

# **Policies to promote the waste management hierarchy**

**With special attention to the paper cycle in Europe**

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14 September 2001

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## 1. Introduction

In many countries in the world, the waste management hierarchy (see Figure 1.1) has been taken as a key element in waste management policy. Especially in Europe, the hierarchy is widely applied as a guiding principle. The hierarchy, is based on environmental principles, and implies that waste, depending on its characteristics, should be handled by different methods: a certain amount should be prevented by either reducing the content of waste or by reusing the waste, another share of the waste stream needs to be converted into secondary raw materials, some parts can be composted or used as a source of energy, and the remaining may be landfilled.<sup>1</sup>

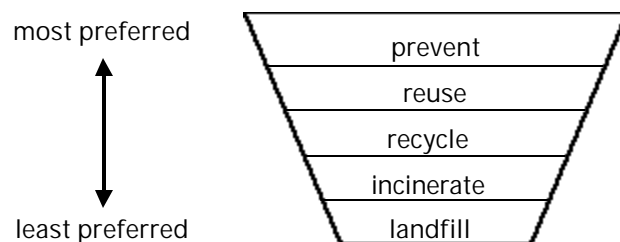


Figure 1.1 The waste management hierarchy.

A large set of policy instruments is available to promote the waste management hierarchy. These include economic, legislative, social and institutional instruments. The type of instruments applied by individual countries to endorse the waste management hierarchy varies widely. For example, in a country like the Netherlands, voluntary agreements between industries and the government such as covenants are considered one of the most influential policy tools. In the United Kingdom, on the other hand, great importance is given to landfill taxes. This brings up the question of which instruments are most effective in promoting the waste management hierarchy and whether it is desirable to apply different sets of instruments in different countries.

The main objective of this report is to review the policy instruments available to promote aspects of the waste management hierarchy. To illustrate the functioning and appropriateness of these instruments, the European paper cycle is used as an example. Special emphasis is placed on where in the hierarchy each instrument intervenes. Due to the limited means available to conduct this study, the report is not intended to cover the complete range of waste management and recycling related policies. Also in certain cases examples of policy instruments will be provided based on application outside Europe or the paper cycle.

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<sup>1</sup> It should be realised that the hierarchy has always been subject to fierce criticism. For example, many believe that the options presented in the hierarchy should not be ranked in a particular order but considered as a 'menu' of alternatives. "It is not a question of good and bad waste management options. Rather, each option was equally appropriate under the right set of conditions addressing the right set of waste stream components" (Schall, 1995).

The report is structured as follows. Section 2 provides an overview of the European paper cycle and presents the main variations in the waste hierarchy for solid waste, and for the paper cycle specifically, across EU countries. Section 3 describes the three broad categories of policy instrument: economic, direct regulatory and communicative instruments. An overview of the subtypes of instruments in each category is given, and these subtypes are illustrated by providing examples from the European paper cycle. In section 4 criteria for the evaluation of policy instruments are outlined and economic, direct regulatory and communicative instruments are evaluated and compared accordingly. Finally general conclusions are drawn.

## 2. The European paper cycle

The appropriateness of policy instruments is partially tested by looking at the effectiveness of the policy measures. One main indicator of effectiveness is the extent to which the waste management hierarchy is attained in a country. To conduct such a test, two difficulties arise. First, the most preferred option in the hierarchy – prevention – is rather difficult to measure because the baseline scenario is unknown (what would have happened without policy intervention?). Second, for the paper cycle itself it is difficult to create an overview of the allocation of the waste management hierarchy. Although aspects of recycling are known for paper, more generic activities such as landfilling and incineration are not expressed for paper as a separate material but rather as waste in general.

### 2.1 Variations in the waste hierarchy across Europe

Table 2.1 shows the variety of the configuration of the waste management hierarchy throughout Europe for solid waste in general. The countries are ranked on the basis of their share of landfilled municipal solid waste. Note that the base year differs across countries. Denmark, the Netherlands and Switzerland reveal the lowest landfilling shares. Italy and the UK perform poorly according to the waste management hierarchy. On the one hand, these differences may be the result of the implementation of different waste management and recycling policy instruments. On the other hand, the variation in the Europe-wide hierarchy may be the natural consequence of country specific conditions such as demographics, culture and economic prosperity.

