EFFECTIVENESS OF THE LANDFILL TAX IN THE UK: BARRIERS TO INCREASED EFFECTIVENESS AND OPTIONS FOR THE FUTURE.

EXECUTIVE SUMMARY

On behalf of Friends of the Earth, ECOTEC has undertaken an analysis of the Landfill Tax and progress achieved thus far in moving waste management up the waste management hierarchy. The key conclusions of the paper are:

- though the tax has encouraged more sustainable waste management ir 81% of companies surveyed, 40% have not changed their practices in this regard;
- the tax has reduced waste arisings, especially inert wastes;
- alternative options to landfill are poorly developed;
- the tax is not being passed through in such a way as to encourage actors to reduce waste.

The tax has had an impact on some waste producers, but none on others. Few waste producers are passing the tax on in final product pricing due to the fact that the tax is a very small fraction of companies’ overall turnover. In terms of encouraging alternative waste management options, the size of the tax has been, for the most part, too small. However, the tax, in conjunction with other instruments, has given impetus to increased investments in Materials Recovery Facilities by waste management companies.

On the basis of these conclusions and the research carried out, a number of recommendations have been made. These are as follows:

- **Rec 1**: use the tax to meet strategic targets;
- **Rec 2**: increase the tax rate;
- **Rec 3**: introduce a tax on incineration;
- **Rec 4**: review the regulations governing exempt activities;
- **Rec 5**: minimise perverse responses through regulation and/or developing alternatives;
- **Rec 6**: review the impact of NFFO scheme on waste management options;
- **Rec 7**: review the development of Environmental Bodies to assess their contribution to reducing waste in particular;
- **Rec 8**: review instruments aimed at enhancing provision of information and education;
- **Rec 9**: examine the option of using accelerated depreciation deductible from tax on investments in waste minimisation, composting and recycling;
Rec 10: introduce a change in (central and local) Government procurement policy and/or targets for use of products made from secondary materials;

Rec 11: increase recycling credits and stimulate the market for recycled materials;

Rec 12: encourage local authorities to explore the possibilities for unit charging of municipal waste.

These recommendations can be considered in isolation. It is clear, however, that there are complementarities, and that some need to be put in place before others. For example, there may be little point in going ahead with unit charging schemes in advance of putting in place aggressive recycling strategies, which in turn, would benefit from measures to stimulate the market for products manufactured from recycled materials. On the other hand, this does not mean that unit charging could not be considered as other measures are implemented. Thus, although the majority of these measures could be introduced in the short-term, careful thought is needed in putting any changes into context within an integrated waste management strategy.
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1.0 INTRODUCTION

The Landfill Tax was one of the most innovative pieces of environmental policy brought in by the previous Government. It began to put into practice the commitments to using economic instruments in environmental policy where appropriate and to making polluters pay. Moreover, it was introduced with an associated cut in the rate of employers NICS and as a consequence presented as an eco-tax reform initiative that shifted the tax burden off jobs and onto waste. But how effective has the landfill tax been in reducing waste generation and increasing recycling and re-use? And how can it be developed to become effective as achieving these environmental aims while increasing the scope for further shifts in tax burden?

On behalf of Friends of the Earth, ECOTEC has undertaken a study of the Landfill Tax. On the basis of survey work undertaken, as well as other research, attempts have been made to analyse how the Landfill Tax’s operation may be improved in terms of its capacity to make waste management more sustainable.

In the July Budget the Chancellor announced plans to re-examine the Landfill Tax with the intention of bringing forward proposals for changes and Budget in Spring in 1998. We believe this report makes an important contribution to that process.

1.1 Waste in the UK

Waste management in the UK is dominated by the practice of landfilling. Some 90% of all household waste, and 70% of all controlled waste, is disposed of in landfill sites (DoE and WO 1995, 4). The dominance of landfill has partly historic routes, but under current institutional arrangements, disposal to landfill is the cheapest option for waste disposal.

A number of concerns have arisen regarding the practice of landfilling. Principal among these are problems associated with leachate, migration of gas generated through the rotting of putrescible materials, local disamenity, and a feeling that simply filling up holes in the ground ad infinitum cannot be sustained in the longer term. Furthermore, the cheapness of landfilling has constituted a brake on initiatives designed to make waste producers more aware of the costs of wasted raw materials since the marginal costs of disposal of waste are low or zero for many economic actors. Reflecting some of these concerns, an intention to introduce the Landfill Tax was announced in the November 1994 Budget. Unusually, in advance of the tax, a consultation process took place prior to

1 Also, recent work suggests that landfills may contribute to global warming and ozone depletion.
the finalising of the details in the November 1995 Budget. The Tax was eventually introduced in October 1996.

The consultation process was undertaken to elicit the views of industry, environmentalists, and local authorities. The major outcome of the consultation process, as confirmed in the announcement in the November 1995 Budget, was a change in the tax from an ad valorem to a weight-based tax. Furthermore, it was intended that there should be no exemptions from the tax.

Among those applauding the way in which the tax was introduced, the Department of the Environment’s Chief Economist, Chris Riley (1996, 237-8), suggests that its success in this regard was due to the following factors:

- the analytical and policy ground was well-prepared in advance of the tax;
- the consultation process helped defuse potential criticisms
- the practice of basing the tax on externality estimates, which was most acceptable to economically knowledgeable commentators;
- the fiscal neutrality of the tax; and
- the move to a weight-based tax and the retention of Environmental Trusts was viewed favourably by the environmental lobby.

The tax was set at two rates, the standard rate of £7 per tonne for non-inert wastes, and the lower rate £2 per tonne for inert wastes specified in the HM Customs Qualifying Materials Order (HM Customs 1996). Exemptions from the tax were eventually awarded for dredgings removed from inland waterways and harbours, mining and quarrying waste (which typically resides in the mine itself), pet cemeteries and waste arising from the clearance of contaminated land (for further details, see HM Customs 1997), whilst lobbying also ensured that some wastes were shifted from the £7 to the £2 bracket.

The tax was supposed to be revenue neutral. HM Customs and Excise estimated initially (Nov. 1994) that the tax would generate some £500 million, based, it should be said, on the very limited statistics that are a feature of the waste industry. The figure was revised to £450 million in November 1995 (Riley 1995, 233). This cost to business was to be offset through a reduction in higher rate National Insurance Contributions (NICs) from 10.2 to 10%. In addition, an element of hypothecation of revenue was made possible through the channelling of funds to groups registered as environmental bodies under a new organisation named ENTRUST.
1.2 Structure of the Report

Section 2 of the paper addresses the manner in which the tax was set, and the way in which this relates to its aims.

Section 3 looks briefly at the waste management hierarchy, and then examines the response of waste management companies, waste producers and local authorities to the tax on the basis of ECOTEC survey work. Section 3.0 also reviews the progress made by ENTRUST and the Environmental Bodies scheme, through which, potentially, 20% of total tax revenues could be channelled.

Section 4 examines a number of obstacles that may be dampening the effectiveness of the landfill tax as a tool for sustainable waste management. It also assesses the arguments that environmental taxes should be introduced in conjunction with complementary measures which are explicitly designed to enhance actors’ response to the incentives created by the tax.

Section 5 looks at the experience of other European countries which have introduced waste taxes. The Danish waste tax is examined in more detail.

Section 6 explores three scenarios for the future development of the tax.

Section 7 completes the report and includes the study’s conclusions and recommendations.
2.0 AIMS OF THE TAX AND SETTING OF LEVELS

On the surface, the tax seemed to be a rarity, a popular tax (Wakelin 1997). As mentioned above, the way it was introduced was heralded as a success by some involved in the process. If the tax was so popular, it may seem unwise to embark on any criticism of it. Why tamper with a popular tax?

Yet the successful introduction of a tax, and procedural probity, does not guarantee its success in action. Indeed, there are reasons to believe that the level at which the tax was set has, in particular, been subject to some misunderstanding, with the Treasury apparently believing that the tax was designed to capture the difference in externalities between incineration and landfill, and the Department of the Environment (DoE) believing the tax to have been set on the basis of an absolute measurement of externalities associated with landfill.

The aims of the tax as set out in the UK Waste Strategy are:

- to ensure that landfill costs reflect environmental impact thereby encouraging business and consumers, in a cost effective and non regulatory manner, to produce less waste;
- to recover value from more of the waste that is produced; and to dispose of less waste in landfill sites (DoE and WO 1995, 12).

Three related aims are clear from this:

- internalising externalities
- increasing recycling and valorisation of waste
- reducing disposal of wastes to landfill

The first of these provides the guidance as to setting of the actual level of the tax. Although the other two are affected by the tax level, they provide no guidance as to how it should be set. Some would argue that this is unhelpful and places too much faith on assumptions concerning the way a tax will influence behaviour. What follows, therefore, is a critique of the tax in terms of its level and its aims.

