Annex 4B.4

# Economic and Policy Instruments for Waste Management

## *ECONOMIC INSTRUMENTS*

# STICK OR CARROT?

## How to move waste management up the hierarchy

*by Dr David C Wilson*

The objective of the UK's recent draft *Waste Strategy for England and Wales*, in common with that of many other countries, is to make waste management more sustainable by moving up the hierarchy of options *(see Figure 1).* The first priority is to avoid producing waste in the first place; if it must be produced then the quantity should be minimised; the next step is to reuse or to recycle as much as is practicable; treatment should then be aimed both at recovery of energy and at minimisation of the quantities requiring final disposal; only then should the residues be considered for landfill.

However, to date people have merely paid lip service to the hierarchy, acknowledging the supremacy of waste avoidance, minimisation and recycling, while in practice the vast majority of wastes in all of the EU Member States have either gone to landfill or incineration.

It is, by definition, almost impossible to measure the base line position for waste avoidance and minimisation. However, Figure 2 shows the growth in household waste arisings recorded by the Member States between 1980-1990. In most countries this was in the range of 20-35%. (The lower UK figure needs to be treated with caution, as even now the total quantity of domestic waste arisings are not measured systematically.) The negative values for Germany and the Netherlands show the impact of policies introduced in the late 1980s to stem the growth in waste arisings.

In all of the EU Member States landfill was either the dominant, or at least an important, management option (1990 data), and recycling made a relatively small contribution,

Why is it that landfill, which everyone agrees should be used as a last resort, has dominated waste management? One answer is that it is the cheapest option. Another is that **it** *appears* to be the cheapest option, at least partly because the existing 'free' market is in fact distorted, whereby the waste generator pays only a portion of the costs of waste management, the remainder being in effect an indiscriminate subsidy paid by society.

One type of market distortion in the present system relates to the so called 'external' environmental and social costs, which are generally held to be higher for landfill than for other treatment and disposal methods, and certainly much higher than for recycling or for waste avoidance and minimisation.

The second way in which the present market is distorted is that waste collection and disposal services for domestic wastes are effectively provided free of charge in most cases. From the point of view of the consumer, whether we are talking about packaging, newspapers and magazines, batteries, consumer durable items, cars or any other product, we expect to pay a price for the product which covers *all* of the costs associated with raw materials extraction, primary production, manufacturing and distribution, but currently *not* the cost associated with waste collection and final disposal after its useful life. In the current market, it therefore makes little sense for manufacturers or final users to spend money on waste prevention, minimisation or recycling in order to reduce the quantities of post consumer waste, because they would be increasing their costs for no benefit to themselves.

A concerted move away from landfill up the waste management hierarchy requires a fundamental change in behaviour by. manufacturing industry, by commerce and by individual consumers. For this to happen, we need to develop viable, innovative and affordable physical means for waste avoidance, minimisation, and recycling which are capable of competing financially with the traditional methods of waste collection and landfill disposal.

Even if the cost of waste avoidance, minimisation and recycling become more competitive, a major change in behaviour so that waste quantities actually decrease as you move down the hierarchy is going to require the support of a set of *policy measures.* The purpose of the policy measures is at least partly to counteract the market distortions mentioned earlier, to 'level the playing field' so that waste generators can choose the most cost effective management system for their particular wastes.

The development of integrated sets of policy measures by countries around the world is an area which has seen intense activity over the last few years.

Types of policy measures

A wide variety of policy measures has been developed with a great deal of creativity in recent years. Among the types of classification which have been used are the following:

- *legislative measures, economic instruments and institutional arrangements ;*

- *'traditional' command and control enforcement mechanisms, information dissemination and use mechanisms, economic and financial instruments and institutional/participatory mechanisms;*

*mandatory versus voluntary approaches; and*

*the 'carrot' versus the 'stick'.*

For the purposes of presentation in this article, a somewhat hybrid, *ad hoc* classification has been adopted. This covers information dissemination and use mechanisms; economic 'sticks', which aim to force changes in behaviour by changes in the cost structure faced by waste generators; producer responsibility, including mandatory schemes, voluntary agreements and the setting of targets; 'carrots', to provide a positive financial encouragement; and legislative 'sticks', which work through restricting the choice of option which is legally available.