Table 2.1 Waste management hierarchy in Europe.

	Year	Landfill	Incineration	Composting	Recycling
Denmark	1996	0.11	0.58	0.02	0.29
Netherlands	1998	0.12	0.42	0.07	0.39
Switzerland	1996	0.13	0.45	0.11	0.31
Sweden	1997	0.30	0.36	0.08	0.26
Austria	1996	0.35	0.17	0.14	0.34
France	1993	0.49	0.39	0.06	0.06
Germany	1993	0.54	0.18	0.05	0.23
Norway	1995	0.62	0.15	0.01	0.22
Spain	1997	0.74	0.06	0.17	0.03
Italy	1997	0.80	0.07	0.10	0.03
UK	1996	0.85	0.06	0.01	0.08
Average Europe	n.r.	0.60	0.19	0.07	0.14

Source: Resource Recovery Forum (2000)

### 2.2 Variations in the paper cycle across Europe

A similar dispersed pattern emerges if we focus on the European paper cycle in particular (see Table 2.2). The first two columns depict the recovery and the utilisation rate, respectively. The recovery rate is the amount of secondary material domestically recovered

for recycling purposes as a share of the total level of the disposal that particular commodity in a country. Because statistical cross-country information on disposal levels is not available, consumption of the particular commodity is used. In this case, the recovery rate of paper is the total amount of recovered wastepaper divided by the total amount of paper consumption in a country. The utilisation rate is the amount of secondary material used as a share of the total production of that final commodity in a country. In the case of paper the utilisation rate is the total amount of wastepaper consumed divided by the total amount of paper produced in that country. Similar to the overall waste management situation, the large range of recovery and utilisation rates may be caused by policy instruments as well as country-specific conditions.

*Table 2.2 Recycling performance in European paper cycle (1996)*

Country	Recovery Rate	Utilisation Rate	Per capita paper consumption (kg)	Per capita paper production (kg)
Austria	0.73	0.42	181	457
Germany	0.71	0.60	189	180
Sweden	0.66	0.17	194	1,002
Netherlands	0.65	0.71	198	187
Denmark	0.54	1.23	228	64
Finland	0.44	0.06	327	2,088
France	0.41	0.49	159	145
Spain	0.41	0.74	133	94
UK	0.40	0.70	194	105
Belgium	0.39	0.27	263	133
Portugal	0.39	0.31	84	103
Greece	0.33	0.87	83	32
Italy	0.31	0.51	145	122
Average Europe	0.55	0.45	176	204

Source: compiled from Pulp and Paper International (1997)

In the following chapter an overview of the various types of policy instruments is provided. Examples of specific applications of these instruments illustrate the variety of waste management and life cycle policies in Europe.



### 3. Policy instruments

The success of any waste management and recycling policy depends on changes in the behaviour of producers and consumers. Authorities can try to bring about these changes by means of various instruments. Unfortunately, there is no generally accepted standardised classification of waste management and recycling policy instruments. However, there is some agreement that three broad categories of environmental policy instruments can be distinguished (Opschoor and Turner 1994, p.10):

- *Economic instruments*: instruments which affect the market conditions under which people and firms make their decisions, without directly reducing the decision space available to them.
- *Direct regulative instruments*: instruments that influence the range of alternatives by means of prohibition, restrictions or obligations. Certain public investments such as the provision of infrastructure and facilities may broaden the range of available alternatives and therefore also belong to this category. An alternative term for this category is 'command-and-control' regulations.
- *Communicative instruments*: instruments aimed at voluntary adaptations of individual and group behaviour in a more environmentally friendly (read recycling enhancing) direction.

