than the national targets since free riders and companies below the thresholds do not account for their handling of packaging. This means that costs of packaging not accounted for becomes an additional cost burden for the obligated companies.

About 14 % of the packaging waste in the EU-15 is generated in the UK. Generation is 159 kg/capita, slightly below the EU-15 average (172 kg/capita) (Table 30).

The UK has apparently succeeded in decreasing the generation of packaging waste by 7 % between 1997 and 2001, despite an increase in GDP of 12 %, so the UK seems to have achieved a relative decoupling. However, the 7 % decrease

Table 30 Key figures

	UK	EU-15
Total packaging waste generation 2001, 1 000 tonnes	9 314	64 876
Generation incl./excl. wood 2001, kg/capita	159/148	172
Change in generation, 1997–2001, %	– 7	+ 8.4
GDP change 1997–2001, %	+ 12.4	+ 11.4
Change in per capita household consumption, 1997–2001, %	+ 13.3	–
Change in the number of households, 1998–2000, %	+ 2.9	–
Change in the population, %	+ 0.6	+ 0.8
Recycling (EU target 2001, 25 %), %	42	53
Recovery (EU target 2001, 50 %), %	48	60

Note: The key figures cover the response indicators 2–7 on effectiveness. GDP and household consumption expenditure are in 1995 prices.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste, and Eurostat.

relies heavily on the figures for total packaging in the waste stream in 1997 and 1998. There were some problems with the reliability of data in the beginning of that period. It was difficult for obligated businesses to submit accurate data on packaging handled, even though compliance schemes assisted their members to a certain degree. As a result, so-called 'producer's reasonable estimates' were accepted for the period 1997 to 1999. By 1999 businesses should have started to report the most accurate possible figures, providing the basis for a more reliable set of data (European Commission, 2001). However, even taking the initial inaccuracies into account, a relative decoupling of packaging quantities arising and growth in GDP may have been achieved.

The levels of recycling and recovery in 2001 were distinctly lower than the EU-15 average. The recycling rate was 42 % which is far beyond the 25 % minimum recycling target in the directive but 11 percentage points lower than the EU-15 average and significantly lower than the 50 % recovery required by the directive. With a recovery rate of 48 %, the UK just failed to meet the 50 % EU recovery target in 2001. By 2003 the recycling rate had increased to 47 % and overall recovery to 53 %.

Regarding recycling of the four packaging materials in the directive, the UK has reached recycling rates from 16 % to 57 % and thereby also exceeds the 15 % recycling target (Table 31). The UK measures therefore narrowly failed to achieve the overall recovery rate required by the directive, but the overall and material-specific targets on recycling have all been met.

Table 31 Recycling of packaging materials in 2001 and targets

Packaging material	Recycling 1 000 tonnes	Recycling %	Business target 2001, %	Packaging directive target 2001, %
Paper and cardboard	2 031	53	–	15
Glass	766	33	–	15
Metals	307	35	–	15
Plastics	270	16	–	15
Wood	574	57	–	–
Total	3 948	42	18	25–45

Note: The table covers response indicators 8–9 on effectiveness.

Source: UK reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste.

An effect of the producer-responsibility scheme is that a number of companies are below the threshold level or are simply not participating in the scheme. This implies that some packaging put on the market is not accounted for, and business targets are raised in order to compensate for this. Initial assessments used for setting the business recovery targets prior to introduction of the regulations in 1997 concluded that about 6 % of packaging would avoid the recycling and recovery obligations by being below the threshold level, but figures from 1999 and 2000 showed that the figure for unreported packaging was actually 12 %, i.e. twice as much. The corresponding figure for 2001 was 15 % (Riddick, 2003). In 2003 it was estimated that there was a gap of 1.2 million tonnes between the amount flowing into the waste stream, and that accounted for by obligated companies, and one third of this is thought to be due to free riders (ACP, 2003). The number of free riders is not known, and a government task force is looking into the matter.

8.4.1 Stakeholder views of system effectiveness

It is generally agreed that the packaging waste management system has a positive influence on the amounts of packaging waste recovered and recycled.

According to SEPA, the producer-responsibility approach means that environmental awareness is increasing among companies that have not traditionally been subject to waste regulation. SEPA also brings out the fact that the system gives at least a theoretical incentive to reduce and re-think packaging use. On the same subject the Local Governments Association asserts that the total amounts of packaging have not been minimised. Waste Watch emphasises that the weight-based orientation of the system may lead to an increase in the use of plastics, as this fraction is lighter than glass, for example.

Valpak points out that most packaging is low density and that local authorities concentrate on denser and heavier materials such as newspapers and organic waste in order to fulfil the targets of the Household Waste Recycling Act (HWR). The issue of local authorities being responsible for setting the targets for recycling under the HWR is also raised by the Environment Agency which asserts that the local authority targets do not necessarily include packaging waste. In general, materials like plastics are considered to be easier to collect from industries. SEPA concludes that the HWR Act may assist towards meeting packaging waste targets but that it is more likely to encourage collection and recycling of heavier wastes such as glass and may therefore have little influence on the collection and recovery of plastic packaging waste.

Valpak praises the system for its low costs for industry, but is concerned with the system's complexity and the demanding data-reporting requirements. According to SEPA, it is likely that the UK legislation would not have been so complex, had the Government not tried to ensure that most sectors of industry supported the proposals. The Environment Agency adds that it took a huge amount of time for industry to agree on the structure of the system. At the same time the Government had a 'hands off' approach which subsequently led to a late implementation of the system. The Environment Agency finds that many companies would like a review of the threshold values. The review should be aimed at including more packaging within the regulatory framework, while keeping the number of obligated companies down.

SEPA views the system's low costs as problematic in terms of environmental achievement: the low prices of PRNs may result in poor incentives for producers to reduce and re-think their packaging use. By delegating all of their responsibilities to compliance schemes and reprocessors, producers may lose the incentive to improve environmental performance. As recycling obligations can be fulfilled through purchasing PRNs that are unrelated to a producer's own waste, the system also acts as a disincentive for producers to design their own packaging, for example for ease of recycling. Valpak argues that recycling obligations still have to be fulfilled according to individual materials targets in addition to overall recycling targets.

SEPA points out that the environmental outcome of the UK system is difficult to assess in terms of improved waste recovery since few data are available on whether recovery of non-packaging waste has decreased to make way for increased packaging waste recovery. In general, SEPA considers that the environmental performance of the current system is limited. This is backed by Waste Watch pointing out the negative feature of reprocessing

being cheaper abroad ([26]), in China for example, even though it may not be environmentally beneficial to do so. Valpak states that export markets are an essential feature of meeting the overall targets for the UK because as a net importer of both goods and packaging the UK does not have sufficient raw materials production or reprocessing capability and markets to meet the targets in all cases. The vast majority of packaging is still reprocessed in the UK.

SEPA supports the view of Waste Watch and has observed an increase in the export of packaging waste, particularly plastics, for recovery overseas. It is acknowledged that there is nothing inherently illegal in such practices and that there is a genuine trade in wastes for recycling. However, this may be to the detriment of domestic capacity, and may compromise the principles of proximity and self sufficiency. SEPA also emphasises that the PRN system may encourage low-value recycling (down-cycling), often at the expense of high-quality closed loop recycling. An example is that the PRN revenue available to a business that crudely crushes glass for use as a low quality aggregate is the same as that available to a business manufacturing new glass containers from old glass. Overall, there is no link to the best practicable environmental option for waste recovery. In contrast, Valpak points out that the PRN system encourages the end markets with the highest value, because these should be able to produce PRNs at a lower cost than processes which feed a lower-value end market and therefore require greater PRN subsidy. Alternative lower-value end uses will only be taken up where the high-value markets are saturated or of insufficient capacity. For glass, alternative markets are necessary because the balance of colours means that it is impossible for the container industry to reprocess all the green glass. Aggregate markets are therefore required in order to make up the difference.

Another issue raised by SEPA is that the funding available to those recovering packaging waste may have encouraged the emergence of fraud within the system and the possibility that reported recovery is greater than what has actually been achieved. Waste Watch criticises Government subsidies for local authority collection of packaging waste, which keeps PRN prices low and thus gives a false impression of the low costs of the system. According to SEPA, the setting of optimum domestic targets has proved difficult, with the result that levels of packaging waste recovery and operation of PRN markets have been very varied and unpredictable, leading to problems with forward planning. SEPA proposes that there should be some means by which the funding arising from PRNs could also be directed towards those that collect, sort and bale the waste rather than only those that recover it.

According to Waste Watch, the number of compliance schemes (over 20) is a negative feature of the system. It seems as if more attention has been paid to market-related competition issues than to achieving a highly efficient and environmentally sound system.

An issue raised by several of the interviewees was the lack of public involvement. Thus, Waste Watch states that the public is not aware that recycling of packaging waste is taking place and that there is no public debate on waste issues. SEPA notes that there is no consumer/householder involvement in the system. Given that much of the packaging waste arises at the consumer/householder level, SEPA finds that this is a major negative factor. Valpak states that compliance schemes are required to communicate with consumers about recycling their packaging and this is done through a variety of means including websites and other communication methods. It is, however, not widely enforced and standards vary.

8.5 Cost-effectiveness of the packaging waste measures

The following subsection shows the costs of the UK packaging waste system, or rather the PRN system, as it is the only measure for which information on costs is available.

([26]) PRN revenue can be obtained directly by businesses that collect, sort and bale packaging when the packaging waste is exported.

Table 32 Cost-effectiveness of the packaging waste management system

	1998	1999	2000	2001	2002	2003
Financing need*), mEUR	118	53	55	106	175	78
Generated quantity, 1 000 t	10 244	9 200	9 180	9 314	9 897	10 059
Recovered quantity, 1 000 t	3 339	3 743	4 167	4 462	4 989	5 304
Recovery rate, %	33	41	45	48	50	53
Financing need per t generated, EUR/t	12	6	6	11	18	8
Change in financing need per t generated, %	–	– 49	+ 1	+ 95	60	– 56
Financing need per t recovered, EUR/t	35	15	13	24	35	15
Change in financing need per t recovered, %	–	– 59	– 11	+ 85	47	– 59
Financing need per % recovered, mEUR	3.6	1.3	1.2	2.2	3.5	1.6

*) Total PRN and PERN revenue.

Note: The table covers response indicators 10–11 on cost-effectiveness.

Source: DEFRA (2004a) and DEFRA (2004c).

8.5.1 Financing need of the packaging waste management system

The available and comparable figures for the financing need of the packaging waste management system are presented in Table 32, which shows that the quantity recovered increased by 51 % over the six years 1998–2003. However, uncertainty exists regarding the collection of data at the beginning of the period.