Information dissemination and use mechanisms

Waste reduction requires changes in the behaviour of people, both collectively (eg as companies) and individually as householders and as employees. Whatever other policy measures, both sticks and carrots, are being used, they will need to be supported by co-ordinated campaigns both to tell people what it is that we want them to do and to persuade them to do it. Co-ordinated publicity and education programmes must therefore form an integral part of any waste reduction programme.

At the consumer level, simple information and publicity campaigns are often backed up by longer term education programmes working through the schools. An excellent example of such a co-ordinated programme is in Taiwan. Consumers also need information to inform their purchasing decisions, which is the rationale behind *eco-labelling schemes.*

For industry and commerce, the initial publicity and information campaigns need to be backed up systematically, by making available to individual companies more specific information of what they should be doing in their individual circumstances. Groups with an important part to play include the regulatory authorities with the provision of advice on waste reduction to individual companies, industry and trade associations and local technical institutes. A related policy

measure is to require the preparation of waste management or waste reduction plans. This applies both to the public sector in terms of producing strategies or plans at the national, regional and local levels, and also to individual companies. For example, Austria requires that all enterprises


*Figure 1: The waste management Hierarchy*

with more than 100 employees must draw up a waste management plan.

Most of the measures discussed so far in this section could be classified either as mere exhortation, gentle encouragement (rather small carrots) or even gentle persuasion (a small stick). However, the US has demonstrated that information can also provide a very powerful stick, as effective as anything discussed elsewhere. This is the so called community right-to-know or emissions reporting legislation (SARA Sub-title Ill or the *Toxic Release Inventory)* which was introduced in 1986 as a political expedient in response to the Bhopal accident in India. This requires companies to report publicly on their emissions of chemicals in annual reports. This deceptively simple requirement, which could be termed 'regulation by embarrassment' has been remarkably successful in bringing waste management onto the boardroom. agenda. Waste prevention is infinitely preferable to the company president than justifying to the local community high waste discharges to air, to water and to land.

The stick provided by the community right-to-know legislation has led to a number of interesting voluntary initiatives in the USA. One is the 33/ 50 waste reduction programme, to which 1,250 companies have signed up, under which they 'contract' to reduce their waste production by 33% by year A and by 50% by year B.

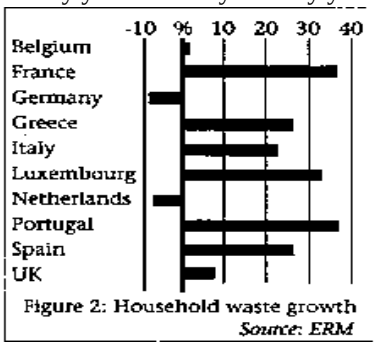



Figure 2: Household waste growth
*Source: ERM*

Another is the *Waste Wi$e Program,* which is co-ordinated by the US EPA and in which each participating company voluntarily makes a public commitment to self-set targets for waste reduction and also to three significant new initiatives for waste prevention, recovery or secondary material usage each year. The benefit to the 300 major companies who had signed up by August 1994 lies not only in public relations, but also in the information exchange and learning from the mistakes and successes of others.

**Economic sticks**

There are a number of policy instruments which try to force changes in the behaviour of both industry, commerce and the consumer through changes in cost structure at some point in the product life cycle.

The most obvious economic incentive for waste reduction is for the waste generator to pay directly the full costs of collection, treatment and disposal of the waste they generate, in proportion to the quantity. This is generally the case for commercial and industrial wastes, but seldom so for household waste. A variety of methods are used to finance household waste collection and disposal but in the vast majority of cases the amount of the charge is either a flat rate, or determined by the number of people in the household or the size of the property. There are a few exceptions where weight- or volume-based charges have been introduced. Switzerland has recently introduced a charge per bag (averaging 75p) while Korea has been operating a pilot scheme since 1 April 1994, with the intention of extending it to the whole country in 1995. Ireland has had some limited experiments with bag tagging while Austria, although operating a flat rate system, offers a. rebate for those who compost green wastes at home.