#### 3.1 Economic instruments

Economic instruments have the shared characteristic of providing incentives to economic agents to act in a more environmentally sound manner. In terms of waste policy, economic instruments alter the value of some element of the waste process, allowing decisions to be made that reflect the full social cost of the particular activity. This approach can be described as internalising the external costs and benefits associated with the waste process. Within the category of economic instruments, a distinction can be made between various subtypes (Kuik et al. 1997):

- *Charges and taxes*, making polluting and waste generating behaviour more expensive. Charges and taxes can be levied at various stages of the waste process and include: product charges, collection charges, disposal charges and emissions charges.
- *Subsidies and other types of financial support* (such as tax reductions), which makes environmental-friendly behaviour relatively cheap. For example, it may reward waste prevention and recycling.
- *Tradable rights/permits* (to produce a certain amount of waste). Rights are tradeable to allow reductions in the polluting activity to be undertaken by the lowest cost processes.
- *Deposit-refund systems*, in which a deposit for a potential waste product is paid by the purchaser, who can claim a refund after returning the product. In this way the product keeps a value, even if it has become useless to the economic agent that bought it, thereby preventing uncontrolled dumping. It is recognised that this tool is only applicable to a small part of the waste stream.

Next, several examples of economic instruments in the European paper cycle are given.

*Charges and taxes*

Collection charges for solid waste are widespread but are mostly flat rate charges rather than differentiated according to the volume of waste produced. An increasing number of local authorities, however, are introducing progressive or differentiated taxation systems based on the quantity of waste. For example, waste collection in Einzkrise, Germany uses waste bins equipped with an electronic identification system that identifies the volume of waste collected. Inhabitants are charged according to the volume of waste and also the collection frequency. Another example of a variable collection charge system is that of Mouscron in Belgium. Household waste is collected for an annual charge but inhabitants are allocated a fixed number of collection bags. Additional bags can be purchased at a relatively high price (Bernhiem, 1998).

A further example of a variable charge waste collection system is provided by an experiment in the town of Weert, in the Netherlands in 1997, where large waste containers were built underground in residential areas. These bins are fitted with electronic measuring equipment and users were given electronic cards which opened the bins. This system enables users to be charged according to the weight of waste that they dispose. The experiment was seen to be successful as it reduces the space needed and the visual impact of conventional bins. For householders it also means that they no longer have to find space for a large bin in their homes and it removes the need to store waste in the home for a weekly collection. This system has become integrated into national policy because of its popularity and effectiveness. In 1998, 4,000 underground bins were installed, and it is planned that 8,000 bins will be developed every year (Wastewatch 2000).

Waste disposal taxes are used in a number of countries to produce an incentive for waste prevention and recycling. Taxes for waste disposal are used in Austria, Denmark and Belgium, the Netherlands and the UK. The level of tax varies greatly across countries, for example, the landfill taxes in the UK and Denmark in 1998 were between €4-10 and €28-35 per tonne, respectively (Wilson, 1995)<sup>2</sup>.

Most waste disposal taxes are hypothecated, in that revenues are used for waste management. For example, revenue from the UK landfill tax may be diverted to registered Environmental Bodies (EBs) through a credit system, up to a ceiling of 20% of an operator's overall tax liability. A landfill operator donating £100 to a registered Environmental Trust can then claim back £900 from their landfill tax liability, bringing the donation to a total of £1000. A regulatory body regulates donations and approves EBs.

Projects carried out by EBs that are assisted through the Landfill Tax Credit Scheme must perform at least one of a number of waste management objectives (Wastewatch 2000). These objectives include (1) research, development and education on recycling; (2) waste prevention; (3) the use of energy from waste; (4) the collection and dissemination of information regarding the development of products from the recycling of waste, and; and (5) The development of markets for recycled products.

Belgium introduced a system of ecotaxes in 1993 aimed at encouraging reuse and recycling. Exemption from the tax is granted to products which operate a Deposit Refund

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<sup>2</sup> The UK landfill tax has been increased significantly since 1998 and a value of 15 pounds per tonne is proposed for 2004.

System (at or above predetermined reuse rates) and for products meeting certain recycling targets. This ecotax can also be seen as a non-compliance fee for not meeting the reuse and recycling rates in that it is intended to be avoided. This mechanism has faced some criticism because the target levels are essentially arbitrary and are unlikely to be optimal in terms of the marginal cost of abatement being equal to the marginal damage cost (Bernhiem 1998).