The financing need per tonne of recovered packaging waste is not very stable, mainly because of the fluctuating prices of PRNs. From Table 32 it can be seen that the financing need in 1998 was EUR 35 per tonne. This level subsequently dropped by 59 % to EUR 15 in 1999 and was more or less unchanged in 2000. However, the level rose by about 85 % to EUR 24 in 2001, the target year in which the statutory EU targets had to be achieved.

PRN prices are governed by several factors. The basic principle of the PRN system is that costs to obligated companies should be minimised. Hence, the costs of PRNs should reflect only the reprocessors' costs associated with collecting and recovering packaging waste, including the development of the necessary collection and treatment capacity. Other market-related factors also have an influence on prices, e.g. the type of waste material and alternative prices for virgin materials. Prices also depend on the balance between supply and demand. The perception is that an insufficient supply of PRNs will result in higher PRN prices and stimulate investment, whereas an oversupply of PRNs will result in a lower level of PRN prices. As PRNs are used to finance the collection and recovery of packaging waste, a decline in prices should, in theory, mean that demand is low and that the UK is thus close to meeting targets and vice versa (Riddick, 2003).

According to the intentions of the packaging waste management system, the figures for financing need in Table 32 should reflect the minimum amount required to meet the targets. Nevertheless, it is doubtful whether the figures give a complete picture of the costs associated with the handling of packaging waste. For example, the increase in recovery does not seem to correlate directly with any increases in PRN revenue. This matter could be partially explained by a lag between rising PRN prices and the necessary investment occurring to bring additional capacity on stream. Moreover, total PRN revenue alone does not give a true and fair view of the total costs of achieving compliance with the Regulations, i.e. administrative costs, such as registration fees to environment agencies or compliance schemes and expenses related to increased workload, are not included. These could represent up to an additional EUR 15.2 million in total (Hawkes, 2004).

Another issue adding to the uncertainty of the financing need is that the normal costs of the collection of packaging waste from households are not included. It is the responsibility of local authorities to collect

all household waste (including packaging waste) although compliance schemes and self-compliers may pay the reprocessors to recover some of these wastes where available. The additional costs of separately collecting household packaging waste via kerbside schemes are at least partly financed by higher material values paid by reprocessors to local authorities as a result of additional revenue from PRNs. However, much waste collected by local authorities may be landfilled.

Given these uncertainties in the assessment of the financing need it is obvious that caution should be used when evaluating the figures. However, the figures give an indication of the order of magnitude of the costs of the PRN system, although they cannot be considered to reflect the full costs of compliance.

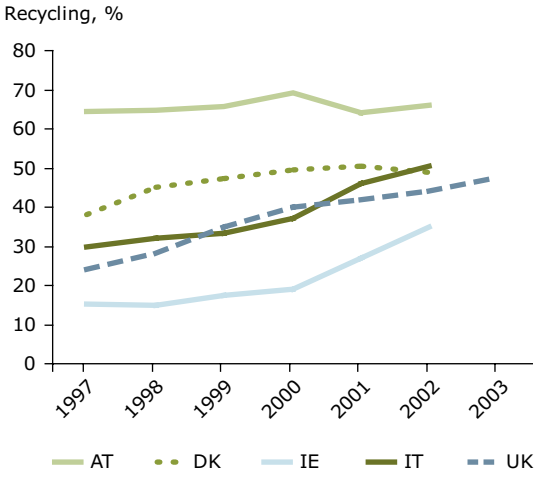
9 Comparative assessment

9.1 Introduction

There are major differences between the countries in the study, for example in terms of when the systems were implemented, how stakeholders were involved in the design and setting up of the system, which parties are obligated in the system and the level of packaging recycling and recovery in the base year, 1997 ([27]).

To illustrate these differences, Figure 7 shows the trends in recycling rates for each country. Recycling rates in 1997 varied from 15 % in Ireland to 64 % in Austria. By 2002, Ireland had increased recycling to 35 % and Austria to 66 %. Recycling levels in Austria and Denmark seem to have stabilised. In comparison, the systems in Italy and the UK established in or around 1997–1998 have managed to produce steadily increasing recycling levels, reaching 45–50 % in 2002. Despite a slow start, the Irish system has been making significant progress since 2000.

Figure 7 Trends in recycling rates, 1997–2003



Note: Wood packaging has been added to the reported Danish data for supply of packaging and the recycling rate for Denmark is thus not the data reported to the Commission. The recycling rate for Ireland does not include wood.

9.2 Start of implementation

The **Austrian** and **Danish** systems were fully or partly implemented **before the introduction of the packaging directive.** Austria was in a transposition phase before entering the EU in 1995, and was therefore implementing several ordinances on waste which increased the costs of waste management. Thus, Austria decided on a producer-responsibility system covering all types of packaging waste which obliged the producers to cover the costs. In Denmark, local authorities are in charge of the management of all waste. In practice, however, only household packaging waste is collected on behalf of the authorities while commercial packaging waste is often the responsibility of the companies themselves. Both systems have been amended to comply with the requirements of the packaging directive. **Ireland, Italy** and the **United Kingdom** all implemented their systems in 1996–1997 as a **direct consequence of the packaging directive**. Ireland received a derogation from the targets, according to Article 6 of the packaging directive, which meant that Ireland was only obliged to achieve 25 % recovery by 2001.

9.3 Implemented measures

In general, packaging waste management systems include a number of measures which either directly or indirectly support the system and the attainment of the objectives of the directive. Measures are primarily aimed at increasing recovery and recycling, while efforts on prevention are more sporadic.

The majority of measures are administrative. Examples include producer responsibility, mandatory collection or a ban on landfilling of certain waste streams, and instruments that aim at improving markets for secondary (recycled) materials.

([27]) Used here as the first year of implementing the packaging directive as it is the first year for which data have been reported.

Table 33 Measures aimed at prevention (P) and recycling/recovery (R)

	Austria		Denmark		Ireland		Italy		UK	
	P	R	P	R	P	R	P	R	P	R
Administrative instruments										
Producer responsibility	√	√			√	√	√	√	√	√
Deposit systems for reusable beverage containers	√		√							
Prevention programmes							√			
Awareness raising			√	√	√	√	√			√
Mandatory collection		√		√				√		√
Landfill ban for certain wastes		√		√	√	√		√		
Support to cleaner production			√	√					√	√
Improving markets for recyclables										√
Economic instruments										
Landfill tax		√		√	√	√		√		√
Packaging/plastic bag tax			√		√					
Tax on the use of certain resources			√						√	
Subsidy for collection of recyclables										√

Rather few economic instruments are aimed at packaging and packaging waste. All countries have implemented a landfill tax which encourages a diversion of waste from landfill. It can be argued that producer-responsibility schemes provide an economic incentive to reduce the amount of packaging placed on the market. The effect of such incentives depends on whether producers pay the full or only part of the cost of the system.

Measures on prevention are limited to awareness-raising campaigns, some deposit-refund systems and taxes on certain kinds of packaging. Prevention may be the most difficult issue to deal with and measure, since packaging materials, consumer demand and distribution systems are constantly changing.

Producer responsibility is the most widely-used instrument — four of the five countries have such a system. This reflects the wider European situation: almost all countries have placed the responsibility on various parties in the packaging chain. The design and requirements of regulations and systems, however, vary greatly.

In Italy, all companies must register and pay a fee to CONAI, even if they decide to take back and manage the packaging waste themselves (i.e. become self-compliers). In the UK, obligated companies must register with the environment authorities and pay a fee to cover the authorities' administrative costs. Austria has set very high targets (often above 90 %) for companies that choose to self-comply, which provides a strong incentive to join a compliance scheme.

The systems in Austria, Italy and Ireland cover both household and commercial waste; in Denmark and the UK the intention has been to achieve the directive targets primarily through the recycling of commercial waste.

A defined objective of the UK government was to introduce a system with the lowest cost to industry. This is probably why the main focus is on commercial waste as this is a relatively homogenous and clean, and thus cheap, waste stream to recycle. The same could be said of the Danish system, at least for commercial waste, which is recycled only if the company gains an economic benefit from doing so. The Danish tax on incineration and landfill is an important measure to provide this incentive.

The UK system allows any company to apply to become an accredited compliance scheme. As a result, 21 compliance schemes have been established. While this creates competition among schemes to keep prices low, it may have increased the complexity of the system, reducing the transparency of

obligated companies and increasing their administrative costs.

9.4 Involvement of authorities and stakeholders

Central authorities played a decisive role in the overall design of packaging waste management systems. Other stakeholders were involved in the decision-making process to a varying degree. Central authorities from all countries state that the packaging directive has been formally transposed. Nevertheless, some countries recognise that not all the intentions of the directive have been realised. For example, the UK central authorities mention the lack of prevention targets, and those in Ireland acknowledge that there is always room for improvement and further optimisation of the instruments that have been implemented.

There are distinct differences in the way regional and local authorities have been involved in the design and implementation of the packaging waste management system. Participation varies from being responsible for the implementation of the system, to being a member of a network of public enforcement officers, or, in the case of Austria, being virtually without influence.

The general position is that the views of local and regional authorities on the system differ from those of the central authorities. The former are more critical, and find that the effectiveness of the systems is somewhat lower. However this is not the case in Denmark, where local authorities have been given responsibility for the handling of waste which has resulted in a more favourable attitude.

In all countries, industry has been involved in the implementation and design of the systems. In fact, industry has had a major influence on the systems, particularly in countries that have some level of producer responsibility. In Austria the retailers had a huge influence on the design of the system, and in the UK, industry had to agree on a system acceptable to all parties in the packaging chain. Businesses in Denmark were only involved in the implementation process with regard to transport packaging.

Several other actors, such as NGOs, labour organisations, consumer groups, and experts from universities have been involved in the design and implementation of the systems. Nevertheless, the degree of influence of these actors seem to have been quite low.

9.5 Effectiveness: achievement of objectives and targets

The average amount of packaging waste generated per in 2001 was 172 kg (Table 34).