2.1 Capturing Externalities

The key outcome of the consultation process was that the initial proposal to levy the tax on an ad valorem basis was dropped in favour of a weight-based tax. Work was then commissioned by the Department of the Environment to quantify the externalities from landfill and incineration. The study’s authors pointed out that a number of externalities were omitted in the analysis, either because of difficulties with their quantification, or because limited time and resources did not allow for their estimation, or because they did not fall under the study’s terms of reference. Key omissions were:
• no estimation of disamenity costs of landfill or incineration (the study recommended that a contingent valuation study be carried out);
• no consideration of recycling externalities, (the issue is addressed briefly in an Appendix), implying failure to account for benefits foregone as a result of landfill or incineration;
• questionable estimates for leachate externalities - for new landfills, it was assumed that the costs of clean-up, which are internalised in new licences, could be used as a proxy for the externalities associated with leachate; and
• no consideration of externalities associated with toxic emissions from incinerators.

The work was leaned on heavily in the setting of the tax (Riley 1996; Turner et al 1996, 20-21). However, officials at the Department of the Environment responded to concerns expressed during the consultation process asking for a banded structure to the tax, and set two rates for active and inactive waste. In addition, according to Riley (1996) officials made estimates of disamenity effects based on a review of North American studies, these being subject, as Riley (1996, 235) himself points out, to the problems associated with benefits transfer. It should be noted that this estimate accounts for, in the case of the active wastes, £4 of the £7 tax, and all of the £2 tax levied on inactive wastes. Though Riley’s (1996) account suggests a tax based on an absolute assessment of landfill externalities, the Treasury is of the view that the tax was set to capture the differences in externality between landfill and incineration. This is of more than merely academic importance since the Treasury’s view would impart some rationale for the omission of benefits foregone through not recycling since these might be assumed to be similar for landfill and incineration.

If one takes as the aims of the tax, those set out in the Waste Strategy, and if one accepts Riley’s account, to argue that the tax has been set at the wrong level reduces to one of whether or not externalities have been fully, and properly captured. It is clear that is not the case. However, to argue on these grounds is to engage in a debate concerning the measurement of externalities, and the problems related to approaches to environmental valuation. These problems are widely documented (see for example, Baumol 1972; Bowers 1990; O’Connor 1997; Common et al 1993; Martinez Alier 1990; 1992). They are compounded in the case of landfill sites since, particularly as far as leachate and gas migration are concerned, much depends on how the sites are operated, whilst the disamenity externalities (to the extent that one feels these can be fully captured) are likely to be site specific. The inability of any methodology to account for the views and priorities of those not yet born remains a major obstacle.

Furthermore, one has to ask what it is that one is trying to measure the externalities of. CSERGE et al’s study used, for this purpose, a ‘typical tonne’ of landfilled or incinerated waste. Waste producers, however, do not dispose of ‘typical tonnes’, and the typical tonne will not remain typical if the tax’s impact on waste disposed to landfill is non-uniform across different waste streams (an intuitively plausible assumption). To the extent, therefore, that the tax alters the composition of the typical tonne, the tax would have to change dynamically in response to that changing composition (as well
as, for the sake of completeness, changing preferences as revealed through the principal method for capturing disamenity impacts, that of contingent valuation).

An even greater problem with the ‘typical tonne’ approach is that it removes from the policy-maker’s armoury any instrument that concerns itself with the nature of the material being disposed, such as the setting of tax bands dependent on the nature of the waste stream itself. This has the unfortunate side-effect of concentrating attention on the route of disposal as the only determinant of the environmental impact of waste management options, thus helping perpetuate a somewhat sterile debate concerning the ordering of ‘the waste hierarchy’ which may be insoluble in the general case (i.e. the waste hierarchy may be different for different waste streams - see below).

The Department of the Environment recognised the merits of banding the tax to ensure the nature of the waste stream is indeed reflected in the tax.\(^2\) However, to state that one is seeking to capture the externalities associated with landfilling, but then to apply only two bands to the tax is to assume that the externalities are a function only of whether the waste is inert or non-inert. It should also be noted that some wastes, after lobbying from interested parties, were effectively moved from the standard to lower rate band, casting further doubt over the ability of the current tax to reflect externalities.

\[2.2 \quad \textbf{Setting Targets}\]

An alternative approach to setting the level of the tax is to set it with the aim of meeting targets. Indeed, this is the approach of all other European countries with experience of such a tax. Rather than setting out on an endless pursuit of externalities in a quest for the economists’ Holy Grail, ‘the optimal tax’, it may be more useful to set targets for waste management and to use the tax as one policy measure designed to meet those targets (see Box 1). Ironically, the UK Waste Strategy does include targets, but it is not clear that the tax has been set with these aims in mind (despite the fact that the tax is one of few new instruments that have been implemented in the wake of the Strategy’s formulation).

The target-based use of the tax is given greater relevance by virtue of the fact that new, more stringent targets, arising from the EU Landfill Directive, are clearly on the horizon. A number of instruments can be used to meet such targets of which a tax is only one. Thus, in the context of target-based strategies, the key question is less that of whether or not the tax has been set to cover all externalities, but one of whether the various instruments being applied, working in combination, will succeed in meeting these objectives.

One last point needs to be made in this section. If one of the aims of the Landfill Tax as described in the Waste Strategy was to capture the environmental costs associated with landfill, one has to ask why similar taxes have not been levied on other forms of waste disposal which incur environmental

\(^2\) In addition, the Waste Strategy recognises that the way waste should be dealt with should reflect the options appropriate to a given waste stream.
costs. There is a strong case for the tax, if it is a true tax on waste, to cover incineration, a practice followed in many European countries (see below). There is also a strong case for the benefits which could accrue from recycling as a non-disposal option to be included in these assessments.

**BOX 1: EXTERNALITIES OR TARGETS?**

The rise in the use of economic instruments in environmental policy has opened up new opportunities for reducing pollution and the over-use of resources. However, there is a growing concern that in its extreme form economic analysis of environmental issues can become divorced from reality by reducing important policy issues to simple numbers, something which cannot be done in any meaningful way.

We live, for good or ill, in the world of the second best (if we are lucky). The lessons of economic theory, though useful in terms of modelling a particular problem, assume a first best world in which economists of Panglossian outlook hold out the promise of an optimal world as they hunt down, one by one, elusive externalities.

In practice many of the values which economists seek to internalise as costs are simply not quantifiable (through willingness to pay or any other means). This is not an argument for not introducing environmental taxes at all on the basis that insufficient knowledge is available for capturing all externalities. It simply implies appreciation of the fact that the first best option suggested by theory is simply not available to us. Environmental taxes rarely work in as smooth a way as is suggested by economic theory owing to market imperfections, notably those associated with information constraints.

If it is intended that environmental taxes should have an incentive effect, it would seem wise to use them as components of a coherent strategy aimed at meeting targets. The UK Waste Strategy includes such targets, and yet the tax is not used explicitly to pursue these objectives. Indeed, the opposite is the case since basing the tax on externalities effectively ties policy-makers’ hands by asking them to sit back and watch the outcome of an exercise in internalising externalities.

A target based strategy obliges policy makers to move beyond the futile quest for complete rationalisation of the issues confronting them. A number of elements might contribute to the process of setting targets and the level of taxes designed to meet them, valuation exercises being one (providing, it could be said, an order of magnitude estimate of the level at which a tax might be set). Whichever other issues should be included (employment implications, for example) might depend on a closer examination of how the tax is likely to function, this in turn reflecting back on the way the tax is designed. Technocracy thus no longer takes centre stage, and policy-makers are required to regain a taste for politics. Under such circumstances, any change in the tax can be justified on the basis of the extent to which objectives have been met or on the setting of new targets. An externality-based tax should, presumably, only be changed if someone stumbles across a new externality, or if they change over time (which the theory suggests they can).
3.0 SHIFTING WASTE UP THE HIERARCHY - THE EFFECTIVENESS OF THE LANDFILL TAX

3.1 The Waste Management Hierarchy

The waste management hierarchy seeks to lay out waste management options in order of preference, the most preferable, waste reduction, being at the top. Below this, there has been considerable debate as to the most desirable ordering. The basis for the ordering is that movement of waste up the waste management hierarchy should represent a more sustainable approach to waste management. Thus, the least desirable option should reside at the base of the hierarchy.

Disposal rests in this bottom position. However, since incineration without energy recovery is effectively an option which no longer exists in the UK, this implies landfill. Moving up the hierarchy one encounters waste recovery. This includes composting, recycling, and most contentiously, in the UK, recovery of energy from waste. Indeed, in the EU hierarchy, energy from waste is below recycling and composting. Environmental groups believe most strongly that recycling and composting should be above incineration with energy from waste (see McHarry 1997). One argument in support of this view would be that some ash residues from incineration are ultimately landfilled. Another would be that incineration raises (relative to recycling) requirements for raw materials, (though to the extent that recycling and composting incur energy costs in the process, they too may draw on energy derived from a comparison of raw materials).