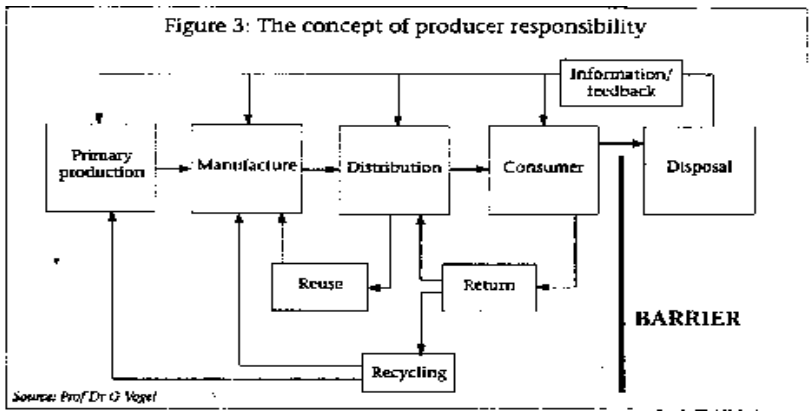
Until recently, *deposit refund systems* have been the instrument used most widely to achieve waste reduction. They apply to a small proportion of the total waste stream, typically beverage containers, and are generally old systems originally established by beverage manufacturers because collecting and washing bottles was cheaper than manufacturing new ones. This has changed over time in response to more efficient production systems and the development and use of new materials, particularly plastics and alu

minium containers. Many traditional deposit refund systems have collapsed with the shift away from glass bottles. A number of countries, largely in Scandinavia, have maintained these traditional systems through using product charges on non-returnable containers. There are relatively few examples of new deposit refund schemes for beverage containers. Some US states adopted 'bottle bills' in the 1980s, while Austria, Germany and the Netherlands have recently introduced deposit schemes for plastic beverage containers.

There are also recent examples of deposit refund schemes used for a number of other products including car bodies (Sweden, Norway), batteries (Denmark, Netherlands, some US states) and disposable cameras (Japan). In Korea, an *industrial deposit refund scheme* has been set up whereby manufacturers are required to pay a deposit to the government, which is refunded if, after consumer use, the company collects and recycles or otherwise treats the product itself. The rationale is similar to that of producer responsibility *(see above)*, as is the scope, ie packaging, batteries and tyres.

The use of *product taxes* is growing in many European countries as a means of raising the price of disposable or non-recyclable goods relative to less environmentally demanding alternatives. Taxes are commonly used as an incentive to set up deposit/refund schemes, as is the case in Norway and Finland, where tax exemptions are allowed if a suitable return rate is achieved. Meanwhile, the introduction of new product taxes on a much wider range of goods has been proposed in Belgium and Switzerland as a way of influencing consumer behaviour and providing subsidies for recycled materials. Other countries involved include Denmark (beverage containers and tableware), Italy (plastic bags), Netherlands (PET soft drinks bottles) and Korea (a wide range of disposable products including nappies).

Another innovative instrument which is widely considered is a *raw materials tax*. This measure is related to a product tax, but being a tax on the raw material input into production, it is effective further upstream in the product lifecycle. The survey of countries showed that, although sound in concept, complications are encountered with implementing the tax, particularly with regard to imported goods. Some cases, however, have been implemented in




Europe; for instance in Belgium there is an initiative which taxes paper and the tax is withdrawn if the targets for recycled content are achieved. In addition, Italy taxes raw material input into liquid containers. This instrument has significant potential, as it affects the price of virgin raw material relative to recycled material, and hence, in theory, should enhance the market demand for recycled material.