Table 34 Key figures

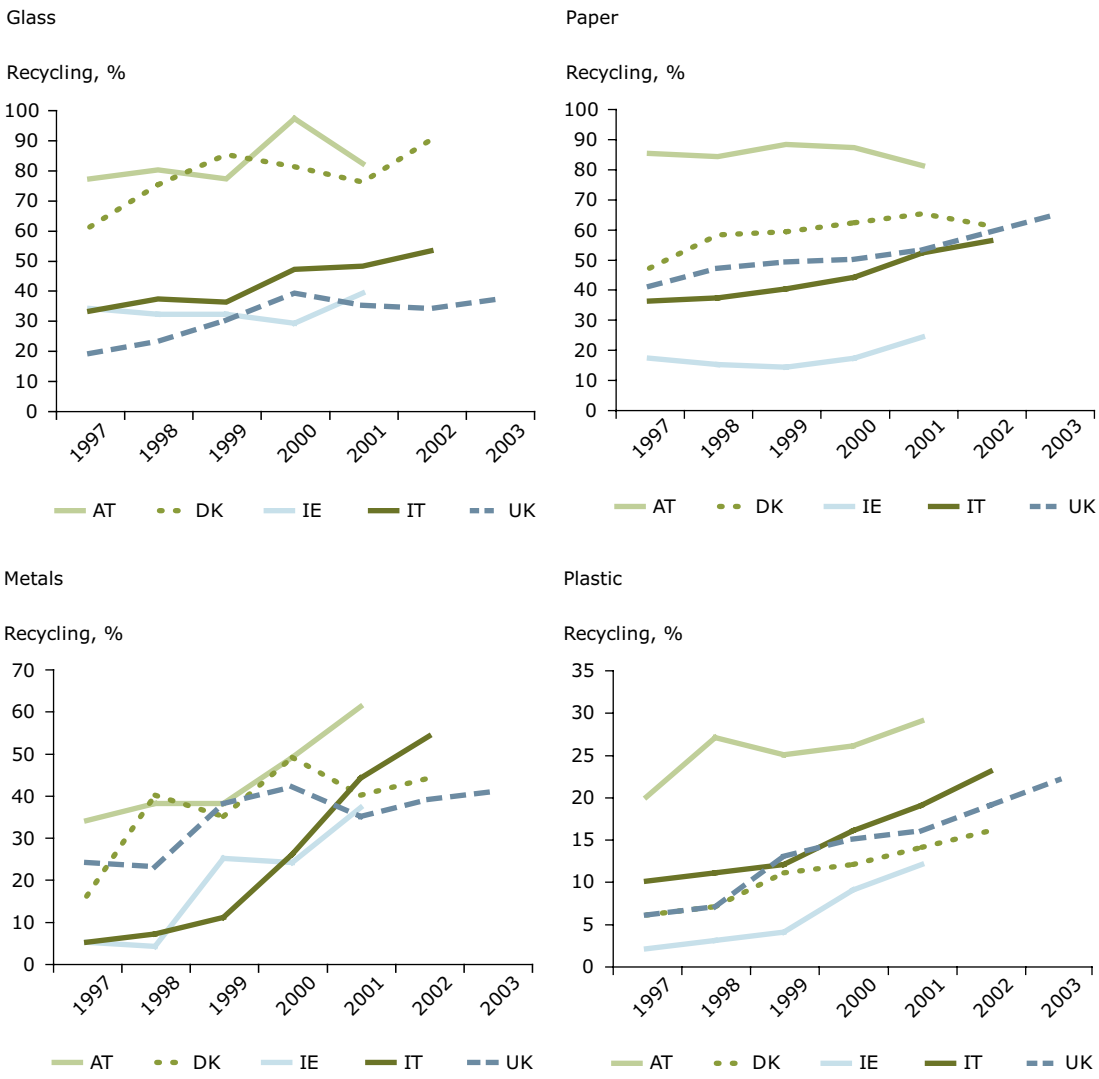
	Austria	Denmark	Ireland	Italy	UK	EU-15
Total packaging waste generation 2001, 1 000 tonnes	1 097	1 029	820	11 262	9 314	64 876
Generation incl./excl. wood 2001, kg/capita	135/122	192/161	214 *)	194/151	159/148	172
Change in generation, 1997–2001, %	– 1.0	+ 2.0	+ 36.0	+ 18.2	– 7	+ 8.4
GDP change 1997–2001, %	+ 11.0	+ 9.8	+ 41.0	+ 8.5	+ 12.4	+ 11.4
Change in per capita household consumption, 1997–2001, %	+ 11.2	+ 1.2	+ 27.7	+ 8.7	+ 13.3	–
Change in the number of households, 1998–2000, %	+ 4.1	+ 2.2	+ 3.2	+ 9.0	+ 2.9	–
Change in the population, %	+ 0.7	+ 1.4	+ 4.6	+ 0.7	+ 0.6	+ 0.8
Recycling (EU target 2001, 25 %), %	64	50	27	46	42	53
Recovery (EU target 2001, 50 %), %	73	90	27	51	48	60

*) Excl. wood.

Note: The key figures cover the response indicators 2–7 on effectiveness. GDP and household consumption expenditure are in 1995-prices.

Source: Member State reports 1997–2001 to DG Environment on packaging waste generation in accordance with Directive 94/62/EC on packaging and packaging waste, and Eurostat.

Figure 8 **Trends in recycling rates for glass, paper, metals and plastics, 1997–2003**



However, the amount of packaging placed on the market varied from 214 kg/capita in Ireland to 135 kg/capita in Austria. Ireland, Italy and Denmark generate more than the EU average and Austria and the UK less. There may be several reasons for these differences, for example the definition of packaging, statistical methodology and production and consumption patterns.

9.5.1 Prevention

The UK apparently succeeded in decreasing the generation of packaging waste by 7 % between 1997 and 2001. However, this relies heavily on figures for total packaging in 1997 which are now considered to be overestimates, thus increasing the uncertainty associated with this figure. Austria has managed to stabilise the amount of packaging, indeed decreasing it by one percent, while Denmark experienced a two percent increase during the five-year period. In comparison, Italy and Ireland saw large increases in packaging of 18 and 36 % respectively.

A common assumption is that the amount of packaging used will increase with increasing economic activity. As a result, the concept of relative decoupling is used to measure increased efficiency: if the growth rate of packaging waste generated is lower than that of GDP, relative decoupling is achieved. From this perspective, all countries except Italy have achieved a relative decoupling. Ireland has achieved relative decoupling, because although it has seen a huge 36 % increase in packaging waste generated, growth in GDP in the same period has been even bigger (41 %).

Changes in private consumption expenditure, size of households, and population are often used as other parameters to explain the generation of municipal waste, packaging and packaging waste ([28]). However, based on the figures in Table 35, nothing conclusive can be said in this respect, and more detailed analysis is necessary to estimate the relationships. Obviously, Austria and the UK have managed to have high increases in private consumption expenditure without affecting the amount of packaging. In comparison, Ireland had a growth in packaging that matched that in expenditure.

The 9 % increase in the number of households, together with private consumption expenditure, seems to have had an influence on the generation of packaging in Italy. In Austria the number of households increased by 4.1 % and in the other countries by some 3 %. Growth in population was about 1 % for all countries except Ireland (4.6 %). So change in population is not the main explanatory factor for changes in packaging.

Experience from other countries shows that producer-responsibility schemes have reduced the weight as well as the total quantity of individual packaging ([29]). However, it is not possible to give a quantitative estimate of this effect.

9.5.2 Recycling and recovery

All countries met the 25 % recycling target of the packaging directive but only four met the 50 % recovery target. The UK achieved a recovery rate of 48 %. As discussed in the introduction, recycling and recovery rates vary significantly between countries, although the differences are getting smaller. Recycling rates for the four packaging materials are presented in Figure 8. The target for all countries except Ireland was to recycle 15 % of each of the four materials: glass, paper, metals and plastics in 2001. This target was met by Austria, Italy and the UK but Denmark did not meet the target for plastics.

For glass, there are two groupings: Austria and Denmark with recycling levels of 60–90 % and Ireland, Italy and the UK with 20–50 %. The levels of both groups are rising but relatively slowly. For paper, Austria has a distinctly higher recycling level of 80–90 %, Denmark, Italy and the UK form a middle group with recycling rates of 35–45 % in 1997 rising to about 60 % in 2002. Ireland reached a level of 24 %. The picture for metals is less clear but all countries have managed to increase recycling by some 15–25 % over the period. Italy and Ireland started almost from scratch whereas the UK and Austria had a recycling rate of 25–35 % in 1997. For plastics, Austria again has a much higher level of 20–30 %, while the other four countries increased recycling by some 10–12 %. It is also clear that plastic is by far the most difficult material to recycle.

New and higher directive targets have been set for 2008. The 12 EU Member States without a derogation have to achieve a minimum rate of 55 % for recycling and 60 % for recovery. Material-specific targets for recycling have also been set: glass 60 %; paper and cardboard 60 %; metal 50 %; and plastics 22.5 %.

Of the five countries, only Austria already meets the 2008 recycling target of 55 % and Austria and Denmark meet the recovery target. However, most of the recovery in Denmark is at municipal incineration plants, taking advantage of the special agreement made in the revision process, but not complying with the new definition of recovery of the European Court ([30]). Nevertheless, it has been a common understanding since 1994 that the recovery target includes incineration at incineration plants, as expressed in the revised directive.

The overall view is that if industry is involved in the implementation and design of the packaging waste management systems, it more likely to support the system and improve the system's performance.

9.6 Costs of systems

The costs used in this analysis are the turnover or financing need of the compliance schemes since this appears to

([28]) ETC/WMF (2004).
([29]) E.g. from Italy (CONAI). Regarding reduction in total quantities, see the website of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, http://www.bmu.de/en/800/js/topics/waste/waste_drinks/.
([30]) Definition: The European court has ruled that the principal objective of a municipal waste incinerator was to dispose of waste and that its EU classification should therefore be waste disposal.

Table 35 Overview of financing of packaging waste management

	Austria	Denmark	Ireland	Italy	UK
Financing by households	n.a.	Financed via general waste charge from households.	Partly financed via general waste charge from households.	Partly financed via general waste charge from households.	Financed via general tax.
Financing by industry/companies:					
Household packaging waste	CS pay for the services of local authorities and private operators.	n.a.	CS contribute to funding of collection systems.	CS pay a subsidy to cover the extra costs of collecting packaging waste compared with the original system.	n.a.
Commercial packaging waste	Companies that are member of CS pay a fee depending on amount and type of packaging material. Optional to self-comply.	Collected if economically competitive. Companies pay the costs of collecting their PW.	Companies that are member of CS pay a fee depending on amount and type of packaging material. Optional to self-comply.	All companies pay membership fee to CS. Companies that are members of CS pay a fee depending on amount and type of packaging material. Others can self-comply.	All companies pay registration fee to the environment authorities. Companies buy a certain amount of PRN/PERNs depending on where they are in the packaging chain. If member of a CS, the CS will manage the obligation to meet targets on their behalf.

Note: CS — compliance scheme(s).

be the best available information on costs. Compliance schemes are typically non-profit organisations which base their tariffs on the actual expenditure incurred for the collection, sorting and recovery or recycling of the individual packaging materials.