Recent work by Coopers and Lybrand, in conjunction with CSERGE (Coopers and Lybrand and CSERGE 1996), appears to call into question the long-unquestioned ordering of the waste management hierarchy. However, this study suffers from broadly similar shortcomings to that of the CSERGE study mentioned above in that it failed to capture all externalities, and it made use of the ‘typical tonne’ as the basis for evaluation of external costs (although externalities were captured explicitly for recycling, these being large and positive).

It seems more than likely that debates concerning the waste management hierarchy will continue as long as the focus on waste disposal routes fails to take into account the specific characteristics of what it is that is being disposed. To put it another way, it seems quite possible that different orderings in the hierarchy will be appropriate for different waste streams and indeed, both the DoE and the Environment Agency appear to recognise this. Furthermore, because the potential conflicts between recycling and routes of disposal, such as landfill and incineration, are likely to be related to ownership structures (private or publicly run facilities), the nature of the conflicts between options within the hierarchy may vary from country to country (and region to region within a given country). Such international variation is made all the more likely by variation between countries in, for example, public procurement policies, and other policy tools such as targets for recycling.

The hierarchy would be best viewed not as an ordering that is set in stone, but as a heuristic tool that guides waste management at the appropriate level. Serious questions need to be asked concerning
the wisdom of attaching any importance to an ordering of the hierarchy which is rigidly applied to all waste streams and across the EU, and special attention needs to be given to what this might imply in the context of application of one of the principals of the EU Framework Directive on Waste, the proximity principle. A more flexible approach to the hierarchy and the proximity principle are made all the more necessary if one appreciates the difficulties involved in obtaining a precise ordering because of problems associated with capturing externalities (even for well defined waste streams as opposed to ‘typical tonnes’ of waste). It is in this light that effectiveness of the tax is now considered.

3.2 The Effectiveness of the Landfill Tax in Changing Attitudes to, and Behaviour Regarding Waste Management

The following analysis is restricted to consideration of the response to the Landfill tax observable since its implementation. It is confined to the extent to which the Tax has encouraged recycling, re-use and minimisation of waste. However, it is inevitable that questions regarding incineration will be raised in the near future, both because of the landfill tax (especially if it were to be raised substantially), and because of the impending EU Landfill Directive (CEC 1997). Some of the salient issues are considered in a separate section below.

3.3 Empirical Evidence

ECOTEC has undertaken survey work aimed at highlighting the response of a number of sectors affected by the landfill tax. The survey covered some major national companies, as well as some smaller companies in 6 local authority regions of the UK.

The evidence below is grouped into four sections. The first three relate to waste management companies, industrial waste producers, and local authorities which collect waste from households and commercial premises. The final section looks at the Environmental Bodies scheme and its progress thus far.

3.3.1 Waste Management Companies

The landfill tax is paid by those holding licences for landfill sites. Any waste disposed to such a site is liable for the tax. Approximately 1,900 sites are registered to pay the tax. A number of companies operate in-house landfill sites, and the consultation process estimated that these account for around one-third of waste arisings that are landfillied. Since the cost of disposing of these wastes was open to a degree of manipulation, this was one of the reasons for moving the tax to a weight base from an ad valorem base.

Increasingly the available void space for landfilling is owned by a small number of large companies operating in the waste management industry. The top ten companies plus the LAWDCs/WDA account between them for an estimated three-quarters of all consented and planned void space, and a
slightly lower proportion of unconsented void space. ECOTEC has conducted interviews with representatives of most of the major landfill operators, as well as the Environmental Services Association (ESA, the trade body for the industry).

A major concern for waste management companies has been the drop-off of inert materials, principally construction wastes, arriving at landfill sites (ESA 1997; Environment Business 1997). Landfill operators have traditionally accepted these wastes at low or zero charge since they were put to use in and around the site itself. Now, they are subject to the tax even if they are used on site. On the basis of a survey of its members, the ESA estimates that the quantity of construction wastes ‘disappearing’ from landfill sites will amount to 18 million tonnes (of an estimated total of 42 million tonnes - the estimate is from the DoE for 1994) over the course of the year. Though these figures are open to question (activity in the construction industry is subject to fluctuations, and statistics in this area are generally not too good), landfill operators confirm the reduction almost universally.

The argument runs that this is an environmentally damaging side-effect of the landfill tax. Two reasons in particular have been given:

- the lack of inert wastes arriving at landfill sites is forcing companies to use virgin materials for engineering site roads, hardstanding, screening bunds, and so forth, so increasing resource usage (Wakelin 1997). The same applies with regard to daily cover materials; and
- where inert-only sites are operated, they are becoming (some have already become) unprofitable to run. This may lead to unfilled sites being abandoned, and becoming eyesores.

With respect to the first issue, not all landfill operators have incurred costs as a result of this reduction. Indeed, some comment that the reduction in inert wastes has had a beneficial impact in terms of reducing the supply of materials which generate low charges and take up considerable volumes of void space. In this way it could be considered as providing an opportunity for operators to generate greater value from their available void space.

The ‘disappearance’ of these materials raises questions as to where it actually ends up. Consultations with various parties suggest that material is being used for landscaping, bunding, golf courses, farmland improvement, or in construction projects, these being activities that are exempt from waste management licensing. In addition, some is almost certainly being fly-tipped, whilst small operators may be seeking to tip waste at civic amenity (CA) sites. In this regard, it should be noted that local authorities in our survey reported, almost universally, increased disposals at CA sites. In some cases, the sites’ capacity is being severely strained as waste delivered has increased by 20% and more. It seems relevant to note, in this regard, that the costs of skip hire have increased significantly in the wake of the tax, and smaller operators (and indeed, DIY enthusiasts) may be tempted to load their private vehicles with waste for transport to CA sites rather than pay this cost (small construction firms report that increases in the price of skip hire may increase the cost of projects by something in the region of

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3 These activities are outlined in Schedule 3 of the Waste Management Licensing Regulations 1994 (HMSO 1994).
5%). Thus, although more attention may be given to waste generation than previously, the use of CAs reduces the impact of the tax.

It is not easy to de-couple the effects of the Landfill Tax on waste management companies from the effects of other policy initiatives affecting waste management. Especially important in this regard are the Packaging Waste (Producer Responsibility) Regulations which require certain obligated companies to achieve targets for the recovery of packaging waste on the basis of the waste that they themselves produce.

Of 11 companies interviewed, 7 reported investment in MRFs. These essentially separate recoverable fractions of waste into component waste streams for use by materials processors (see Box 2). It seems fair to say that these investments are motivated by the landfill tax, but also by schemes designed to help customers meet their obligations under Producer Responsibility. Several companies applied for planning permission in advance of the tax, and though some companies were moving in this direction anyway, the tax has clearly made investments in MRFs more attractive. Recovery activity is also carried out at transfer stations and landfill sites. Also, operators may engage in separation activities at the front of landfill sites to reduce the tonnage of waste liable for the standard rate of the tax.

**BOX 2: MRFs AND LANDFILL OPERATORS**

**Materials Recovery Facilities (MRFs)**

Materials recovery facilities (MRFs) are facilities that process solid wastes for the purpose of recovering commodity-grade materials for sale, or of recovering a mixed material fraction for subsequent processing or conversion e.g. Refuse-derived fuel or a compostable mixture. Depending upon the intent and design of the MRF, the wastes may be delivered to the facility as mixed solid wastes, as source separated wastes (or alternatively, source separated materials), or in both forms. However, facilities tend to process either mixed wastes or source-separated materials rather than both.

MRFs that process mixed solid wastes can be defined as mixed waste MRFs. Those that process source-separated materials can be defined as source-separated MRFs. Mixed waste MRFs are also called “dirty” MRFs, whereas source separated MRFs are also called “clean” MRFs. The term “dirty” refers to the high level of contamination and moisture usually found in mixed solid wastes, while “clean” describes the relatively uncontaminated materials that are provided by source-separated collection schemes.

**Mixed Waste MRFs**

Mixed waste MRFs are designed to process residential, commercial, institutional, or industrial mixed solid wastes, or any combination of these. Levels of contamination in the delivered wastes are expected to be high, and non-processible items (for example cable, textiles, magnetic tape and oversized objects such as vehicle tail pipes and rolled carpet) will require special handling.

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4 Source: The World Resource Foundation Technical Brief Materials Reclamation Facilities
Box 2 Cont...

Rates of recovery for mixed waste MRFs processing household mixed waste can be expected to be, and usually are, lower than those facilities processing commercial and industrial mixed wastes. The reason is that household waste normally contain greater concentrations of food waste that contaminates recyclable materials.

Source-separated MRFs

Source-separated MRFs are designed to process individual components (e.g. aluminium cans), mixtures of individual components (e.g. Commingled tin, glass, and aluminium), or both. Consequently, source-separated MRFs can be further divided according to the degree of mixing or commingling of the components, and also the number of processing lines dedicated to processing the different source-separated mixtures. For all source-separated MRFs, the quality of the materials delivered to the facility is expected to be high, and contamination law.