A waste disposal levy or tax has been used in a number of countries to provide an incentive for recycling and waste prevention and/or as a means of raising revenue to support environmental programmes. Taxes for waste treatment and disposal are used in Austria, Denmark, Belgium, New York State and are proposed in France, while landfill taxes are in place in Australia and the Netherlands and proposed in Finland and the UK. The levels of the tax vary widely, from around £1/tonne up to a high of £20/tonne for landfill in Denmark. Most of the taxes are hypothecated, that is they are used to fund waste management infrastructure, the clean-up of contaminated sites, a new Environmental Protection Agency, research and development in waste reduction or education and market development for recycled materials.

Where any of the above taxes or charges are introduced to shift the responsibility for paying for waste management from general taxation to a specific charge on the waste generator, then it is important that off-setting tax cuts are made elsewhere in the system (to maintain fiscal neutrality),

The UK landfill tax is proposed to be offset by reductions in National Insurance contributions by industry.
Insurance contributions by industry,

A less obvious economic instrument is the use of *liability* for environment damage caused by a company's wastes. This is the cornerstone of US policy for hazardous wastes, with 'superfund' assigning strict liability to a waste producer for any damage resulting from a landfill or other facility receiving their waste, irrespective of whether or not their particular waste caused the damage. The high potential liabilities effectively increase the perceived cost of, for example, landfill so that waste generators seek either to prevent the waste arising, to recycle or to treat it.

**Producer responsibility**

The emergent policy instrument which has attracted most attention over the last five years, is what has been broadly termed 'producer responsibility'. The concept is shown in Figure 3 whereby the producer (manufacturer, importer, distributor, retailer) of the products giving rise to the waste takes responsibility for those wastes, rather than expecting society to pay for waste collection and disposal.

There are many variations in the implementation of producer responsibility. Most current schemes focus on packaging waste, from both the domestic and the commercial sector and require producers of packaging materials to reduce significantly the waste going for disposal. The schemes may be implemented voluntarily to meet targets agreed with government, as in the Netherlands, in the state of Victoria in Australia and as planned in the UK (with legislative backing), or on a mandatory basis. A formal take-back obligation may be placed on the manufacturer (and/or the distributor or the retailer), so that a parallel waste collection system needs to be Established (as is the case for exam-
established (as is the case for exam-

ple in Germany, Austria and Talwan). Alternatively, the producers can be given the financial responsibility to ensure that agreed targets are met, industry then being free to find the most cost-effective way to fulfil that obligation. For example, in France and Italy, the industry consortia which raise funds through a levy on each package pay local authorities a fee for packaging materials collected separately for recycling.

The first of the producer responsibility initiatives was actually that in Taiwan (1989). The best known, however, is the 1991 *German Packaging Ordinance,* which achieved much bad press partly through its own success. The targets set for recycling were graduated, to allow recycling capacity to grow to meet the increasing supply. Unfortunately, public response in the first year was so enthusiastic that initial targets particularly for plastics were overachieved, with the result that markets within Germany for the separated materials could not cope and materials were 'dumped' in markets eisewhere in Europe and the rest of the world, with dire short-term effects on domestic recycling schemes in the affected countries, New recycling capacity in Germany has now come on-line, so hopefuliy this particular problem has been overcome. The Ordinance sets demanding targets for recycling of individual materials, which rise by 1996 to 50% for paper and plastics and 70% for metals and glass. Targets are also set for the share of the market for refillable beverage containers. This latter is fairly common: if targets are not met, then the threat is that compulsory deposit refund schemes will be intFoduced.

Many of the other producer responsibiJity schemes being developed in Europe, such as those in Austria, Belgium, Denmark, France, Italy and Sweden, have been designed specifically to build on the successes of the German scheme, while overcoming some of its disadvantages. For example, in the Austrian law, targets are set, not in terms of percentage recycling which must be achieved as in the German law, but rather limiting the total quantity of different types of packaging material which may be disposed of to landifil. The levy per package is also gradu- • ated, to discourage use, for example of less recyclable 'tomposite packages such as bubble packs. It is then left to producers to achieve the targets in the most cost effective way, by a combination of waste avoidance and minimisation, substitution, recycling and energy recovery.