However, the costs of compliance systems do not necessarily cover the same kinds of expenses since systems may differ: some may cover all collection and recovery/disposal costs and others only the extra costs associated with recycling and recovery. Systems may also have a different focus on particular streams such as commercial or household packaging waste.

The administration cost of the public authorities and the cost of companies that do not participate in the compliance scheme (self-compliers or free riders) are not included in the financing need. Many local authorities also collect packaging waste (either separately or as part of mixed municipal waste) and all these costs may not be included. Thus, expenses in one country cannot be compared directly with those in another.

Table 35 gives a comparison of how the systems are financed. As regards household packaging waste, Austrian households do not pay for collection; the costs in Ireland, the UK and Italy are shared by households and compliance schemes; and households in Denmark cover all costs themselves.

For commercial packaging waste (secondary and tertiary) costs are borne by the industry itself but requirements differ between countries. Austrian members of a compliance scheme have to bring transport packaging waste to certain collection points, and Irish companies are required to segregate packaging waste arising on their premises. In Denmark, companies only collect commercial packaging waste if they generate a sufficient amount per year and if it is economically competitive to recycle it.

The cost level of the Austrian ARA system is the highest of the five countries examined. The system was criticised for being inefficient, for the fees being too high and for the system not being open enough to competition. The government attempted to comply with this by amending the

Packaging Ordinance in 1996 through the introduction of a measure of competition and the possibility of price controls. Since then, licence fees have been reduced several times and total costs have fallen by 20 % since 1997.

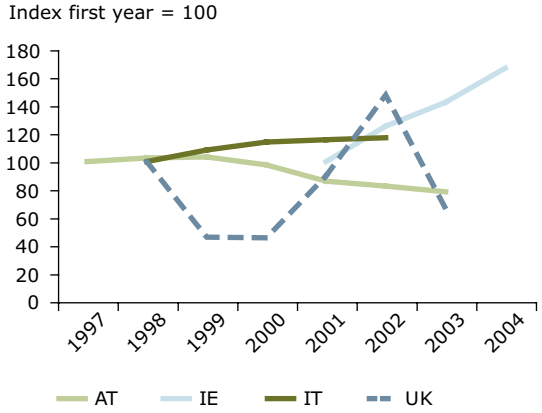
In Ireland, the cost of Repak has increased by almost 60 % in four years, and and a further increase will take effect from 2005. The increase is hardly unexpected as Ireland is still in the process of establishing separate collection systems and expanding its recycling and treatment capacity. Although it has not been proved, it could be argued that the lack of recovery options has led to higher system costs, as recycling in general is considered more expensive than recovery. Nevertheless, the cost is very low compared with Austria.

The Italian compliance scheme CONAI only pays a subsidy where the market does not regulate itself. In other words, the fees cover only the extra cost of collecting packaging waste compared with the original system. Total costs increased by some 20 % between 1998 and 2002 despite the fact that the environmental contribution (fees for each material) has remained constant since 1998.

The fluctuating prices of PRNs in the United Kingdom (see Figure 9) makes it difficult to conclude whether or not total costs are increasing. The cost level appears to be the lowest of the four countries with a compliance scheme. However, this statement should be treated with a degree of circumspection since several costs, such as the registration fee, are not included in the official figures. Meeting the 2008 targets will require much more separate collection of packaging waste from households than is the case today, which will increase the cost of the entire system.

The actual costs per tonne of packaging waste collection in different countries cannot be compared because of difficulties of definition, but some relative changes in the costs of compliance systems are presented in Figure 9.

Figure 9 **Change in cost of compliance schemes compared with the first year with available data**



Note: The figure presents indexed values which cannot be compared between separate schemes, i.e. index 100 is not the same absolute cost for all schemes. Moreover the base year for the index is not identical for all countries.

Denmark does not have a compliance scheme, and no cost information on the system is available. The system relies on market-based principles in that companies have an incentive to recycle waste in order to avoid paying the waste tax on incineration and landfilling. Thus, packaging waste is presumed to be recycled when it is cheaper to do that than to incinerate or landfill it.

In summary, the total cost of implementing a packaging waste management system does not seem to have been calculated by the countries. Only the cost of compliance schemes is publicly available. Lack of transparency has made it impossible to estimate the total cost and compare it between countries.

10 Conclusions

This work was a pilot evaluation of policy effectiveness. The conclusions therefore relate to what it has revealed about the effectiveness of packaging waste policies in the selected countries, and what has been learned from the application of this methodology for evaluating policy effectiveness.

Effectiveness of selected packaging waste management systems

- The targets of the packaging directive were generally met, but not the directive's priority of preventing the production of packaging waste. Most measures related to recycling and recovery. Because the manufacture of packaging accounts for a large share of its environmental impacts, measures to reduce the generation of packaging have greater potential to reduce overall environmental impacts than the management of the waste alone. However, this principle must be balanced with overall resource efficiency, costs and internal market obligations.
- At country level, packaging waste generation in Austria has stabilised but continues to increase in the other countries investigated. Despite absolute increases in packaging waste generation, all countries except Italy achieved a relative decoupling of generation and economic growth. However, the associated error margins are not quantified.
- There are indications that packaging waste management systems are reaching their upper limits in several countries. In general, the higher recycling rates are, the more it is necessary to collect fractions which are less suitable for recycling. At country level, specific reasons differ: Austria's comprehensive and well-established system is levelling out. Denmark and the UK, whose systems target self-contained waste streams such as commercial and transport packaging, will need to increase focus on other waste streams to obtain further increases in recycling levels. Although the expense of moving from more self-contained, easily-targeted waste streams to households may appear considerable, it is a move that can have disproportionately large benefits in terms of public education and awareness.
- Institutional factors are as important as the measures themselves. The extensive influence of industry and the national authorities — together with little involvement of local authorities and NGOs — is a consistent finding across all five countries.
- There was little information on the cost-effectiveness of the systems, and the available data were not comparable between countries. However, this reflected the institutional decisions taken by countries: the fees of some compliance schemes include all costs (Austria), while others serve merely as an intervention to enhance the attractiveness of the recycling option (Italy), supplemented by local authority support. There were indistinguishable overlaps between costs borne by local authorities and compliance schemes.

Lessons learned from the pilot study

- The importance of very precise scoping and formulation of the study, its objectives and its timescale, cannot be overstated. This is both fundamental, and easily underestimated. Such precision is particularly difficult when analysing complex systems that have several different — indeed, conflicting — objectives, and when the subject is a product whose functions change at different stages of its life-cycle, from product protection during transport, to marketing, to ease of recycling.
- Despite six years of quantitative reporting requirements, the study was hampered by data limitations. Packaging waste data alone are not sufficient for an evaluation of the effectiveness of packaging waste policies. Detailed information on costs, and on the institutional structures involved in each system, are also required.
- A nuanced understanding of governance and institutional hierarchies is needed both to do the institutional analysis, and to interpret it. The institutional analysis allows the distribution of responsibility to be described. Characterising a given

system according to the distribution of responsibilities between the institutions and organisations involved is especially useful (and rarely possible). The study's approach — examining a number of Member States in detail — allows this institutional information to be elucidated. Limitations include the difficulty of seeking out the right people to interview, given that a decade has elapsed since transposition.
- Evaluation of effectiveness, if done properly, is time-consuming and resource-intensive. This is partly accounted for by the interview process and the thorough country-level consultations.
- There is no established methodology for evaluating policy effectiveness. This study's balance between quantitative (response indicators) and qualitative (institutional analysis) elements is not necessarily appropriate for other subjects. In such forays away from reliance on objective data, thorough consultation on the work is essential.

The approach of this study — to examine how some Member States implement certain EU policies, investigating the country's institutional and national policy context — has proved to be a useful one. Its main strength lies in its detailed examination of the systems that are in place at country level, and the resulting elucidation of some of the features that work well. The result is a complex picture; the development of each national system tells its own story. However, this complexity provides a powerful explanation of where trends arise from, what they actually mean, and where they may be going.

10.1 Discussion

10.1.1 The challenge of evaluating contrasting objectives

The EU's waste management policies are inevitably a compromise between two conflicting sets of objectives: environmental goals, and internal market goals.

This makes it difficult for countries to put measures in place to fulfil these conflicting requirements. It also makes the objectives and measures difficult to evaluate. A policy designed exclusively for environmental goals would be very different to one designed exclusively for internal market goals. Bringing both aims together means that neither can be achieved optimally. Environmental objectives at the EU and Member State level can also be conflicting, an example being the difficulties experienced by some countries in establishing reuse systems.

This is a cautionary point for future evaluations of effectiveness: policies with very different objectives are difficult to implement and even more difficult to evaluate.

10.1.2 Questionnaire and institutional analysis

The questionnaire, and the institutional analysis that was done on the basis of the information that it provided, were very important elements of the project. However, they were also difficult to design and time-consuming to carry out. One of the main lessons learned from the process was that the questionnaire should be relatively short; trial runs were useful in refining the questionnaire, revealing questions that were similar enough to be merged, or which could be removed, rephrased, or reordered. A second was that person-to-person interviews are strongly preferred, particularly when discussing institutional and governance issues on which the interviewee may have strong subjective opinions.

10.1.3 Limitations of the work

This was is one of two **pilot studies** on the evaluation of policy effectiveness. As a pilot, the depth of analysis was limited, and some points regarding these limitations are discussed below.

Rather than including all aspects of the REM framework, the most concrete elements at the core of the framework were emphasised, i.e. cutting out wider sustainability considerations, justice, societal benefits, etc. It was decided that to include such wider impacts would stray too far from the EEA's greatest strength: reliable data.

From the point of view of society as a whole, the real net cost of achieving the packaging directive's targets is only the amount spent in addition to what would have been spent had the waste been managed as it would have been in the absence of the directive. At the onset of the study, attempts were made to estimate the true costs, but it was decided that it was too complex to arrive at

sufficiently accurate estimates within the scope and resources of the study.

Ideally, cost-effectiveness should take into account possible loss of competitiveness on the part of producers, and there may be hidden costs to retailers, packers and fillers. Environmental measures can also promote innovation and stimulate the adoption of cost-effective reductions in resource use. However, these factors are difficult to quantify and were therefore beyond the scope of the study.

10.1.4 Statistics on packaging

In 1997 the Waste Unit of DG Environment conducted a study ([31]) which highlighted the differences in methodologies used by EU Member States to calculate the amount of packaging waste generated. It identified three categories of methodologies:

- A calculation of packaging placed on the market, taking into account the quantities of packaging manufactured and of empty and filled packaging imported and exported;
- A calculation of packaging placed on the market from direct measurement, usually by businesses, of packed/filled packaging;
- A calculation based on the consumption of products.