Source-separated MRFs can also be designed to process components delivered in both individual forms and in commingled mixtures. Usually, but not exclusively, source separated MRFs that process containers and paper have one section or processing line of the facility dedicated to the processing of containers and another section dedicated to the processing of paper.

Example

One waste management company has just commenced operation of a mixed waste MRF, a Joint Venture with the City Council, 5 weeks into the scheme, less than 3% of waste arriving at the MRF, which is a combination of waste collected in green bins, and commercial waste, is going to landfill. The company is extremely pleased with the clean nature of the waste (which is down to residents and companies themselves).

The City council put up the money for construction and the waste management company has a possible 10 year contract. The overall cost of the project was £2m including Supplementary Credit Approval (i.e. the council contribution), value of land and development of land. The MRF separates textiles, glass, plastics (full range), cardboard (all types) & paper (all types), and metals. All but metals are manually sorted, 10-15 staff are employed to run the MRF with an equal number of drivers at full capacity (25 000 tonnes). The minimum viable tonnage is approximately 8,000 tonnes. When asked whether it was more profitable to run a MRF or a landfill, the company replied that this is a function of resale values for recovered materials, the landfill tax level and local disposal costs.


A problem associated with the increased investment in MRFs has been the impact on the market for recovered materials. Notwithstanding a degree of vertical integration through alliances with processors, the market for products using recovered materials is still limited, and reprocessing capacity reflects this. Thus, the market for some recyclables is experiencing a period of over-supply of, and falling prices for, recovered material. Indeed one landfill operator expressed the view that ‘The tax is a subsidy to reprocessors... diverting money from waste producers to waste processors’ (i.e. local authorities to processors). Another operator suggested that the only way to stimulate the recycling market is to oblige purchasers / manufacturers of materials to incorporate defined percentages from recyclables (see also Wakelin 1997). Only two waste management companies mentioned involvement in composting
Another way in which materials recovery occurs is through use of tax-free zones within the area of a landfill site. Those wishing to do this must apply to have part of their site designated as a tax-free area. Some companies have applied for such designation and are successfully selling-on separated hardcore, soils and wood. However, similar sorting operations are believed to be occurring in undesignated areas in ‘backyard’ sites near residential areas (ENDS 1997e, 20).

Several landfill operators, seeking to increase the range of services they offer their customers, now offer waste minimisation advice to their clients. One offers their customers free-of-charge waste assessments. Another provides waste minimisation advice where it has been demanded, and one other offers waste minimisation service through a sister company.

3.3.2 Waste Producers

The aim of the tax is to stimulate changes in behaviour. There are important questions which remain largely unexplored concerning the way in which the behavioural response of companies is conditioned by a tax of this kind. Included among these are whether behavioural responses are prompted by:

- the visibility of the materials being used in the production process;
- whether the tax introduces a new cost element;
- the size of the tax in terms of percentage increases in the cost of one component of total costs (in this case, waste disposal); or
- the size of the tax in terms of the percentage increase in overall costs.

This could depend on how financial responsibility is administered within a company, and the importance of one or other of the above factors will determine the nature of the response of the company concerned.

On the other hand, the extent to which the tax affects demand for any final product will depend, *inter alia*, upon the extent to which the tax has an impact on product pricing, and on the price elasticity of demand for the product. A principal concern which arises from the study is that the tax is simply lost as noise in the overall cost structure of a given enterprise. For most industrial sectors, the impact of the tax relative to companies’ total turnover is minuscule. In advance of the tax, estimates were provided by M.E.L. (1995) as to the impact of a £5 Landfill Tax on total costs. Typically, the estimated impact was a 0.05% increase in costs (see Figure 1). In fact, our results suggest that MEL’s estimates were, if anything, on the high side (although estimates from small construction companies were more of the order 5%). Table 1 gives some figures for industries sampled in our survey expressed as a percentage of turnover. Typically, the tax increases disposal costs by between 50 and 85%, but the cost of waste disposal for the companies for which we are able to calculate this ratio remains a very small fraction of company turnover.
TABLE 1: SURVEY RESULTS CONCERNING WASTE DISPOSAL COSTS AS A PERCENTAGE OF TOTAL COSTS (figures given are in the form: AVERAGE (RANGE) (PRE- OR POST-TAX) (NUMBER OF DATA POINTS)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Average (Range)</th>
<th>(Pre-tax)</th>
<th>(Post-tax)</th>
<th>(Number of Data Points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>0.00029 (0.00027-0.0003)</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0005 (0.0001-0.0009)</td>
<td>(4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metal goods</td>
<td>0.0035 (0.0007-0.009)</td>
<td>(pre-tax)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0038 (0.0002-0.01)</td>
<td>(post-tax)</td>
<td>(7)</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>0.0038 (pre-tax)</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.004 (0.0009-0.0075)</td>
<td>(post-tax)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.0011 (0.0005-0.0018)</td>
<td>(pre-tax as % salaries)</td>
<td>(5)</td>
<td>Two increases reported were 17% and 70%</td>
</tr>
<tr>
<td>Clothing and leather</td>
<td>0.0004 (0.0001-0.0006)</td>
<td>(pre-tax)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.00017 (0.00004-0.0003)</td>
<td>(pre-tax)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>0.0002 (pre-tax)</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0003 (post-tax)</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-metallic Mineral Products</td>
<td>0.0007 (pre-tax)</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.006 (0.00075-0.015)</td>
<td>(post-tax)</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>Retailing</td>
<td>0.025 (0.0072-0.033)</td>
<td>(post-tax)</td>
<td>(3)</td>
<td></td>
</tr>
</tbody>
</table>

Given the minimal impact on overall costs, one might expect the tax to have a fairly small effect on most industries’ behaviour as regards waste disposal. Furthermore, as regards pass through of the tax in final product pricing, one would expect any change to be limited. These are the two main ways in which one would expect the tax to affect waste arisings. They are examined in turn below.

Company Behaviour

The post-tax situation as regards waste management practices of companies in our survey is shown in Table 2. This does not show the extent to which the tax actually changed company behaviour. This is shown in Figure 1. Figure 2 shows that 40% of the companies surveyed have not changed the amount of waste they send to landfill. Some of these have, however, examined the costs of their waste and some are, for example, separating inert and active wastes to minimise liability to the tax. On the other hand, in addition to the 29% of the sample who had already carried out waste minimisation activity in advance of the tax, the tax prompted 31% of the sample to begin, or strengthen ongoing programmes in waste minimisation, re-use and recycling. Thus, although the picture is far from uniform, on the basis of this survey, the tax is having an impact on the quantity of waste being landfilled in almost a third of firms. In others, it is changing behaviour in ways which do not have, or have not thus far, an impact on quantity of waste being landfilled. It should not be forgotten that the landfill tax is a very small addition to company costs. In that sense, it is perhaps surprising that the tax has had as significant an effect on attitudes to waste as it has.
Figure 1: Cost of £5 Increase in Landfill Charge as % Total Costs
**TABLE 2: POST TAX WASTE MANAGEMENT PRACTICES OF COMPANIES SURVEYED**

<table>
<thead>
<tr>
<th>BEHAVIOURAL RESPONSE</th>
<th>% OF SAMPLE MAKING RESPONSE ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know, do nothing</td>
<td>4</td>
</tr>
<tr>
<td>Know, but do nothing</td>
<td>14</td>
</tr>
<tr>
<td>Know, analyse, but conclude can’t do anything</td>
<td>13</td>
</tr>
<tr>
<td>Charge minimisation (landfill avoidance)</td>
<td>1</td>
</tr>
<tr>
<td>Charge minimisation (landfill unchanged)</td>
<td>7</td>
</tr>
<tr>
<td>Change disposal route</td>
<td>1 (to landfill from incineration)</td>
</tr>
<tr>
<td>Recycling (MRF)</td>
<td>8</td>
</tr>
<tr>
<td>Recycling (separate at source)</td>
<td>19</td>
</tr>
<tr>
<td>Re-use</td>
<td>17</td>
</tr>
<tr>
<td>Waste minimisation</td>
<td>26</td>
</tr>
</tbody>
</table>

¹ There is some double counting in this column as some companies were doing more than one of these activities. Thus, the percentages sum to more than 100.

Evidently, waste costs as a percentage of turnover are significantly higher in some sectors than others. It is not surprising, therefore, that in the context of our survey, the landfill tax has forced foundries and construction firms to consider more carefully the tonnages of waste produced on-site. Another factor which may augment the response of these sectors is the visibility of their wastes, and the integral role played by materials ultimately disposed in their principal activity. The foundry sector, in common with several other industrial sectors, faces extreme competition in the market place. This has the effect of restricting product price increases. The combination of high wastage and an inability to pass on costs to the consumer clearly acts as an incentive to certain companies to reduce their operating costs. This is very much the case in the foundry sector.
Some more specific examples of company experience are given below:

- **had already implemented waste minimisation schemes:**

Thirteen of the seventy-two companies in the ECOTEC survey were involved in ongoing waste minimisation schemes. This is an encouraging observation, but also serves to emphasise the gulf existing between the most forward-thinking companies, and the ‘laggards’ as regards waste management.