So far most producer responsibility schemes are focused on packaging wastes, but in a number of countries, including Sweden, Denmark and Taiwan, producer responsibility is beginning to emerge as a more general philosophy for waste management in the future. Other waste streams being considered for action (Japan may be added to the list of countries) include batteries, end-of-life electronic equipment, end-of-life consumer goods, cars and vehicle tyres.

**Carrots**

Under this heading, we are looking at those policy measures which seek to provide some financial incentive, usually to start off the waste reduction process. The rationale is generally that the public sector is a financial beneficiary of waste reduction, through reduced collection and disposal costs for domestic wastes, while it is the waste generator who bears the cost. It thus makes good sense to 'oil the works' to start off the waste reduction process.

The ERM survey has shown that most countries use some sort of *grant or subsidy programme* to encourage the development of waste reduction. These can take the form of direct monetary support, such as grants to Cover capital costs, iow interest loans or subsidies towards running costs. Another option is to provide land .eutler free of charge or at a subsidised rate: tax concessions are generally considered to be inefficient and are thus relatively rare (one exception being Japan).

*Grants* or *subsidies* may be provided for *waste prevention programmes;* for *research and development* and for *demonstration,* typically for waste prevention by industry; for *in-house recycling and waste treatment schemes,* supporting the installation/use of certain recycling or waste treatment technologies; and for *new central treatment facilities.* For example, most European countries have provided some form of capital subsidy for at least the first generation of 'state of the art' hazardous waste treatment facilities. Several countries, including Austria, Germany and Spain, provide support for developing solid waste infrastructure.

*Grants* or *subsidies* have also been used to support *the supply of materials for recycling,* for example through the establishment of separate collection programmes for household recycla ble materials, and *to develop the demand for recycled materials,* through support for processing facilities and innovative product development. *Subsidies* can also be *linked to charging schemes,* an example being in France where a levy on water consumption is used to subsidise treatment fees for hazardous wastes where it can be shown that the waste is being managed by the 'best practicable environmental option'.

Another form of carrot is the so-called *recycling credit,* an example being the UK scheme whereby the Waste Disposal Authority pays a proportion of its savings and avoided disposal costs to the Waste Coilection Authority or other organisations responsible for collecting materials for recycling, which would not otherwise receive any financial incentive for reducing disposal volumes. Such schemes are surprisingly uncommon, other examples being found in some states in Australia and certain provinces in Canada.

Another group of carrots focuses on encouraging recycling by developing the market for recycled materials. The most common of these are *preferential purchase policies,* which seek to encourage governments, local authorities and private industry to buy materials, typically cffice paper and newsprint, having a defined minimum content of post consumer recycled material. Most such schemes are voluntary and focused on the public sector,.such as that in Denmark, whiie there are several interesting schemes in the US. Some of these require government to purchase products with a specified recycled content so long as the price premium is between 5-10% more than the product based on virgin materials.

Other demand-side initiatives are relatively uncommon. One is the UK's non-fossil fuel obligation (NFFO) -which has been used to subsidise the price of electricity generated from waste; and the price support scheme for waste paper in the Netherlands, where many local authorities guarantee a certain minimum price for waste paper collected separately by voluntary groups.

**Legislative sticks**

Under this heading, we are including all of the policy instruments which work through restricting the options

legally available for waste management.

Most countries have a system of site licensing or permitting for storage, treatment and disposal facilities for a wide variety of waste types. The system may be integrated with or supplemented by a series of technical standards intended to ensure a 'level playing field'. Facility licensing may be complemented by controls over waste transport and particularly the trans-frontier shipment of specific types of wastes, particularly hazardous wastes. There may also be controls over waste generators, such as an annual registration! reporting requirement for hazardous wastes, the UK's *duty of care* system or the German pennit *to dispose,* with permits only being issued where a detailed statement shows that utilisation is technically impossible, where the associated costs are prohibitively high or where there is no market for the resulting materials.