#### *Subsidies*

In Europe there are many subsidy programmes for technological improvements in waste processing facilities and for the development of waste management infrastructure in general. In France for example, grants are available for the installation of equipment for eliminating toxic and dangerous wastes, and producers may also be refunded treatment costs (Potier 1977). 'Recycling credits', preferred purchase policies and other demand-side agreements, however, are becoming less common. The UK operates a recycling credit system, Denmark has a preferred purchase policy and the Netherlands has a fixed price scheme for voluntarily collected waste paper (Wilson 1995).

#### *Tradeable permits*

Under the UK packaging waste regulations, businesses that have recovery and recycling obligations can either collect adequate proof of compliance or obtain an official 'packaging waste recovery note' (PRN) from an accredited reprocessor. A PRN is a tradable certificate demonstrating that the reprocessing of a certain tonnage of waste has taken place. If the supplier of waste packaging does not require the PRN, the reprocessor can retain it and trade it to non-obligated parties. Businesses can purchase sufficient PRNs to meet their obligations, but as they are tradable (and can be purchased by anyone) their price is determined by market forces (Wastewatch 2000).

#### *Deposit-refund schemes*

Deposit refund systems have been a widely used instrument in waste reduction, typically applied to beverage containers. Austria, Germany and the Netherlands have recently introduced deposit-refund schemes for plastic bottles (Wilson, 1995). Germany has established a mandatory deposit refund system for packaging materials that do not meet with recycling targets. From January 1998 the recycling target for paper packaging is 72% (IPTS 1996).

### **3.2 Direct regulatory instruments**

Regulatory instruments are policy mechanisms that influence the range of alternative activities by means of prohibition, restrictions or obligations. Several types of direct regulatory instruments, relevant for the European paper cycle, can be identified:

- *Emission standards*: regulatory instruments specifying the allowable emission per time unit.
- *Design standards*: regulatory instruments specifying process characteristics, such as the maximum allowable level of pollutants in waste water effluents.
- *Licences*: direct regulatory instruments that oblige licence holders to conform to certain environmental standards and rules.

In Europe, examples of each of these regulatory instruments can be found:

#### *Emission standards*

In 1997 the UK set specific recovery rates for packaging waste for a certain category of producers. The motivation for these regulations is the EC Directive 94/62/EC which sets mandatory recovery and recycling targets of 50% and 25% respectively, with 15% being set as the minimum recycling rate for each packaging material. These regulations are designed to place the responsibility for the environmental costs of waste on those who use or produce it.

In this respect, packaging waste is the only waste currently subject to producer responsibility regulation in the UK. The regulations place obligations on businesses which satisfy the following criteria: (1) Annual turnover in excess of £5 million (this drops to £2 million in 2000), (2) Handle in excess of 50 tonnes of packaging per annum. Obligated businesses must recover specified tonnes of packaging waste and recycle given amounts of each packaging material handled. The following materials are covered by the regulations: paper and fibreboard, glass, steel, aluminium and plastic (wood and other packaging are included from 2000). Material sent to incineration with energy recovery can be included in the recovery targets but not the recycling targets. Another obligation under the regulations involves registering as a producer with the relevant agency.<sup>3</sup>

In 1993 France introduced regulations requiring that any producer or importer whose consumer products are sold in packaging has to contribute to or be engaged in the recovery of 75% of all packaging wastes by the end of 2002. To achieve this target a private company (Eco-emballages) has been created to act as a bridge between the following participants in the system for reprocessing packaging waste: the producers and importers of consumer packaging, the local authorities and the packaging materials recycling industry. More specifically, Eco-emballages provides common services for packaging waste collection and recovery and to provide financial assistance to local authorities participating in the programme. Producers and importers who participate in the programme pay a fee on marketed packaging (initially ranging from 10 to 0.1 centimes according to packaging type). In return these products are awarded with a certifying label, the Green Point (OECD 1993).