A multi-national textile and clothing manufacturer noted that the tax had not had an impact on them since, where possible, every attempt had already been made to minimise and recycle waste from their 35 sites. Indeed, the Group now receives £600,000 per year in payments from recycling firms, up from £100,000 in 1992. The company commented on the smallness of the tax in the context of the size of its operations.

A clothing manufacturer in Cumbria initiated waste recycling schemes for fabric, cardboard and plastic in 1994. Waste volumes have fallen from 3 skips per day to just 1 skip per week. The firm is currently liaising with a bed manufacturer for re-use of another waste material.

- **was already involved in re-use**

A major power generation company was already seeking to generate an income stream from its wastes. In particular, power station ash is sold for a variety of purposes at prices from £1.30 to £4.75 per tonne depending on its characteristics. With the company generating less ash, and with more and more outlets being found for selling the material, the company envisages a time when demand will outstrip supply, and landfills may effectively be mined when this time comes.

- **was already involved in recycling:**

For some time, a paper manufacturer in Cumbria has been following their parent company’s overall environmental objective of zero landfill disposal by the year 2000, with the exception of canteen waste. Waste segregation schemes ‘had not come about as a result of the landfill tax.’ The firm had also been valorising their waste through a local MRF for some time.

- **has investigated waste minimisation as a result of the tax and started a scheme:**

Five companies in the ECOTEC survey have followed this route. All four who were able to quantify the reduction in wastes generated reported reductions of a third or more, whilst three reported reductions of more than two-thirds in the quantity of waste produced. The
advantages of waste minimisation are that not only are there savings in waste disposal costs, but also, the cost of waste materials is reduced.

A food processor in Carlisle, noted that the tax had forced a more rigorous analysis of waste costs. The firm has insisted on changing its payment method from volume to weight when the tax was enforced and now receives a monthly computer printout from their waste management company detailing the exact tonnage of waste collected from their Carlisle sites. On the recommendation of their waste company, who regularly consults with the firm on waste issues, the food company has also employed a part-time employee, with the remit of implementing waste minimisation schemes.

With the threat of the tax, a foundry in Bedfordshire invested in a sand attrition unit in 1994, more than a year before the tax was introduced. The unit subsequently reduced sand wastage by 60%. After the introduction of the tax, the firm decided to pay more money for a higher quality, finer grained sand. This has resulted in one less tanker of sand coming on site and 4 fewer skips of waste sand per month. It also now provides customers with a higher grade finish on the product.

- has investigated waste minimisation as a result of the tax but taken no action thus far:

A foundry in Birmingham examined the impact of the tax before it was introduced. They concluded that the nature of the material and their site (i.e. insufficient space) meant they could do little to mitigate the effect of the tax; “We just had to lump it.” The firm’s poor perception of sand reclamation units has also hindered progress in waste minimisation, since the firm feels that such reclaimed materials are not of a sufficiently high quality.

- began re-use

Thirteen companies in the survey responded that they were involved in re-use of wastes. A foundry in the Midlands, after the tax was introduced, found a secondary user for half of their waste sand, diverting almost 8,000 tonnes per annum from landfill.

- began recycling

Eight firms in the ECOTEC survey were becoming involved in recycling activities. Four of these were recycling through choosing to channel their waste to a MRF. A distribution warehouse for a multi-national car manufacturer in Bedfordshire examined in advance the effect of the landfill tax on waste disposal costs. The forthcoming packaging directive was seen as much more important than the possibility of future tax rises. The company has now begun segregating cardboard for reuse, and has recently changed disposal contracts to take advantage of a recently-opened Material Recovery Facility (MRF) in Luton. The firm is now

ECOTEC Research and Consulting Limited
charged a fixed charge per compacted 35 cubic yard skip plus £20 per tonne of waste. The total cost for this is estimated at £110 per skip. However, the contract stipulates that the contractor will pay the company a guaranteed amount per tonne of material recovered by the MRF from their skips. Total recyclables per skip are estimated at £1 tonne.

- **changed disposal route**

Only one company in the survey actually changed its route for disposal, and this was a company which had been forced to switch from incinerating waste to landfilling due to the closure of an incinerator nearby. Ironically, the company has found this to be a cheaper option, even with the tax now in place. This reflects not only the fact the private cost of landfill, even with the tax in place, is still competitive with other options, but also, the fact that companies’ treatment of waste is far from the economically rational ‘ideal’.

- **charge minimisation (landfill unchanged)**

Two main ways of reducing exposure to the landfill tax, whilst leaving the tonnage of waste being landfilled unchanged, exist. Four companies had changed their waste contractor for reasons of cost alone, whilst four others were separating inert from active wastes so as to reduce wastes qualifying for the standard rate of tax.

i) **changed waste disposal contract**

Although none of the large waste management companies reported losing custom as a result of the tax, there has been some switching of contractors as companies seek to respond to the tax by finding the cheapest service available. One company in Bristol found that it was able to switch to a small local contractor and was paying approximately the same after the tax was implemented as it was in advance of the tax. Waste arisings had not been reduced.

A household goods manufacturer in Bedfordshire renegotiated their disposal contract with the same firm when the tax was introduced. Previously, they paid a flat rate of £150 per skip. Now, they pay £70 per skip collection combined with a £20 charge per tonne of waste. Furthermore, they are now producing less waste due to 1995/96 waste minimisation schemes. It is believed that they are now spending less on waste disposal.

ii) **separation of inert and active wastes**

One company in Bristol was informed, by another company in the same sector, that if it separated inert and non-inert wastes, it should see a reduction in disposal costs. Though the company had to persuade its waste management company that it had a case, it now has two skips, one for inert waste and one for non-inert waste, reducing its exposure to the tax.
• **charge minimisation (landfill avoidance)**

Anecdotal evidence suggests that there are other ways in which companies are minimising their exposure to the landfill tax which do not depend on reducing the waste they produce. Exempt activities, fly-tipping, and abuse of civic amenity sites fall under this heading. Clearly a survey, even a confidential one, is unlikely to identify those engaging in the last two activities, both of which may not, ultimately, result in any change in the total waste being landfilled.

However, one construction company interviewed said that it was using rubble from sites it was developing to raise the level of sites by 10cm above the level it would have built at before the tax was introduced. In other words, it was burying waste beneath its ongoing constructs.

• **knew about the tax, analysed it, but concluded they couldn’t do anything**

A food manufacturer in Bedfordshire commented that wage increases and hours allocations are more important factors to their operating costs than the landfill tax. Their view was that another £10,000 on waste disposal costs (i.e. from a doubling of the tax) could be absorbed. The company had considered waste reduction but the gains were seen as small relative to the effort expended, although they noted that waste was becoming more of an issue because of the Packaging Regulations.

• **didn’t know about the tax, have done nothing**

A plaster product manufacturer in Hampshire reports that it is "business as usual" with respect to waste generation. The landfill tax was not considered prior to its introduction nor have waste minimisation schemes, *ex post*. Indeed, the person who costs each contract was unaware of the landfill tax.

**Final Product Pricing**

As regards passing the tax on in terms of final product pricing, only in the construction industry (either by inclusion at the tendering stage or as a result of a levy in the concrete industry) was this an issue. Elsewhere, the tax is simply too small to warrant passing it through into product pricing. Table 1 suggests that waste disposal costs are typically of the order of a thousandth of a percent of total costs. In other words, even allowing for a 50% mark-up, this would add 1 pence to the cost of an item only if it retailed for more than £666. The observation that so few cases exist where producers are passing the tax through in final...
product pricing is confirmed by work undertaken by Coopers and Lybrand (Boulton 1997). The consequence of this is that one of the ways in which, in theory, the tax could work to reduce waste is, at least in the short-term, failing. Consumer demand (and producer behaviour) will not be affected by the tax as long as its impact on cost increases is so insignificant as to have zero impact on final product pricing.\textsuperscript{5}

\textsuperscript{5} One of the difficulties of seeking to elicit this type of response from a survey is that it is very difficult to encourage appreciation of the counterfactual scenario. Thus, even if the landfill tax does not affect product pricing today, waste disposal costs may be one factor which is taken into account in future decisions concerning product pricing.
3.3.4 Local Authorities

The response of householders to the Landfill Tax is not expected to be significant since householders do not pay the tax directly and as a consequence have little incentive to change their behaviour. Furthermore, those who collect their wastes are not responsible for paying the tax directly. Waste collection and waste disposal are separate functions, responsibility for which lies, typically, with the district and county councils respectively. Thus, the incentive structures provided by the tax are diminished in the case of household waste because of the institutional arrangements which govern waste collection and disposal.

The issue as regards waste disposal options and recycling is covered below. In terms of altering their behaviour in response to the Landfill Tax, LAs are constrained by the contracts which they have entered into with waste collection and disposal companies in the past. These may lock them in to the provision of quantities of waste for disposal over a period of years.