An alternative approach is to *require* either the provision of separate collection facilities for particular types of waste on the part of local authorities or waste producers; and! or the participation in those schemes by householders. Several of the producer responsibility schemes discussed earlier have a *mandatory* component to them, such as those in Taiwan and in Austria. Japan has had mandatory separate collection of combustible and non-combustible components of waste for many years, while mandatory separate collection and recycling programmes for a variety of materials have been in operation in several American and Canadian States (notably New York, New Jersey, California, Pennsylvania and Ontario) since the late 1980s. Recent schemes in Europe, for example those in the Netherlands and Austria, oblige municipal authorities to collect source-separated organic materials from householders for composting. Similar legislation has been proposed in Denmark, Germany and Luxembourg.

A complementary measure to separation programmes is to restrict the availability of landfill for certain types of waste. For example, the Netherlands is proposing to introduce bans on the landfilling of some of their 29 priority waste streams progressively from 1995. Austria has already introduced a ban on the landfill of waste containing more than 5% organic material, while a similar ban by the year 2000 has
been proposed in Germany and France.

Another approach is to put restrictions on certain types of products which give rise to waste. For example, Denmark bans aluminium cans and non-refillable beverage containers for domestic sales of beers and soft drinks. Switzerland bans PVC bottles and beverage containers which are neither refillable nor recyclable. Korea has legislated standards for the packaging of certain materials. For example, processed foods can have no more than 15% of the volume of the package taken up by void space, and no more than iwo layers of material enclosing the product. A related approach is to set standards for the minimum recycled content of certain materials, which is under consideration, for example, in Taiwan.

## Achieving a **balance**

What is the best set of policy measures to ensure that we move up the waste management hierarchy? Should we be using *sticks* **or** *carrots* and, out of all the confusing variety reviewed above, which particular measures should we choose?

From the work which ERM has been doing for the last year in Hong Kong to develop an integrated *Waste Reduction Plan,* and from an international review which has taken in some 25 countries, a number of conclusions can be drawn.

*There is no one policy measure which, on its own, can achieve systematic waste reduction. An integrated waste management strategy requires a combination of measures.*

*There is no right or wrong approach, there are merely tailored sets of measures adapted to the circumstances of a particular country or region.*

*The need is for a balanced set of measures, probably containing one or more from each of the five categories discussed above. Thus, we need both sticks and carrots, legislative measures and economic instruments.*

There is much to be said for an approach which sets a framework within which industry must act, and then allows industry itself to decide on the most cost effective means of achieving the agreed results. In many countries, this is called the voluntary approach: to be successful, the penalty of not achieving the agreed targets must be perceived by industry to be unacceptable. However, a mandatory producer responsibility scheme can still allow industry some freedom to choose the most cost effective means of achieving the target of waste reduction to landfill.

In putting together a balanced set of policy measures, it is important to take care to encourage waste prevention as well as recycling. One disadvantage of the *Gennan Packaging Ordinance* is that demanding targets are set only in terms of the percentage recycling which must be achieved for each material. In Austria, on the other hand, targets are set in terms of the total quantity of different fypes of packaging material which may be disposed of to landfill. The choice between prevention, recycling and energy recovery as a means of achieving these targets is left to industry.

Similarly, care is required to encourage the *demand for recycled materials,* and for products made from them, as well as encouraging the *supply of materials for recycling.* This lesson was driven home by the chaos in international markets following the early implementation of the *Gennan Packaging Ordinance.*

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The basis for the article, a longer version of which was presented to the Institute of Wastes Management's 1995 conference in June, is ERM's in-house database on policy measures for waste reduction. This database was updated most recently in Spring 1994 at the beginning of the US$1m *Waste Reduction Study* which ERM are currently carrying out for the Hong Kong Government.

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