In 1991 Germany introduced regulations which mandate that 80% of all packaging waste be collected, and that 64% (80% of the 80%) be recycled by the year 1995. A private collection system was established to facilitate recycling, called the Duales System Deutschland (DSD). Under the DSD, packaging producers are charged a fee based on the weight and type of material used in the packaging. The DSD is then responsible for the collection, sorting and delivery of materials to the raw materials industry. The packaging

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<sup>3</sup> In this respect, obligated businesses have two options: (1) They can individually register with the Environment Agency or the Scottish Environmental Protection Agency and meet their targets by paying waste management companies and reprocessors to carry out the recovery and recycling of their packaging waste. (2) They can join a compliance scheme, which will take on their legal obligation and exempt them from prosecution for non-compliance. A number of compliance schemes have now been approved by the Environment Agency and the Office of Fair Trading.

products of participants in the DSD can be identified by a green dot. Participants pay a license fee for the green dot, which initially ranged between zero and 0.10 Euros per packaging unit (Nash 1995).

Denmark has prohibited the landfilling of combustible waste since 1997. The impact of this regulation on the use of incineration, i.e. the extent to which incineration has been substituted for landfill, is uncertain due to a lack of data. It is assumed, however, that the prohibition gives a strong incentive for the recycling of building and construction waste, and that it is also related to the increase in new biogas installations (Jong 1999).

#### *Design standards*

In Europe, the EC Recycling Forum is considering the idea of minimum requirements for recycled content of some products. In the UK, a proposed draft bill appeared suggesting a recycled content of 80% for newspapers from the year 2010 (ENDS 1998).

#### *Licences*

The Environment Agency for England and Wales operates a licensing programme covering the depositing, recovery and disposal of all controlled wastes. The term 'controlled household, commercial and industrial wastes (either solid or liquid).

There are certain exemptions from the need for a licence; for example, most individuals disposing of their personal garden waste would normally be exempt. To hold a licence applicants must fulfil a number of criteria. Some applicants may also have to demonstrate 'technical competence' i.e. by holding a Waste Management Industry Training and Advisory Board (WAMITAB) certificate.

The holding of a licence imposes a Duty of Care on persons who produce, import, carry, keep, treat or dispose of controlled wastes. Those subject to the Duty of Care must seek to: (1) prevent the escape of waste; (2) ensure waste is transferred only to an 'authorised person' or to a person for 'authorised transport purposes'; (3) ensure during the transfer of waste that a written description of the waste is given; and (4) prevent persons disposing, treating or storing controlled waste either without a licence; in breach of a licence condition or in a manner likely to cause pollution or harm to health (Wastewatch 2000).

### **3.3 Communicative instruments**

Communicative instruments are aimed at voluntary adaptations of individual and group behaviour in a more environmentally friendly (read recycling enhancing) direction.

Broadly, two types of communicative instruments can be distinguished:

- *Information and education*; research and demonstration, waste exchanges, ecolabelling, public awareness campaigns, public procurement (by which governments set an example by purchasing for example recycled products and thereby may pave the way for advanced products and technologies).
- *Covenants*: voluntary agreements.

Different types of communicative instruments are applied in the European paper cycle.

*Information and education*

There are potentially a large number of alternative uses for recycled materials. For example, paper can be used to produce animal bedding (CWC 1998). Without research and demonstration projects supported by the government, these alternative uses are often unlikely to become economic in the foreseeable future. Among others, the UK government already has a number of mechanisms for funding research work. Another example is the US Recycling Technology Assistance Partnership (ReTAP) programme that concentrates on the identification, development, and implementation of manufacturing applications for the use of post consumer and post-industrial recycled materials (CWC 2000).

The standardisation of wastepaper can also be considered a means of facilitating recycling activities in the European paper cycle. At present there are three main sets of standards; European, American and Japanese. Although the standardisation of grades within Europe has generated significant advantages in harmonised trading, there is presently very little interest to produce one worldwide set of standards. Nevertheless, the Bureau of International Recycling (BIR) has taken the first step in this direction (Ogilvie and Poll 1999).