The DG Environment study evaluated the methodologies, and concluded that although no methodology was significantly superior to the others, the approach based on direct measurement of the packaging placed on the market was marginally preferable. According to the study, very few countries seemed to base their calculation on products.

A study conducted for the Nordic Council of Ministers (Kaysen and Jakobsen, 2003) concluded that differences 'in the packaging consumption per capita can be caused by several factors. Firstly, differences can exist in the composition of the goods and in the distribution conditions of the goods. Secondly, the interpretation of what can be regarded as packaging varies from country to country, and thirdly the individual countries may use different calculation principles in connection with the estimation of the packaging consumption.'

A general assumption in packaging statistics is that packaging placed on the market in any given year is assumed to become waste during that year.

For the countries included in the present study, the **Irish** packaging statistics take their point of departure in waste generation, as the amount of packaging is estimated on the basis of the amount of packaging waste landfilled and recovered. The approaches in **Austria** and the **UK** seem to be a combination of point of waste generation, and packaging production. The compliance schemes receive reports from members on the quantities of packaging waste collected, while self-compliers provide information on the amount of non-licensed packaging placed on the market. **Italy** and **Denmark** calculate the generation of packaging using the first category of the calculation methods: packaging produced plus imported packaging minus exported packaging.

The statistical approach used and the definition of packaging are clearly relevant when calculating the amount of packaging generated in a country as well as for the ability to compare quantities among countries. The quantity and type of packaging material generated also influence whether and at what cost the targets of the packaging directive can be met. However, analysing the impacts of these differences was beyond the scope of this study.

10.1.5 Future work in this area for the European Environment Agency

The context in which this pilot study was conducted was one of the development of capacity for policy effectiveness evaluation within the EEA.

Other activities that form part of this development, and into which lessons learned from the study will feed, include:

- A review of international studies on the evaluation of effectiveness and cost-effectiveness, elucidating examples of good practice;
- The development of practical guidelines and more consistent methodological approaches to the evaluation of policy effectiveness;

([31]) European Commission (2003d), BIPE study.

- Further studies, including one on the effects of the landfill and incineration directives in selected Member States, and the use of economic instruments in the area of natural resource usage.

Environmental impacts were not the primary concern of this particular study. The main area of interest was the policy consequences of having to meet quantitative targets. Separating the effects of policies from those of other factors is very difficult, and this is why impacts have not been systematically treated in this study: establishing clear causal links between a system's outcomes and the ultimate environmental impacts of that system remains a difficulty in policy effectiveness evaluation.

It is possible to translate outputs into environmental impact categories, using state-of-the-art data on emissions and including information on changes in private consumption expenditure, size of households, population, commercial prices of recycled materials, and many other issues. Consistent approaches to this need to be developed in order to characterise these wider environmental impacts. There is a need for reliable, comparable information about the effects that policies are having, and the EEA should attempt to respond to this need in future work.

Although the ideal scope for the study would appear to be the **whole EU**, the level of in-depth institutional investigation and the extent of understanding of governance and relationships between relevant organisations needed for such a study are such that time and resources would preclude it. However, some Member States may be interested in applying the analysis to their own countries, and the EEA would support such initiatives.

References

Andersen, M. S. *et. al.* (1997). *The Waste Tax 1987–1996 — an* ex-post *evaluation of incentives and environmental effects*. Working Report from the Danish Environmental Protection Agency.

Andersen, M. S. (1999). *Governance by green taxes: implementing clean water policies in Europe 1970–1990*. Economics and policy studies, Springer-Verlag.

ACP (2003). *The Recommendations of the Advisory Committee on Packaging — June 2003*. Web: http://www.DEFRA.gov.uk/environment/waste/topics/packaging/pdf/acp_report_june03.pdf

APAT (2003). *Rapporto Rifiuti 2003*. Agenzia Per La Protezione Dell'Ambiente E Per I Servizi Tecnici. Roma, November 2003.

Austrian Federal Environment Agency (2001). *Bundes-Abfallwirtschaftsplan Bundesabfallbericht 2001*

Austrian Chamber of commerce (2003). *Annual report on the implementation of the voluntary commitment*. Web: http://wko.at/up/enet/Selbstverpflichtung/bericht2002.pdf

Austrian Parliament Inquiry, ZI. 13.500/81-I 3/2003. *Schriftl. parl. Anfr. d. Abg. z. NR Dr. Eva Glawischnig, Kolleginnen und Kollegen vom 10. Juli 2003, Nr. 674/J, betreffend skandalöser Vorgänge in der österreichischen Abfallwirtschaft*. 9. September 2003.

Bundesministerium für Umwelt, Jugend und Familie (1999). *Wiederbefüllung, Verwertung und ernergetische Nutzung von Getränkeverpackungen 1997*, Vol. 5/1999.

Bongaerts, J. and Kemp, R. (2000). *The implementation and technological impact of the Packaging and Packaging Directive (94/62/EC) in France, Germany and Finland*. Synthesis report for TEP. Technology and Environmental Policy, European Commission Framework Programme IV (1994-98) and European and Climate Programme of DGXII. November 2000.

CEC (2003). Common Position (18/2003 EC) adopted by the Council on 6 March 2003 with a view to adopting Directive 2003/…/EC of the European Parliament and of the Council of … amending Directive 94/62/EC on packaging and packaging waste.

Collins, C., Meaney, B., Nolan, K., *et al.* (2004). *National Waste Database Interim Report 2002* Environmental Protection Agency, Wexford, Ireland: 2004. Web: http://www.epa.ie/TechnicalGuidanceandAdvice/NationalWasteDatabase/.

CONAI (1999). *Guide to CONAI membership and to the application of the Environmental Contribution – New facultative and simplified procedures from 1st January 2000*. November 1999.

CONAI (2002a). *Annual report 2002*. Web: http://www.conai.org/hpmdoc.asp?iddoc=130.

CONAI (2002b). *Relazione sulla Gestione*. Web: http://www.conai.org/hpmdoc.asp?iddoc=133.

CONAI (2003). *The European System of Packaging Waste Management 2 – The National Systems of Member States – 15 Dossiers*. Research Project edited by Edizione Ambiente, Milan November 2003. Web: http://www.conai.org/hpmdoc.asp?iddoc=133.

CONAI (2004a). *Dossier prevenzione. Progetti e soluzioni per imballaggi ecocompatibili*. Milan, May 2004. Web: http://www.conai.org/helloportal.asp?http://www.conai.org/hpm01.asp?CgiAction=Display&IdCanale=123&IdNotizia=503&IdSession.

CONAI (2004b). *Programma generale di prevenzione e gestione degli imballaggi e dei rifiuti di imballaggio*. Milan 2004. Web: http://www.conai.org/helloportal.asp?http://www.conai.org/hpm01.asp?CgiAction=Display&IdCanale=123&IdNotizia=503&IdSession.

Danish EPA (1986). Cirkulære nr. 107 af 24/06/1996 om bekendtgørelse om indsamlinger fra erhvervsvirksomheder

Danish EPA (1987). *Cirkulære nr 4 af 09/01/1987 om bekendtgørelse om kommunale indsamlinger af genanvendelige materialer og produkter fra private husstande.*

Danish EPA (1992). *Kommunale indsamlingssystemer for glasemballage fra husholdninger, Miljøprojekt Nr. 733* 2002.

Danish EPA (1994a). *Aftale om genanvendelse af transportemballage, 16 August 1994.*

Danish EPA (1994b). *Voluntary agreement on PET.* 14 September 1994.

Danish EPA (1996). *Statusnotat vedrørende transportemballageaftalen*. 28 May 1996.

Danish EPA (1998). *Genanvendelse af transportemballager af plast.* Vejledning fra Miljøstyrelsen nr. 1 1998.

Danish EPA (1998b). *Statusnotat vedrørende transportemballageaftalen*. February 1998.

Danish EPA (1999a). *Waste Management Plan 1998-2004, Affald 21* (Waste 21).

Danish EPA (1999b). *Effects of the Increase in the Danish Waste Tax - with special focus on waste from industry and commerce*. Working Report from the Danish EPA No. 23 1999.

Danish EPA (2000a). *Statutory Order no. 619 of 27 June 2000 from the Ministry of Environment and Energy on waste.*

Danish EPA (2000b). *Statusnotat vedrørende transportemballageaftalen*. March 2000.

Danish EPA (2002a). *Kommunale indsamlingssystemer for glasemballage fra husholdninger*. Miljøprojekt Nr. 733.

Danish EPA (2002b). *Statutory Order no. 713 of 24 August 2002 from the Ministry of Environment on deposits and collection etc. of packaging for beer and certain soft drinks.*

Danish EPA (2002c). *Statusnotat vedrørende t ransportemballageaftalen*. 25 November 2002.

Danish EPA (2002d). *Emballageforsyningen i Danmark 2000.* Miljøprojekt Nr. 696.

Danish EPA (1990-2001). *Materialestrømsanalyser for returpapir.*

Danish EPA (1990-2001). *Materialestrømsanalyser for metalemballage 2000-2001.*

Danish EPA (2003a). *Waste Management Strategy 2005-08, Affaldsstrategi 2005-08.*

Danish EPA (2003b). *Statistik for plastemballage 2001.* Miljøprojekt Nr. 842.

Danish EPA (2003c). *Statistik for metalemballage 2001*. Miljøprojekt Nr. 829.

Danish EPA (2003d). *Statistik for glasemballage 2001.* Miljøprojekt Nr. 826.

Danish EPA (2003e). *Udvikling og afprøvning af indsamlingskoncepter for genanvendelse af transportemballager*. Miljøprojekt 841.

Danish EPA (2003f). *Affaldsstatistik 2002*. Orientering fra Miljøstyrelsen Nr. 6 2003.

Danish EPA (2003g). *Emballageforsyningen i Danmark 2001.* Miljøprojekt Nr. 831.

Danish Ministry for the Environment (1999). '*Strategi for PVC-området. Statusredegørelse og fremtidige initiativer*'. Web: http://www.pvc.dk/billeder/Lovstof/RegeringensPVCstrategi.doc.

Danish Ministry of Taxation (2001). *Consolidated Act no. 101 726 of 13 February 2001 on taxes on certain types of packaging, bags, disposable tableware and PVC foils*.

Danish Ministry of Taxation (2003). *Lov om ændring af lov om afgift af øl, vin og frugtvin m.m. samt emballageafgiftsloven (Konkurrenceforbedring for visse grænsehandelsvarer) LOV nr. 1217 af 27/12/2003.* (Act revising Consolidated Act no. 101).