An issue which has come to the fore more recently owing to studies undertaken by the Environment Agency has been the influence of different containers on the weight of waste disposed. In particular, LAs’ willingness to supply wheelie bins to households has been criticised in research suggesting that this increases the weight of waste disposed by households. Thus, not only may a cost be incurred in the collection phase through leasing these bins (which may constitute 10% or more of total waste collection costs), but the increased tonnages collected result in higher landfill tax and disposal costs.

The following accounts describe the experience of some Local Authorities:

Bedfordshire

The waste disposal authority in Bedfordshire sees little alternative to landfill in the near term. Bedfordshire is well-endowed with void space and has a poor history with incinerators. Options such as pyrolysis and anaerobic digestion are being considered but though the former looks good on paper, no local authority has really backed it as a solution, so the wait and see approach that has been adopted is characterised more by waiting than seeing. For the foreseeable future, the aim will be to divert waste from landfill but not to other disposal routes.

The County Council is responsible for approximately 180,000 tonnes of waste per year (150,000 from domestic collections, 30,000 from CA sites). They have put in place a scheme to begin recovering household waste beginning in October 1998. In this scheme, householders will place recyclables in a translucent sack and place this in a wheelie bin. The sacks will be sorted from the rest of the waste on a conveyor belt and their contents put through a MRF. There were some issues to be addressed along the way, not least of which was that the District Councils wanted to be paid recycling credits for their involvement in the scheme, but they have now backed down since this is primarily an initiative that has come from the County Council. In addition, one District Council has said that its households will
place the bag outside the wheelie bin. They have effectively argued for more waste disposal space for their constituents.

They have had some problems with fly-tipping. One of the causes cited was that waste collection authorities do not collect bulky waste or collection of asbestos. Their CA sites do not take asbestos as it is special waste so there is a fly-tipping problem, but the reasons appear to be unrelated to the landfill tax. There is also some CA abuse, although they tried to prepare for this by asking those arriving at the sites to sign declarations confirming the legitimate nature (i.e. the non-trade nature) of their wastes.

**Hampshire**

Hampshire County Council is responsible for 738,000 tonnes of household and commercial waste, up from 615,000 tonnes in 1988. Since the closure of four incinerators in November 1996, the only disposal route is landfill. Hampshire County Council, perhaps more than any other, has committed itself to the building of incinerators to take the County’s waste. After consultation in 1993/1994, an integrated waste management strategy was adopted by the County Council and 13 District Councils (and new unitary authorities). The project was given the name Project INTEGRA. This includes:

- expansion of waste minimisation programmes;
- provision of kerbside collection for recyclables to all households;
- increasing the capabilities of 26 household waste recycling centres specifically to incorporate composting (a purpose built composting centre was built at Paulsgrove to process 10,000 tonnes of green waste per annum);
- an anaerobic digestion plant in Southampton to accept biodegradable wastes;
- investment in three MRFs. One of these currently under construction is the largest MRF in Europe;
- construction of three energy from waste incinerators at Somerly, Palligrove and Bromshill; and
- landfilling of residual waste.

These decisions were made in advance of the landfill tax coming into force. Consultations were held before the tax was announced. The integrated nature of the strategy is a consequence of the cooperation between Council and District authorities. In these respects, the tax has changed little, though the financial impact has been significant (see below).

**Cumbria**

Cumbria is responsible for approximately 213,000 tonnes of waste, 190,000 from domestic collections and 23,000 from CA sites. The landfill charge in the area is very low, ranging from as low as £7.40 per tonne to £14.00 prior to the tax, and the Council is tied to landfill disposal through contracts which it has already entered into. Recycling is relatively expensive because of the costs of transporting materials. However, CA sites are encouraged to carry out recycling.
The Council’s own engineering department is trying to minimise landfill by avoiding landfilling inert wastes. A contract with a crusher is being considered, and it the possibility of specifying the use of secondary materials in new contracts was looked into, but not carried forward for the simple reason that raw materials were often cheaper than secondary materials.

The Council is currently preparing new tenders for contracts which will be let in the near future. These will be of seven years’ duration, and the Council perceives a real problem on the basis that although it expects the Landfill Tax to increase, it has no idea how large any increase might be over the lifetime of the contract. Incineration is unlikely to figure in these plans. The possibilities for using pyrolysis and anaerobic digestion have been raised, and the impending Landfill Directive is forcing a closer look at materials recycling and resorting. The Council has always paid recycling credits though there has not been a great deal of interest shown in these.

As regards waste arisings, no data of any use is available prior to the creation of the LAWDC five years ago. Waste to landfill has been increasing over the last three years. Though the Council does use some wheelie bins, and these were introduced in selected areas three years ago, they are not convinced this is the real reason for the increase. Falls in tonnages may be related to whether the summer has been wet or dry.

Bristol

The reorganisation of local authorities in the Bristol area and surrounds has led to the creation of four Unitary Authorities from the previously existing Avon County Council. These are Bristol, North Somerset, South Gloucestershire and Bath and North East Somerset. Three of these four have essentially agreed to collaborate on waste matters with North Somerset going its own way.

The incinerator at Avonmouth has closed down recently, and is now being used as a transfer station. The Council is presently trying to see whether this could be retrofitted. Historically, under the old arrangements, half of Bristol’s waste went by rail to Buckinghamshire. This is still the case today. Bristol has ‘inherited’ the rail scheme. There is one local authority owned landfill in South Gloucestershire, and three privately owned ones in the area, but the rail arrangements are a reflection of the fact that the area has to look beyond its borders to dispose of waste to landfill. The tax and the closure of the incinerator have had a significant impact on the way waste disposal is costed, and each of the three collaborating unitary authorities is currently considering waste disposal plans through contracts let to management consultants.

Bristol has problems with CA sites, one of which, at Kingswood, is now running at capacity. The increase is approximately 20-25% over last year. Wheelie bins are leased by the Council which actually makes the collection job easier for contractors whilst it incurs a cost for the Unitary Authority. As a result, or so it is felt, of their use, waste arisings have increased by 7% since they were introduced. There is a feeling that current structures simply do not reflect the imperative to reduce waste. Bristol feels
hemmed in by contracts it has already let. The performance of contractors has not been particularly promising as regards recycling, and when approached on the matter, the company concerned has not been afraid to threaten the Council with non-collection of waste.

Other Local Authorities

A survey of WDAs (Waste Disposal Authorities) conducted by NAWDO (National Association of Waste Disposal Officers) suggested that of the 33 respondents, only 8 indicated increases, or suspected increases in fly-tipping, whilst 9 noted increased waste arriving at CA sites (NAWDO 1997). NAWDO’s survey, to which just over half of the WDAs responded, identified 11.2 million tonnes of waste of which 99% was landfilled. The average pre-tax landfill charge was £11.93 per tonne. The average recycling rate envisaged for the year 1998/1999 was 10.5% for 24 WDAs responding to the question (NAWDO 1997).

3.3.5. Environmental Bodies

On 15 October, HM C&E formally approved ENTRUST as the regulator of the Environmental Bodies. ENTRUST is responsible for enrolling Environmental Bodies, who, if they meet the application criteria, can, once registered, receive landfill operators’ contributions under the Landfill tax Credits system (HM Customs and Excise 1996b). Under this scheme, operators may claim a credit against their landfill tax payments if they make a voluntary contribution to an approved environmental body. The credit is limited to 90% of the contribution, and the total amount of credit that may be claimed in any landfill tax year is limited to a maximum of 20% of the operators’ landfill tax in that period. Given the estimated revenue from the tax of £450-500 million, the theoretical maximum which could go to Environmental Bodies would be £90-£100 million. The types of activity which can be carried out by Environmental Bodies include projects as diverse as land reclamation, recycling, and repairing a place of religious worship in the vicinity of a landfill site. Critically the activity does not have to be linked with aims of the tax itself.

A number of problems appear to have bedevilled this scheme, despite its being, at least on the surface, an ideal opportunity for landfill operators to give a much needed boost to the public image of the waste management industry. As a result, out of a current estimated collection of £250-300 million, implying a maximum donation to the Bodies of £40 million, only £1.85 million had actually been paid. Though operators have made further commitments, problems as highlighted by landfill operators relate to concerns over liability to pay Landfill Tax, Corporation Tax or both.

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6 This is different for different operators, who registered for one of three staggers, beginning at the start of October, November and December 1996 respectively. The amount on which credits can be granted is not carried forward from one year to the next. Thus, the latest stagger finishes its Landfill Tax year at the end of November. A one month’s grace period extends the period over which operators may make contributions.

7 Personal communication with Dr. Richard Sills, Chief Executive of ENTRUST.
HM Customs and Excise has tried to make it clear that concerns of liability for the Landfill Tax if the environmental body acted incorrectly are ill-founded.