Another information-based instrument is that of waste exchanges. Waste exchanges provide a means of putting producers and consumers of recyclable materials in touch with one another. In the last decade, it has become much easier for buyers and sellers to meet. This is mainly due to improved information technologies and the establishment of national and international networks. Formal trading systems alleviate uncertainty of international supply and prices of secondary materials. For example, the Chicago Board of Trade (CBOT) opened an international exchange for recyclables in the late nineties. CBOT's main objective is to reduce market uncertainty by developing futures markets for various materials, particularly wastepaper. Similar initiatives are planned in Europe.

Eco-labelling can also be considered an information-based instrument. The EU eco-labelling programme sets out criteria by which labels are awarded through the European Eco-label Organisation. The labels are awarded in a tiered system, with products meeting basic criteria being awarded one flower (the logo of the scheme), and products satisfying stricter criteria receiving two or three flower labels. The EU scheme is based on a life cycle approach and includes criteria related to production processes and re-use, recycling, and disposal of associated wastes. Examples of the eco-labelling criteria for tissue paper are: that all wood is sourced from sustainably managed forests and that load points for sludge from wastewater treatment and ash from combustion are used.

Public awareness campaigns are also a general way to inform the public about recycling. Public support and participation in waste processing can be pivotal in determining the path taken by domestic waste. This is particularly true for domestic waste recycling schemes, for which public involvement determines the volume of waste entering the recycling process. The role of public awareness campaigns is to increase public participation in waste management. Some of the more important design considerations for promotional campaigns include: targeting of the audience, clarity of the message and the use of different media.

The Royal Borough of Kensington and Chelsea, London has been operating a doorstep recycling collection since May 1993, but despite extensive publicity using conventional methods such as leafleting the service is under utilised and many residents are believed to have been unaware of the scheme. In response the “recycling roadshow” initiative was undertaken. This was a door-to-door approach to distributing information and also a means to gauging participation levels. The result was a 19% increase in quantity of waste recycled, although the recycling rate is still only 12%.

#### *Covenants/Voluntary Agreements*

The European Declaration on Paper Recovery is a voluntary agreement undertaken by the European paper industry to improve efforts within the industry regarding the protection of the environment. The signatories to the European Declaration on Paper Recovery are committed to achieving several objectives. First, to further reduce the production of waste during all processes in the paper and board life-cycle. Second, to further improve the efficient use of raw and auxiliary materials. Third, to optimise collection systems by sharing their expertise with those responsible for collecting recovered paper for recycling purposes. Fourth, improve technical and operational as well as environmentally benign solutions by simulating and supporting research and development. Fifth, increase the awareness of paper recycling by informing consumers about their role in closing the paper loop. And finally, to take the necessary measures to ensure that by the year 2005 at least 56% of paper and board products consumed in Europe are recycled.

The current signatories to the European Declaration on Paper Recovery are the Confederation of European Paper Industries (CEPI) and the European Recovered Paper Association (ERPA). The motivation of this declaration is to show that the paper industry is taking action to contribute to sustainable development on a voluntary basis.





## 4. Discussion

The applicability of this broad range of policy instruments is constrained by various factors (Kuik et al. 1997, p. 31). These factors form criteria to evaluate the appropriateness of waste management and recycling instruments. The following main categories can be distinguished:

- *Environmental effectiveness*: The main goal is to achieve certain goals and targets. If the policy measure is not effective in reaching its target, the instrument does not perform well. Therefore, the instrument should adhere to basic environmental principles such as ‘polluter pays’ and precaution
- *Administrative and institutional feasibility*: The instrument should fit in the existing institutional and legislative framework as much as possible. Moreover, the instrument should be technically and administratively feasible. Sufficient information should be available to implement the instrument;
- *Acceptability*: The instrument should have sufficient public support to prevent sabotage. Opposition to a particular instrument may raise enforcement costs and may therefore negatively affect overall effectiveness and efficiency of the instrument.
- *Economic efficiency*: The costs and other economic consequences of applying the instrument should be acceptable. With respect to efficiency a distinction should be made between static and dynamic efficiency. Instruments that operate well on the short term may have negative consequences on the long term, such as reducing incentives for technological innovations. Therefore, the instrument should preferably generate incentives for technological development.
- *Equity*: As a rule, policy instruments affect the distribution of income and wealth. Adverse effects for the lowest income groups should be avoided;

### 4.1 Conclusion on individual categories of policy instruments

On the basis of the above range of evaluation criteria, several general conclusions can be drawn for each category of policy instruments individually.