Dansk Retursystem A/S (2003). *Årsrapport 2003*. Web: http://www.danskretursystem.dk

DEFRA (2000). *Waste strategy 2000 for England and Wales Part 1 & 2*. Web: http://www.defra.gov.uk/.

DEFRA (1998). *Review of the Producer Responsibility Obligations (Packaging Waste) Regulations 1997— A Consultation Paper*. Published 7 August 1998. Web: http://www.DEFRA.gov.uk/environment/consult/pwreg97.

DEFRA (1999). *The Producer Responsibility Regulations (Packaging Waste) Regulations 1997: A Forward Look for Planning Purposes.* Department for Environment, Food and Rural Affairs, 28 July 1999.

DEFRA (2000). *Waste strategy 2000 for England and Wales Part 1 & 2*. May 2000.

DEFRA (2003a). *The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 (as amended) — The User's Guide*. Department for Environment, Food and Rural Affairs, The Scottish Executive and The National Assembly for Wales. 2nd edition 2003.

DEFRA (2003b). *Packaging changes recommended by advisory committee*. Web: http://www.DEFRA.gov.uk/news/2003/030613e.htm. News release, 13 June 2003.

DEFRA (2003c). *Communication from the Commission 'Towards a thematic strategy on the prevention and recycling of waste'*. United Kingdom Government Response, November 2003.

DEFRA (2004a). *Q18. Are the compliance costs placed on businesses obligated under the Packaging Regulations excessive?*. FAQ From DEFRA's wesite: http://www.DEFRA.gov.uk/environment/waste/topics/packaging/faq.htm.

DEFRA (2004b). *Producer Responsibility Obligations (Packaging Waste).*

DEFRA (2004c), *Regulations 1997 (as amended) — Data Note*'. July 2004. Web: http://www.DEFRA.gov.uk/environment/waste/topics/packaging/data.htm.

DoEHLG (2002). *Preventing and recycling waste: delivering change. A policy statement.* Government Publications Office, Dublin.

Dolan, B. (2004). *Personal communication with Bill Dolan, Chartered Waste Manager, Collections Services Manager, Repak Ltd.*

ECOLAS-PIRA (2005). *'Study on the implementation of Directive 94/62/EC on Packaging and Packaging Waste and Options to Strengthen Prevention and Reuse of Packaging*'. Web: http://europa.eu.int/comm/environment/waste/studies/packaging/050224_final_report.pdf.

EEA (1999). *Baseline projections of selected waste streams — Development of a methodology.* Technical report No 28.

EEA (2001a). *Reporting on environmental measures: Are we being effective*? Environmental issue report no 25.

EEA (2001b). *Paper 1: Defining criteria for evaluating the effectiveness of EU environmental measures. Towards a new EU framework for reporting on environmental policies and measures (Reporting on environmental measures - 'REM')*. Environmental issue report No 25. Web: http://reports.eea.eu.int/rem/en/defining.pdf.

EEA (2002). *Case studies on waste minimisation practices in Europe*. EEA Topic Report No. 2/2002.

EEA (2005, forthcoming). *Effectiveness of urban wastewater treatment policies in selected countries: an EEA pilot study*.

Environment Agency of England and Wales (2003). *Compliance Monitoring Strategy for 2003. 29 April 2003*. Web: http://www.environment agency.gov.uk/commondata/105385/2003strategyfinal_523412.pdf.

EPA of Ireland (2000). *National Waste Database Report for 1998*. Environmental Protection Agency. Web: http://www.epa.ie/TechnicalGuidanceandAdvice/NationalWasteDatabase/.

EPA of Ireland (2001). *National Waste Database, Factsheet Series 2001, 3: Packaging Waste*. Environmental Protection Agency, Wexford, Ireland. Web: http://www.epa.ie/TechnicalGuidanceandAdvice/NationalWasteDatabase/.

ETC/WMF (2003). *Response indicators for waste prevention in the OECD*, Draft, September 2003.

ETC/WMF (2004). *Prospective analysis on waste and material flows*. Draft report.

European Commission (1997a). Commission Decision 97/138/EC of 3 February 1997 establishing the formats relating to the database system pursuant to European Parliament and Council Directive 94/62/EC on packaging and packaging waste.

European Commission (1997b). Commission Decision 97/622/EC of 27 May 1997 concerning questionnaires for Member States reports on the implementation of certain Directives in the waste sector (implementation of Council Directive 91/692/EEC).

European Commission (1999). *The New Programming Period 2000-2006: methodological working papers, Working paper 3, Indicators for monitoring and evaluation; An indicative methodology*. DG XVI. Web: http://europa.

eu.int/comm/regional_policy/sources/docoffic/working/doc/indic_en.pdf.

European Commission (2000). *Cost-efficiency of packaging recovery systems. The case of France, Germany, the Netherlands and the United Kingdom.* Final report. Taylor, Nelson, Sofres Consulting, DG Enterprise, February 2000.

European Commission (2001). *European Packaging Waste Management Systems*. Argus in association with ACR and Carl Bro A/S. Final Report February 2001.

European Commission (2002a). *Working Document on Packaging Data, Committee for the adaptation to Scientific and Technical Progress of Directive 94/62/EC on Packaging and Packaging Waste*. Brussels, 8 July 2002.

European Commission (2002b). Press release from the European Commission, 19/12/2002 (IP/02/1922).

European Commission (2002c). Communication for the Commission from the president and Mrs Schreyer (2002). Evaluation standards and good practice, C(2002)5267 - 23.12.2002.

European Commission (2003a). *Evaluating EU activities, A practical guide for the Commission Services*, November 2003.

European Commission (2003b). *Evaluation of costs and benefits for the achievement of reuse and recycling targets.* RDC and PIRA, March 2003.

European Commission (2003c). *Towards a thematic strategy on the prevention and recycling of waste.* Communication from the Commission. COM(2003)301 final, 27 May 2003.

European Commission (2003d). *Working document on packaging data.* Committee for the adaptation to scientific and technical progress of Directive 94/62/EC on packaging and packaging waste, October 2003.

European Packaging and Waste Law (2002a). Issue No. 96. 1 April 2002.

European Packaging and Waste Law (2002b). Issue No. 98. 1 June 2002.

European Packaging and Waste Law (2002c). Issue No. 102. 1 November 2002.

European Packaging and Waste Law (2003a). Issue No. 106. 7 April 2003.

European Packaging and Waste Law (2003b). Issue No. 107. 6 May 2003.

European Packaging and Waste Law (2003c). Issue No. 111. 6 October 2003.

European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Eurostat/OECD Joint Questionnaire (2002).

Eurostat. The New Cronos Data Base – Free Data. Web: http://europa.eu.int/comm/eurostat/.

Hawkes, A. (2004). Personal communication with Adrian Hawkes, Valpak. August 2004.

Hochreiter, W. (2004). Personal communication with Werner Hochreiter, the Austrian Chamber of Labour. August 2004.

Kaysen, O. and Jakobsen, J. (2003). *A survey of Nordic Packaging Data Collection Methods*. TemaNord 2003:562, Nordic Council of Ministers: Copenhagen 2003. Web: http://www.norden.org/pub/miljo/miljo/sk/TN2003562.asp.

Kaysen, O. (2003). *Statistik for glasemballage 2001*. Miljøprojekt 826, 2003. Web: http://www.mst.dk/udgiv/Publikationer/2003/87-7972-772-7/pdf/87-7972-773-5.pdf

Keri, C. (2004). Personal communication with the Ministry of Environment in Austria.

Lauber, V. and Ingram, V. (2000). 'Packaging Waste' in *The voluntary approach to environmental policy. Joint environmental policy-making in Europe.* Eds: Mol, A., Lauber, V. and Liefferink, D. New York, Oxford University Press, p. 104.

OECD (2003). Environmental Performance Reviews – Austria. Web: http://www.oecd.org/document/22/0,2340,en_2649_34307_19414806_1_1_1_1,00.html

Perchards, FFact Management Consultants and SAGIS Ltd. (2004). *Study on the progress of the implementation and impact of Directive 94/62/EC on the functioning of the internal market: Interim report*. Volume 1: main report. Web: http://www.europa.eu.int/comm/enterprise/environment/interim_report.pdf.

Puopolo, G. and Sistilli, A. (1997). *Recycling of Packaging Materials — The Ronchi Decree*. Puopolo, Sistili, Geffers & Luise, March 1997. Web: http://www.eco-web.com/cgi-local/sfc?a=editorial/index.html&b=editorial/02945-02.html.

Rendan A/S. Materialestrømsanalyser for returpapir, 1990–2001.

Repak (2003). *Repak Grows Recycling Tonnages by 36% in 2002 - Organisation Allocates Over 15 Million Euro to Recycling in 2002*. Press Release dated 26 May 2003. Web: http://www.repak.ie/news/03-05-26.html.

Riddick, K. R. (2003). *UK Implementation of Directive 94/62/EC on Packaging and Packaging Waste. A Critical Assessment of the UK model designed to deliver the Directive's mandatory recovery targets*. Thesis, January 2003.

Simeone, M.G., Mazzanti, M., and Zoboli, R. (2003). *Policy-response indicators for packaging waste policy*. Preliminary draft, November 2003.

Strobl, B.L. and Langford, I.H. (2002). *UK Implementation of the EU Packaging Waste Directive: Can a Market Based System Achieve Economic and Environmental Goals?* CSERGE Working Paper ECM 02-02.

Stutz, J. (2002a). *Developing Waste Prevention Indicators*. Draft, OECD.

Stutz, J. (2002b). *Drivers for Waste Generation*. Draft, OECD.

Teknologisk Institut (1999). *Statistiske data om affald og genanvendelse i Danmark 1997. Materialestrømsanalyser for glasemballage 1998–2001.*

The Environment Exchange (2004). *PRN prices — 1998-2003 history*. Web: http://www.t2e.co.uk/asp/main_hist.asp.

UK S.I. No. 648 (1997). *The Producer Responsibility Obligations (Packaging Waste) Regulations of March 1997.*

UK S.I. No. 1165 (1998). *The Packaging (Essential Requirements) Regulations 1998*. Revoked by S.I. No. 1941 (2003).