The issue of corporation tax has proven more difficult to resolve. Although ENTRUST has tried not to register Environmental Bodies where they generate a direct benefit for the landfill operator, the Inland Revenue’s perspective on the contributions made by operators may be, ironically, that since they are not directly related to the work of the operator itself, they are liable for Corporation Tax. In this case, the operator would be forced to pay tax on the whole contribution. Furthermore, since the contribution and the Landfill Tax credit are treated separately, the operator would have the amount which they can offset against tax further reduced by the amount of the credit. Some waste management companies have tended to treat this more seriously than others. The issue, however, has not been resolved by statements from the Inland Revenue along lines that though they are unlikely to find against operators in this matter, they reserve the right to do so. This seems a somewhat inadequate response, and remains a disincentive for operators who might otherwise make (greater) contributions. Somewhat unhelpfully, the Inland Revenue has suggested, as a ‘solution’, that operators pilot small donations this year to see how the system works. Few companies are likely to follow this ‘suck it and see’ approach to tax issues.

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8 The phrase “direct benefit” has been used frequently, and seems intended to imply that no Environmental Body should be receive funding to do things which an operator is required to do anyway.
9 This is the figure as at 12 June 1997.
4.0 BARRIERS TO THE EFFECTIVENESS OF THE LANDFILL TAX

As set out in Section 2.0, the Landfill Tax aims to affect changes in behaviour by waste producers and waste managers that results in: a reduction in the amount of waste generated; increased recovery of the material and energy value of waste; and a reduction in the amount of waste disposed via landfill. The theory is that by increasing the price of landfill, incentives will be created not only to reduce the amount of waste going to landfill but also to increase efforts to reclaim value from waste and to reduce its production. The theory is simple by comparison with what happens in practice. Orthodox economic theory treats firms and individuals as economically rational. In reality economic behaviour is structured by factors other than price, and by the limited capacity of actors to assimilate all relevant (price) information concerning their actions. The effectiveness of the tax is dependent upon both the nature and magnitude of the price signals provided by the tax and other regulations and a number of other factors. There are a number of issues which appear to impede the effectiveness of the Landfill Tax in achieving its aims and among the more significant barriers are:

- lack of well-developed alternative options (structural issues);
- lack of information;
- investment costs;
- pass-through of the tax;
- size of the tax; and
- institutional culture.

These will be addressed in turn below. There is, as should become clear below, some logic in addressing these issues in this order, and it is hoped that the linkages will become clear.

4.1 Lack of Well-developed Alternative Options

The ability of waste producers to alter their behaviour in response to the Landfill Tax is conditioned first and foremost by the availability of alternative options available to them. These can be summarised as minimisation, re-use, recycling, composting, and alternative routes of disposal such as incineration. The lack of well-developed alternative options is reflected in the statistic that some 90% of all domestic waste is still disposed to landfill. The roots of this dependence on landfill are historical.

As early as 1914, 338 refuse incinerator plants had been constructed in Great Britain with 225 incorporating boilers for heat recovery. Strong growth in waste incineration capacity occurred in the 1960s and 1970s owing in part to the fact that landfill standards were poor and good sites close to conurbations were difficult to obtain, but also to the availability of new technology such as moving grate plants with improved gas cleaning systems of cyclones and electrostatic precipitators. 47 new plants were constructed in the period 1966-78, though only 8 included energy recovery in some form.

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10 These factors again act to dampen enthusiasm for the idea of setting taxes on the basis of externalities. The assumption that behaviour will change in ways predicted by the theory simply do not hold water.
The incineration boom ended in the 1970s, the most significant event being the switch in responsibility for waste disposal from the district and city councils to the Metropolitan Authorities and Shire Counties (and the Greater London Council). The area of planning responsibility increased, and new areas suitable for landfill development became available. Also, constraints placed upon local authority expenditure effectively priced incinerators out of the waste disposal market. New contractors offering long distance landfill disposal to large sites (often mines or quarries) emerged, the capital cost of the sites being extremely low (if not zero).

The recent history of UK waste management has been based very firmly on disposal to landfill. The main reason for this is its low cost which is based upon the fact that if there is a ready supply of void space, it is an inherently low cost process and it has not had to pay for its environmental costs. The Environmental Protection Act of 1990 introduced a number of measures which have increased the costs of operating landfill sites. However, relative to other options, landfill is still cheap. In some areas where landfill charges are high, the Landfill Tax has made incineration financially competitive, especially when support is available through the Government’s Non-Fossil Fuel Obligation (NFFO) programme. In many areas, even with the tax in place, landfill disposal remains the cheapest waste management option. Table 3 gives an indication of the relative costs of various waste management options.

Notwithstanding these changes, the alternative options to waste disposed to landfill remain poorly developed.

Waste Minimisation:- The potential for waste minimisation is increasingly well appreciated by companies in the UK. Waste minimisation does not simply reduce the costs of waste disposal. It also reduces the cost implied by wastage of raw materials. This is significant since although the costs of waste disposal are typically a small fraction of total company turnover, the cost of wasted materials can often be far more significant in terms of total company turnover. In seeking to encourage waste minimisation, the landfill tax is a somewhat blunt instrument. By increasing the costs of waste disposal, the focus tends to fall on these costs without necessarily encouraging firms to assess the costs implied by wasted materials. To the extent that companies may not have looked at these before, the landfill tax may not be able to encourage firms to appreciate a significant benefit of waste minimisation.
<table>
<thead>
<tr>
<th>OPTION</th>
<th>COST PER TONNE</th>
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<tr>
<td></td>
<td>Coopers and Lybrand (1993)</td>
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<tr>
<td>Landfill (Pre-Tax)</td>
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<tr>
<td>Urban high cost area</td>
<td>22.5</td>
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<tr>
<td>Rural high cost area</td>
<td>15</td>
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<tr>
<td>Urban low cost area</td>
<td>10</td>
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<tr>
<td>Rural low cost area</td>
<td>7.5</td>
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<tr>
<td>Incineration</td>
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<tr>
<td>Mass Incineration</td>
<td>15-20&lt;sup&gt;2&lt;/sup&gt;</td>
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<tr>
<td>WTE Incineration with NFFO</td>
<td>20-30&lt;sup&gt;3&lt;/sup&gt;</td>
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<tr>
<td>without NFFO</td>
<td>(25-30)-(35-40)</td>
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<tr>
<td>Recycling</td>
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<tr>
<td>Bring</td>
<td>16-36</td>
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<tr>
<td>Blue Box</td>
<td>85-175</td>
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<tr>
<td>Green Bin</td>
<td>55-70</td>
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<td>Green Bag</td>
<td>55-75</td>
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<td>Composting</td>
<td>35-50</td>
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<td>M.E.L. (1995)</td>
<td>£1-£3 (inert)</td>
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<td>Holmes (1996)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>8-10</td>
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<td>W. S. Atkins (1993)</td>
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<sup>1</sup> Includes landfill tax.
<sup>2</sup> Inclusive of incinerator cost.
<sup>3</sup> Inclusive of NFFO cost.
At least three players within those surveyed from the waste management industry clearly see the tax as a way of moving their industry towards higher value-added areas in which, rather than merely picking up materials for disposal in landfill sites or incinerators, they are able to offer a service to customers in line with the need to make waste management more sustainable. To this end, some companies are already seeking to provide more information and advice to customers so as to help them reduce waste bills at minimal cost, or sometimes, with net benefits to them.

Some of the waste producers surveyed were somewhat sceptical of this more enlightened service which the waste management industry purported to offer. This may be a reflection on the industry’s past as much as an assessment of the current situation since the industry is clearly undergoing some upheaval. One large company surveyed was particularly cynical, commenting that when it asked for waste management advice in the past, it was told, ‘You need more bins.’ This points to a general problem for the waste management industry, that of the need to divest itself of its somewhat lack-lustre past in terms of its commitment to sustainable waste management. Certainly, a full commitment to service provision founded on sound advice and a response to the needs of customers will go a long way to improving the industry’s image, though indications are that sustained efforts will be required. One aspect of this might be an increasing landfill tax, which many waste management companies see as inevitable, but which would provide an incentive to offer a higher value-added service to customers.

recycling: in 1990, the UK Government set a national target for recycling of 25% of household waste, or 50% of the recyclable component by the year 2000. The target being applied to the nation as a whole implied that not all local authorities were expected to meet this. However, local authorities are required by law to produce recycling plans.

In 1991-92, the Supplementary Credit Approvals (SCAs) programme was introduced aimed at helping local authorities invest in recycling infrastructure and related projects. However, SCAs were scaled back from £16.4 mn in 1995/6 to £10mn in 1996/7 and £5mn in 1997/8. The DoE argued that the possibility now exists for increased private sector spending on recycling initiatives through Environmental Bodies, in addition to spending on recycling and packaging through Producer Responsibility (ENDS 1995).