#### *Economic instruments*

As confirmed by other studies, such as OECD (1991), economic instruments related to waste management have several strong advantages: (1) They can yield substantial cost-savings by allowing polluters to determine the most appropriate ways of meeting a given standard. Therefore, they can deliver more sustainable waste management solutions; (2) They offer an ongoing incentive to reduce pollution below the levels determined by regulations. Among others this can be achieved through technological development. For example, they can provide incentives for producers and consumers towards waste prevention initiatives. (3) They increase flexibility. For authorities, it is often easier and faster to modify and adjust a charge than to change legislation or regulation; for polluters, the freedom to choose within an overall financial constraint is preserved. (4) They may provide a source of finance, which may either be directed to specific environmental programmes, or used as a significant instrument in overall fiscal policy. (5) They are justifiable because economic instruments strongly adhere to the polluter-pays principle.

Economic instruments also have a number of generally recognised disadvantages. The most important is that, if economic instruments are applied at local or national level, they may constitute barriers to trade. The only way to avoid such barriers is to implement economic measures at an international level. Especially in the European context this forms a complication because EU-wide measures require unanimity to vote these into effect within the EU. Therefore, economic instruments at the European level are almost certainly unattainable.

#### *Direct regulatory instruments*

Regulation is the most well established policy instrument in waste management and is likely to remain as the dominant policy tool (EC 1996). Regulatory instruments provide a significant degree of predictability in the level of the activity being controlled and so are particularly attractive when strict control of the pollutant is necessary. They may, however, not result in an optimal (least cost) distribution of abatement activity. Regulatory instruments are also unlikely to be dynamically efficient, in that once the particular standard has been reached there is no incentive to pursue further reductions in the polluting activity. Regulatory controls can, in principle be tailored to specific circumstances and also adjusted over time but the required level of information and administrative complexity generally prohibits this. Compliance, administration and monitoring costs tend to be high for regulatory instruments (EC 1996).

#### *Communicative instruments*

Information and educational instruments are a prerequisite for each waste policy package aimed at promoting the waste management hierarchy for the paper cycle in Europe. Educating children in schools about the benefits of wastepaper prevention and recycling raises 'aware' citizens for future generations. Moreover, by promoting waste exchanges the gap between demand and supply of wastepaper can be bridged in a relatively easy manner.

The success of voluntary agreements depends largely on the commitment of the parties involved and also on the credibility of the threat of alternative policy instruments in the event that the voluntary agreements are not honoured. A predilection for voluntary agreements is to some extent culturally determined. Germany for example, has a long experience of co-operative agreements between industry and the state, and this can be expected to foster the use of voluntary agreements. In general, however, voluntary agreements have tended to acquire a more compulsory nature. In Germany and the Netherlands for example, the current regulatory schemes grew out of voluntary agreements (EC 1996).

## **4.2 Comparison between categories of policy instruments**

Ideally, an evaluation of the above-identified waste management and recycling related policy instruments should take into account the complete range of the above criteria. However, several constraints exist that prevent the evaluation to be comprehensive and complete. The most important handicap is that the available information is insufficient to define the baseline of the waste management hierarchy for the paper cycle in Europe. In other words, what would have taken place in the absence of the instruments considered?

It is beyond the scope of this literature study to answer this question. Therefore, we rely on the few studies available comparing effectiveness between recycling systems in different countries.

Ogilvie and Poll (1999) identify several barriers that constrain paper recycling in the UK. These include the imbalance between UK consumption and production of wastepaper, the cost of recycled paper, the technical limits of recycled content and the high investment costs as well as the time required for additional recycling capacity. Given the broad range of constraints, they also suggest the implementation of a large variety of policy instruments (see Table 4.3). Technical problems should ideally be addressed through research and subsidies while the imbalance between supply and demand of wastepaper requires awareness campaigns and waste charges to be introduced. Alternatively, waste exchanges could bridge this gap.