UK S.I. No. 1361 (1999). *The Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations 1999.*

UK S.I. No. 3447 (1999). *The Producer Responsibility Obligations (Packaging Waste) (Amendment) (No.2) Regulations 1999.*

UK S.I. No. 3375 (2000). *The Producer Responsibility Obligations (Packaging Waste) (Amendment) (England and Wales) Regulations 2000.*

UK S.I. No. 732 (2002). *The Producer Responsibility Obligations (Packaging Waste) (Amendment) (England) Regulations 2002.*

UK S.I. No. 3294 (2003). *The Producer Responsibility Obligations (Packaging Waste) (Amendment) (England) Regulations 2003.*

UK S.I. No. 1188 (2004). *The Packaging (Essential Requirements) Regulation 2004.*

Waste Watch Waste Online (2004). *History of Waste*. Web: http://www.wasteonline.org.uk/resources/InformationSheets/HistoryWaste.htm.

Wollny, V. (2000). *Hundreds of packaging free riders.* ENDS Report No. 306, London, July 2000.

World Bank (2003). *World Development Indicators 2003*.

Glossary of abbreviations and definitions

Abbreviations

APAT	L'Agenzia per la protezione dell'ambiente e per i servizi tecnici, the Agency for Environmental Protection and Technical Services, Italy
ARA	Altstoff Recycling Austria AG, Austria's packaging compliance scheme which organises and finances the collection and recycling of packaging waste
CONAI	Consorzio Nazionale Imballagi, the National Packaging Waste Decree, Italy
Dakofa	Dansk Komité for Affald (Dakofa), the Danish Waste Management Association
DEFRA	UK — Department for Environment Food and Rural Affairs
DoEHLG	The Department of the Environment, Heritage and Local Government, Ireland
GDP	Gross Domestic Product
PRN/PERN	UK Producer-responsibility obligations require demonstration of compliance with recovery and recycling obligations through presentation of Packaging Waste Recovery Notes (PRNs) or Packaging Waste Export Recovery Notes (PERNs)
Repak	Ireland's packaging compliance scheme, established by voluntary agreement between industry and the Department of Environment.
SEPA	Scottish Environment Protection Agency
Valpak	The largest packaging compliance scheme in the UK, with over 50 % of total packaging compliance market
WRAP	Waste & Resources Action Programme, UK

Definitions

Decoupling	Occurs if the growth rate of an environmental pressure is less than the growth rate of a given economic driving force (e.g. GDP) over a certain period of time. Relative decoupling occurs when an environmental pressure continues to grow, although at a slower rate than the underlying economic driver. Absolute decoupling is when an environmental pressure is decreasing in a period of economic growth
Disposal of packaging waste	'Disposal' refers to any of the applicable operations provided for in Annex II.A to the Waste Framework Directive 75/442/EEC, including landfilling and incineration at waste incineration plants with energy recovery, if the main purpose of the operation is to dispose of the waste

Environmental impacts	Impacts on human beings, ecosystems and man-made capital resulting from changes in environmental quality
Financing Need	Gross costs minus revenue from the sale of secondary raw materials or energy. The financing need refers to the funds that need to be injected into the market in order to make recovery economical (and thus to ensure that it takes place)
Free riders	Those who are gaining by not paying fees to a compliance scheme
Green Dot	The Green Dot is a registered trademark that is applied to product packaging. It indicates that a company has transferred its obligation for the collection and recovery of material to a packaging compliance scheme. The Green Dot Programme is currently the standard take-back programme in 21 European countries and Canada
Gross costs of recovery	All costs from the point when packaging become waste, to the point when it becomes a recycled product or turns into energy
Gross Domestic Product (GDP)	The total output of goods and services produced by a national economy in a given period, usually a year, valued at market prices
Management of packaging waste	The Waste Framework Directive 75/442/EEC states that 'management' shall mean the collection, transport, recovery and disposal of waste, including the supervision of such operations and after-care of disposal sites
Net Costs for Society	The financing need minus the saved disposal costs. Depending on the material and the circumstances, recovery may be cheaper or more expensive than disposal
Organic recycling	According to the packaging directive, 'organic recycling` refers to the aerobic (composting) or anaerobic (biomethanization) treatment, under controlled conditions and using micro-organisms, of the biodegradable parts of packaging waste, which produces stabilized organic residues or methane. Landfill shall not be considered a form of organic recycling
Prevention of waste	Includes both quantitative and qualitative prevention: quantitative prevention refers to a reduction of the amount of waste generated; qualitative prevention refers to a reduction of the hazardousness of waste generated. According to the packaging directive, 'prevention' refers to the reduction of the quantity and of the harmfulness for the environment of materials and substances contained in packaging and packaging waste, and packaging and packaging waste at production process level and at the marketing, distribution, utilization and elimination stages, in particular by developing 'clean` products and technology
Recovery of packaging waste	According to the packaging directive, 'recovery` refers to any of the applicable operations provided for in Annex II.B to Directive 75/442/EEC, recycling and incineration with energy recovery, if the main purpose of the operation is to replace alternative fuels. 'Energy recovery` refers to the use of combustible packaging waste as a means to generate energy through direct incineration with or without other waste but with recovery of the heat. The packaging directive includes targets for packaging waste recovery and incineration at waste incineration plants with energy recovery. For reasons of readability, the term recovery is used in this report to include both recovery and incineration at waste incineration plants, even if not explicitly indicated

Recycling	Reprocessing in a production process of the waste materials for the original purpose or for other purposes including organic recycling but excluding energy recovery
Reuse of packaging waste	According to the packaging directive, 'reuse` is any operation by which packaging, which is intended to accomplish within its life cycle a minimum number of trips or rotations, is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market enabling the packaging to be refilled; such reused packaging will become packaging waste when no longer subject to reuse
Self compliers	Those who are meeting targets without the assistance of a compliance scheme. Some countries have a system for registering self-compliers, but others do not. There is uncertainty in some cases about the extent of self compliers' ability to meet legal requirements. It is not known what the exact share of self compliers is, or whether they fulfil targets for packaging waste management
Waste hierarchy	According to the packaging directive, the Community strategy for waste management set out in Council resolution of 7 May 1990 on waste policy and Council Directive 75/442/EEC of 15 July 1975, the management of packaging and packaging waste should include as a first priority, prevention of packaging waste and, as additional fundamental principles, reuse of packaging, recycling and other forms of recovering packaging waste and, hence, reduction of the final disposal of such waste

Annex 1: Questionnaire

In order to obtain information on institutional factors in the design and implementation of the packaging waste management systems, a comprehensive series of interviews has been undertaken. For each of the five countries, four to six interviews were carried out. The questionnaire consists of eight topics with three to eight questions in each. For each of the eight topics the interviewee is asked about his/her assessment of:

1. Status of the transposition of the directive.
2. The role of the interviewee's organisation and other actors in connection with the transposition of the directive.
3. The effectiveness of the directive.
4. Applicability of the measures and the system in practice.
5. Quality of national data on packaging waste.
6. Implications of the structure of the country's institutions for the transposition of the directive and the present operation of the packaging waste system.
7. Implications of national conditions on the transposition of the directive.
8. Important changes if the rules or the organisation of the packaging waste management system were to be amended.

The questions require both qualitative and quantitative answers. The qualitative answers typically relate to questions regarding the interviewee's perception of the transposition or performance of the system, whereas the quantitative answers are structured through a scoring system from one to ten, which is used to underpin the statements of the interviewee. The scoring system is used to evaluate e.g. influence of actors relative to each other. Finally, a number of questions require the interviewee to evaluate specific conditions of the system with regard to whether they have been a support or a barrier to the established system. All questions are based on the interviewee's opinion, and should thus reflect the views of the interviewee or the respective organisations.

The full text of the questionnaire is presented below.

The interviews were conducted as telephone interviews. Partners of the ETC/WMF identified actors that would be relevant to contact in the respective countries ([32]). Following this, the person to be interviewed was contacted by the ETC/WMF in order to inquire into their willingness to participate and, if positive, to set a date for the interview. The ETC/WMF forwarded the questionnaire in advance to allow for preparation for the interview.

Some actors declined the invitation to participate since the questions were too demanding with regards to their (historical) knowledge of the design and implementation of the system. In Table 1A a list of the actors contacted is presented. As not all actors were interested in participating, the table also lists the reason for the decline.

Table 1A shows that most of those contacted in Denmark, Austria and Italy were willing to participate. Two in Denmark had some doubts whether they were able to answer the questionnaire in a sufficient manner. This problem was resolved by contacting other actors with similar positions towards the packaging waste management system.

Questionnaire for telephone interview on effectiveness of packaging waste management systems: text of request to participate in questionnaire

As part of a general focus on the effectiveness of environmental directives, the European Topic Centre on Waste and Material Flows is conducting an analysis of the effectiveness of the packaging waste management systems in five countries. The analysis applies to the

([32]) The Province of Salzburg was suggested by the Chamber of Labour.

Table 1A Stakeholder interviewed for the institutional analysis

Country	Contact persons	Organisation	Status
Austria	Christian Keri	Ministry of Environment	Interview done
	Hermann Koller	ARA	Interview done
	Werner Hochreiter	Chamber of Labour	Interview done
	Prof. Gerhard Vogel	University of Vienna	Interview done
	Wilfried Mayr	Province of Salzburg	Interview done
Denmark	Helge Andreasen	Environmental Protection Agency	Interview done
	Lars Blom	The Danish Plastics Federation	Interview done
	Henrik Wejdling	Danish Waste Association, Dakofa	Interview done
	Merete Kristoffersen	EPA City of Copenhagen	Interview done
	–	Danish Commerce & Services	Declined*)
	–	COOP (retailer)	Declined*)
	–	The Danish Society for the Conservation of Nature	Declined*)
Ireland	Brendan O' Neill	Dept. of Environment, Heritage & Local Government	Interview done
	Dorothy Maxwell	Enterprise Ireland	Interview done
	Carla Ward	Dun Laoghaire Rathdown County Council	Interview done
	Frank Corcoran	An Taisce	No reply received
	Bill Dolan	Repak	Interview done
Italy	Fabrizio De Poli	Ministry of Environment	Interview done
	Rosanna Laraia	APAT	Interview done
	Walter Facciotto	CONAI	Interview done
	Stefan Ciafani	Legambiente	No reply received
United Kingdom	James Biott	Department for Environment, Food & Rural Affairs (DEFRA)	Interview done
	Jeff Cooper	Environment Agency	Interview done
	Karen Riddick	SEPA Corporate Office	Interview done
	Adrian Hawkes	Valpak Limited	Interview done
	Alice Roberts	Local Government Association	Interview done
	Doreen Fedrigo	Waste Watch	Interview done

*) Declined because questions were too specific.

systems established to comply with the intentions of the directive and to the effectiveness of these systems.

The five countries included in the analysis are Austria, Denmark, Ireland, Italy and the United Kingdom.

Part of this analysis is a series of interviews with selected actors that presumably have followed the process of transposition of the directive and its effectiveness.

This is the reason why we would like to carry out an interview with you.

The Directive 94/62/EC on Packaging and Packaging Waste was adopted in December 1994.

The general purpose of the directive was
To harmonise national measures for the management of packaging and packaging waste

To prevent impacts on the environment, and
To ensure the functioning of the internal market

Furthermore, the environmental objectives of the directive were
To prevent the production of packaging waste
To promote reuse of packaging
To promote recycling and recovery of packaging waste, and

To reduce landfilling of packaging waste.

The objective of the directive for year 2001 was a rate of recycling of 25–45 % and a rate of recovery of 50–65 % of total packaging waste generation. Moreover, for each of the packaging materials paper and cardboard; metals, glass and plastics the objective was to achieve 15 % recycling.

We do not expect that you will have a clear answer to *all* the following questions, as the questionnaire is directed at several different types of actors.

Please notice, that the questionnaire focuses on two aspects: a) the transposition of the directive into national legislation; and b) the actual efficiency of the national, packaging waste management system.

The Topic Centre is one of five topic centres of the European Environment Agency. For further information, please visit our website: http://waste.eionet.eu.int/

Kind regards,
Mette Skovgaard
Project manager

Topic: 1

How do you assess the status of the transposition of the directive?

1-1: First I would like to hear whether in your view the directive is today fully transposed in the (country)? — and if not, what is outstanding?

1- 2: State with a number from 1 to 10 (10 being highest score), to which extent you believe that the directive is formally transposed in the (country): _____

1-3: Have the intentions of the directive been satisfied through the transposition in the (country)? — and if not, what is outstanding?

1-4: State with a number from 1 to 10 (10 being highest score), to which extent you believe that the intentions of the directive have been satisfied through the transposition in the (country): _____

Topic 2:

How do you see your (your organisation's) role and that of others in connection with the transposition of the directive

a) in the national waste regulation (i.e. design of rules and division of responsibilities) and
b) implementation of the ensuing waste management system
a) transposition of the directive in the national waste regulation

2-1: In which way have you or your organisation been involved in the design of the rules and division of responsibilities behind the system that has subsequently been established in your country?

2-2: State with a number from 1 to 10 (10 being highest score), to which extent you find that you or your organisation has had the *opportunity to* influence the design of the rules and distribution of responsibilities that are behind the system that was subsequently established in your country: _____

2-3: State with a number from 1 to 10 (10 being highest score), to which extent you find that you or your organisation have *actually* had influence on the design of the rules and distribution of responsibilities that are behind the system that was subsequently established in your country: _____

b) implementation of the ensuing waste management system

2-4: In which way have you, or your organisation, been involved in the subsequent concrete implementation of the system for packaging waste?

2-5: State with a number from 1 to 10 (10 being highest score), to which extent you find that you or your organisation have had the *opportunity to* influence the actual implementation of the system in the (country): _____

2-6: State with a number from 1 to 10 (10 being highest score), to which extent you find that you or your organisation have *actually* influenced the actual implementation of the system in the (country): ____

2-7: In your view, which actors have been involved in the actual implementation of the system in the (country) — and was this influence positive, negative or neutral for the result in your view?

		YES — were involved			**NO — were not involved**	**DO NOT KNOW**
		positive	**negative**	**neutral**		
1	Central authorities					
2	Regional authorities (municipalities/counties)					
3	Industrial organisations					
4	Enterprises					
5	Experts from universities or similar					
6	Environmental organisations (NGOs)					
7.	Retailers					

2-8: State with a number from 1 to 10 (10 being highest score), to which extent you find that other actors have actually had influence on the actual implementation of the system in the (country) — state a number for each actor:

	Degree of actual influence (from 1-10)
1. Central authorities	
2. Regional authorities (municipalities/counties)	
3. Industrial organisations	
4. Enterprises	
5. Experts from university or similar	
6. Environmental NGOs	
7. Retailers	

2-11: In your view, are there any imbalances in the system that may originate from certain stakeholders having achieved particular advantages — e.g. in the form of exemptions or dispensations?

Topic 3:

How do you assess the effectiveness of the directive?

3-1: In your view what are the most important effects (both positive and negative) of the transposition of the directive in your country?

3-2: State with a number from 1 to 10 (10 being highest score) to which extent a positive effect has been achieved so far on the following parameters:

1. More effective packaging waste management
2. A cost-effective system
3. A fair system in economic terms
4. An effective preventative effort towards packaging waste
5. An optimum recovery of packaging waste
6. An overall positive environmental impact
7. A well-functioning organisation of waste management in the packaging field
8. A system promoting the overall objectives of the directive
9. A system promoting the environmental objectives of the directive

3-3: Has the transposition of the directive been a barrier to measures that would have been better in your opinion, e.g. in terms of economy or the environment?

Topic 4:

In your view how do the instruments and the system work in practice?

Instruments: (national instruments listed here)

4-1: In your view, are there problems with the instruments introduced to meet the intentions of the directive? — including conflicting instruments?

4-2: State with a number from 1 to 10 (10 being highest score) to which extent there is an optimal coherence between the instruments introduced and the overall system in your opinion?: _____

4-3: State with a number from 1 to 10 (10 being highest score) the useful value of the instruments introduced for the following parameters — state a number for each parameter:

1. More effective packaging waste management
2. A cost-effective system
3. A fair system in economic terms
4. An effective preventative effort towards packaging waste
5. An optimum recovery of packaging waste
6. An overall positive environmental impact
7. A well-functioning organisation of waste management in the packaging field
8. A system promoting the overall objectives of the directive
9. A system promoting the environmental objectives of the directive

4-4: State with a number from 1 to 10 (10 being highest score) to which extent the instruments introduced motivate the following actors into taking responsibility for achieving compliance with the environmental objectives:

1. Packaging manufacturers
2. Manufacturing industries
3. Industrial organisations
4. Retailers
5. Householders
6. Waste operators
7. Waste treatment facilities

Topic 5:

How do you assess the quality of national data on packaging?

5-1: In your view, are there elements in the packaging waste system introduced that has created barriers to the generation of reliable data?

5-2: State with a number from 1 to 10 (10 being highest score) how valid national packaging data reported to the EU Commission is in your view: _____

Topic 6

Which implications has the structure of your country's institutions had for the transposition of the directive and the present operation of the packaging waste system?

6-1: Has there been a positive or negative impact on the transposition due to special conditions in the way the *national institutions and authorities are organised* — e.g. the distribution of responsibilities between the different public authorities?

6-2: State with a number from 1 to 10 (10 being highest score) to which extent you find that the way the national institutions and authorities are organised has caused problems for the transposition of the directive: _____

6-3: State with a number from 1 to 10 (10 being highest score) to which extent you find that the way the national institutions and authorities are organised has caused the operation of the system to work less efficiently than it should: _____

6-4: Has there been a positive or negative impact on the transposition due to special conditions in the way the *cooperation between the state and commerce and industry* works?

6-5: State with a number from 1 to 10 (10 being highest score) to which extent you find that the way the cooperation between the authorities and commerce and industry works has caused problems for the transposition of the directive: _____

6-6: State with a number from 1 to 10 (10 being highest score) to which extent you find that the way the cooperation between the authorities and commerce and industry works has caused the operation of the system to work less efficiently than it should: _____

6-7: Please indicate in the following table to which extent different conditions have been a support or a barrier to the *efficiency of the established system* in the (country).

Condition	Support		Neither/ nor	Barrier	
	High	Low		Low	High
1. Legislation introduced					
2. Responsibility for transposition in legislation					
3. Responsibility for implementation of ensuing instruments					
4. Cooperation of authorities in the process					
5. Interplay between authorities and industrial organisations					
6. Interplay between authorities and other organisations					
7. Interplay between authorities and producer organisations established					
8. Interplay internally between industrial organisations and/or enterprises					
9. Distribution of roles in the introduced system					
Other:					

Topic 7:

Which implication have other national conditions had for the transposition of the directive?

7-1: Problems with the transposition of the directive and the design of the system for packaging waste management may be due to other matters than the way the national institutions and authorities are organised or the way the authorities cooperate with industry and commerce. Do you find that such other conditions have come into play?

7-2: Has the directive been transposed within the deadline of 30 June 1996? — if not, what are the main reasons in your view?

Topic 8:

Which changes would you find important if it were possible to amend the rules or the organisation of the packaging waste management system?

8-1: If you were to put forward three concrete proposals for changes in the way the packaging waste management system is organised, which changes would you focus on? — and on which grounds?

8-2: If you were to put forward three concrete proposals for changes in the rules behind the packaging waste management system, which changes would you focus on? — and on which grounds?

Annex 2: Text of Annex II of the packaging directive

1. Requirements specific to the manufacturing and composition of packaging: Packaging shall be so manufactured that the packaging volume and weight be limited to the minimum adequate amount to maintain the necessary level of safety, hygiene and acceptance for the packed product and for the consumer.
- Packaging shall be designed, produced and commercialised in such a way as to permit its reuse or recovery, including recycling, and to minimise its impact on the environment when packaging waste or residues from packaging waste management operations are disposed of.
- Packaging shall be so manufactured that the presence of noxious and other hazardous substances and materials as constituents of the packaging material or of any of the packaging components is minimised with regard to their presence in emissions, ash or leachate when packaging or residues from management operations or packaging waste are incinerated or landfilled.

2. Requirements specific to the reusable nature of packaging: the following requirements must be simultaneously satisfied.
- The physical properties and characteristics of the packaging shall enable a number of trips or rotations in normally predictable conditions of use.
- There should be a possibility of processing the used packaging in order to meet health and safety requirements for the workforce.
- When the packaging is no longer reused and thus becomes waste, the requirements specific to recoverable packaging should be fulfilled.

3. Requirements specific to the recoverable nature of packaging:

a) Packaging recoverable in the form of material recycling: Packaging must be manufactured in such a way as to enable the recycling of a certain percentage by weight of the materials used into the manufacture of marketable products, in compliance with current standards in the Community. The establishment of this percentage may vary, depending on the type of material of which the packaging is composed.

b) Packaging recoverable in the form of energy recovery: Packaging waste processed for the purpose of energy recovery shall have a minimum inferior calorific value to allow optimisation of energy recovery.

c) Packaging recoverable in the form of composting: Packaging waste processed for the purpose of composting shall be of such a biodegradable nature that it should not hinder the separate collection and the composting process or activity into which it is introduced.

d) Biodegradable packaging: Biodegradable packaging waste shall be of such a nature that it is capable of undergoing physical, chemical, thermal or biological decomposition such that most of the finished compost ultimately decomposes into carbon dioxide, biomass and water.

European Environment Agency

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