*Table 4.3 Summary and evaluation of policy instruments.*

Instrument	Potential to promote recycling
Economic instruments	
Levies	*
Subsidies	*
Legislative instruments	
Standard – recycle	*
Standards – products	-
Legislation	-
Recycled content	**
Social instruments	
Buy recycled	**
Eco-labels	-
Institutional instruments	
Technology transfer	-
Waste exchanges	-
Trading recyclables	*

Source: based on Ogilvie and Poll (1999).

Note: Number of stars indicates relative significance.

Cagnot et al. (2000) make a comparison between the systems for packaging recycling in France, the Netherlands, Germany and the United Kingdom. They find the French and German system to be predominantly based on an administrative approach, i.e. the setting of a relatively detailed framework. The Dutch system relies to a large extent on voluntary agreements with industry and public authorities and does not differentiate between industrial and household packaging waste. Cagnot et al (2000) conclude that the German system achieves the highest recycling rates but also has the most costly system. The Dutch system fails to achieve similar recycling levels but due to the flexibility of the system is far less costly than the German system.

Cagnot et al. (2000) identifies several key factors that determine the cost-efficiency of recycling policies. The density of population is an important factor. Obligations to cover small and remote municipalities increase costs considerably. Environmental benefits, however, are reduced by higher transport distances only to a relatively smaller extent. Second, the quantity of materials recovered is a neutral factor. On the one hand econo-

mies of scale reduce the unit cost of the programme. On the other hand, the declining quality of the recovered materials increases the costs per unit of recovered waste. The overall conclusion of this study is that demographic differences cause different waste policies to have different impacts.

Recent research for the EC suggests that (Linher 2000): (1) High rates of taxes on land-filling and incineration have a significant positive effect on waste diversion from landfill. (2) Prevention is enhanced when taxes are also placed on the extraction of virgin materials. (3) At the municipal level, differentiated charging can improve local waste management. This study, therefore, emphasises the strength of economic instruments to be applied at a European level. No attention was given to the political handicaps of introducing EU-wide economic instruments.

### **4.3 Conclusion**

The main objective of this study was to review policy instruments available to promote aspects of the waste management hierarchy. The motivation of this review is embedded in two questions: (1) What policy instruments are most effective in promoting the waste hierarchy? and, (2) Should EU policies in the European paper cycle be harmonised? The time available to address these questions is too limited to come up with a comprehensive and all-encompassing answer. However, on the basis of the evidence summarised above, several broad conclusions can be drawn.

With respect to the first question, the most effective policy instrument to promote the waste hierarchy for the European paper cycle, it is concluded that none of the policy categories is sufficient to 'do the job' alone. Firstly, it is important to note that most of the policies reviewed in this study impact on only a small part of the waste hierarchy and so a range of policies are required to promote the full hierarchy. While this does not preclude the use of a single policy instrument, it does allow for different policy instruments to be applied to different elements of the hierarchy. Secondly, it is recognised that an appropriate balance needs to be struck between regulatory, economic and communicative instruments. Although economic and communicative instruments seem to be most in line with the EU principles of promoting the market economy, liberalising trade and educating its citizens, it is unlikely that these instruments eliminate the need for regulation in the area of waste management. Regulatory instruments provide a greater degree of certainty of outcome than other types of instrument. As well as there not being a single policy instrument category which can be described as most effective in promoting the waste hierarchy, it is also noted that there is not a unique combination of policy instruments which can be described as being 'most effective', in that sets of measures should be tailored to suit the local circumstances in which they are applied.

Regarding the second question, harmonisation of EU policies, it is concluded that for the most part, it is better to have country-specific policy strategies, while for some part EU-wide policies are more appropriate. This is confirmed by the Coopers and Lybrand (1996) study which claims that the differences in the size of the environmental costs and benefits between Member States for specific waste management systems suggests that a uniform EU policy would not be appropriate since such a policy would not reflect the fundamental differences in costs which exist. On the other hand, some of the environ-

mental impacts associated with waste reflect either regional or transboundary impacts. These impacts are most appropriately addressed at an EU level, if not at a broader level.



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