In April 1992, a system of recycling credits was introduced, obliging WDAs to pay WCAs on a mandatory basis a sum equivalent to the costs of disposal avoided through WCA recycling schemes. These were increased in 1994 so as to include full savings on disposal costs. In addition, WDAs pay third parties, such as charities, the avoided costs of disposal on a discretionary basis. Another scheme includes the Environmental Action Fund, a DoE scheme which provides matching grants to voluntary groups carrying out recycling. The Government requires that the landfill tax be included in the recycling credit paid by WCAs. However, since the tax includes no accounting for externalities associated with the benefits foregone through not recycling, the recycling credit still fails to capture the full benefits which accrue from recycling.
Effectiveness of the Landfill Tax in the UK: Barriers to Increased Effectiveness and Options for the Future

Provision of facilities for recycling varies enormously from one local authority region to another. The Audit Commission reports variation from Wear Valley District Council’s 0% recycling rate to Weymouth and Portland’s 21.9% (Coslett 1997). A Press Release concerning work funded by the DoE on household waste arrived at some alarming conclusions regarding recycling. Of an estimated 26.4 - 26.9 million tonnes of household waste arisings in 1993/4, the total amount recycled and composted amounted to 1.2 million tonnes, or 4.7% of the total (ENDS 1997, 12). This percentage may be slightly higher now owing to growth in kerbside collection schemes and composting, but heroic efforts would be needed to meet the Governments 25% target by 2000.

Recycling activity does not seem to be correlated with the costs of waste disposal, raising the question of how the tax is passed through to those generating the waste (see Section 4.4). The commitment of councillors in the relevant area may be a key factor determining the extent of provision for recycling, and party political orientation may be significant. Furthermore, as mentioned above, the nature of contracts which LAs are locked in to may limit their ability to change matters, certainly in terms of a response to the Landfill Tax. The opinion was also expressed in our survey of local authorities that waste collection companies were doing little to meet recycling targets specified in contracts. Some such contracts have specified targets to be met by the end of the contract, and there appears to be concern that the spirit, if not the letter of these contracts is being broken by poor performance in the period running up to the day when targets have to be met. When pressed on performance targets, collection companies have occasionally retaliated by simply threatening to withdraw their services.

The DoE has expressed concern that the separation of collection and disposal responsibilities leads to a lack of strategic planning for materials recovery through investments in MRFs (Anon 1987b). The argument has been used to advocate closer collaboration between WCAs and WDAs so as to plan for these investments. However, this assumes that there are no alternatives to large scale commingled MRFs in seeking to meet recycling targets. This assumption may be questionable in the light of the extent to which community recycling schemes, and other kerbside collections where waste is separated at source, have proven successful.

A danger associated with the landfill tax regarding recycling is that, since the Government has determined that the payment of recycling credits must include a landfill tax payment, the discretionary payments to voluntary groups will fall under the axe as County Councils review their spending plans. Some County Councils have already sought to do this (Boden 1997; Kirkby 1997). This is not to argue that such credits should necessarily be mandatory since there are good reasons for making such awards on a discretionary basis (Redmayne 1997). However, to withdraw support from established schemes would appear to be somewhat unhelpful unless this is done for strategic reasons. One of the benefits of introducing the Recycling Credits scheme was that in calculating these, Councils were to be made aware of the true costs of collection and disposal of waste. It is not clear that all Councils took this exercise seriously, and as a result, the perception of Recycling Credits is that they represent a cost to the Council, and are therefore, to be discouraged.
The recycling of industrial wastes is firmly established in some sectors and almost non-existent in others. Much appears to depend on the financial cost of the resource concerned, or on the costs of its disposal (especially where the waste is classified as special waste). With regard to the former, the textiles sector routinely recycles waste fibres, and though nickel, a more expensive metal, is often recycled, zinc, which is much cheaper, is recycled less frequently.

Whilst the Landfill Tax gave a nudge to all companies to start them down the ‘road to recovery’, the Producer Responsibility Obligations (Packaging Waste) Regulations have pushed obligated companies even further down this route. A number of schemes exist to help obligated companies reach targets in terms of Packaging Waste Recovery, and most waste management companies report a growing interest in recycling amongst customers. Exactly how these changes will affect the market structure and prices for recovered materials is as yet unclear. However, the outlook would be improved if attention was given to measures to stimulate the demand for recycled and reprocessed products, and improving institutional arrangements so as to encourage investment in reprocessing and recycling infrastructure.

A clear impact of the tax has been that it has encouraged waste management companies to invest in materials recovery facilities (MRFs), and to a much lesser extent, composting. One reason for this is that landfill operators who do not declare landfill tax on their invoices to customers do not have to pay the tax to C&E. Thus, companies may effectively charge so as to include a tax on landfill even though some of the waste may be recovered and not disposed to landfill sites at all. By this means, landfill operators effectively create a form of recycling credit for themselves where the use of MRFs allows them to keep the avoided costs of disposal associated with that tonnage of waste diverted from landfill. Some companies are passing back benefits to customers who separate at source where market conditions allow.

Composting- the composting of municipal waste is still largely in an embryonic phase. However, the landfill tax is certainly leading to greater attention being given to composting of garden wastes from households, either collected on collection rounds or through CA sites. A number of obstacles have served to slow the rate at which composting schemes have been taken up. One of these is the low charge for landfilling of waste. The landfill tax is causing companies to take a closer look at options such as composting, and with the Landfill Directive on the horizon, there would appear to be increased potential for composting schemes to be developed in the forthcoming years. Other barriers to composting include licensing issues, of relevance for all scales of operation, and those of planning.

A number of schemes are now operating around the country. Gate fees typically have to be lower than landfill gate fees, and yet cover the capital and maintenance costs of the schemes involved. Thus, as the tax increases, and the overall landfill charge per tonne increases in step, composting should become increasingly viable commercially. This will be all the more likely where the end product can be absorbed by stable market outlets.
Incineration: at the end of 1989, there were 35 incinerators in operation of which only four were equipped to recover energy. No incineration plant was commissioned on the UK mainland between 1978 and 1994 (Holmes 1996). In 1993, only 23 incinerators were reported to be operating, but the majority have now ceased operation owing to the effects of EU Directives 89/369/EEC and 89/429/EEC which required new standards to be met by the end of 1996. By this time, estimated capacity was set to fall to around 1.25 million tonnes from six or seven incinerators (DoE 1995, 54). The DoE estimates, however, that capacity could increase to 5.5 million tonnes by the year 2000 through upgrading of existing incinerators and the development of new ones (DoE and WO 1995, 55).

Certainly, the NFFO and the landfill tax make incineration more viable financially relative to landfill, but as indicated above, the costs of incineration are still much higher than those for landfill. NFFO is an important initiative for creating incentives for increased incineration capacity. NFFO is a subsidy scheme which is being used to subsidise the output of incineration with energy recovery, but evidently, this output is dependent on adequate inputs in the form of waste. Such a demand for waste may run counter to achieving the aims of the Landfill Tax to reduce the amount of waste generated and maximise recovery of value from waste. In environmental terms, there remain unanswered questions concerning the impact of toxic emissions from incineration, problems associated with fly-ash, and issues relating to competition with recycling for materials for combustion (Thomas 1997). These issues are reflected in discussions concerning the position of incineration in the waste management hierarchy (see above). It could be argued that in the absence of a tax on incineration, the NFFO scheme unfairly subsidises a waste disposal option, a process which, though helping to meet NFFO obligations, is inconsistent with sustainable waste management policy.

It is worth noting that many other countries which have introduced a waste tax include incineration within the tax albeit at a lower rate in most cases. This point is expanded upon in the next chapter.

Lastly, since capital investments in incineration are significant, the contracts required for them to be profitable may stipulate minimum tonnages for delivery to the incinerator. Penalty clauses may come into play if deliveries fall short of this level (Thomas 1997). The experience of Germany is instructive as regards over-investment in incineration. Sullivan (1996) reports that Germany found it necessary to import waste from Brazil to maintain capacity at incineration plants owing in part to successes in waste reduction and recycling. In the absence of other measures, one would expect that short-term financial considerations will tend simply to shift waste from landfill to incineration over time.
4.2 Lack of Information

The waste industry has been called the dataless industry. This applies equally at the level of companies as to the level of the UK as a whole. Thus, a key problem as regards waste has been that decision makers in many companies simply do not know what wastes they are producing, and therefore, what they might do with these wastes that they are not doing already. Research conducted in advance of the landfill tax estimated that although waste was costing UK industry £2.6 billion, some 44% of UK firms did not keep track of waste costs, and over half had no plans for waste minimisation (Biffa Waste Services 1994). A positive impact of the landfill tax is that it has clearly made some companies take note of their waste streams and the costs of their disposal where they had not done so before, though others still have not changed their management practice.

The issue which follows from acquiring greater knowledge concerning waste streams is that of seeking the best technologies and techniques for reduction, re-use and recycling of wastes, or alternative routes of disposal. ECOTEC’s own work shows time and again that in this respect, there are technologies and techniques that firms could adopt today which would increase their profits considerably. Although it is certainly true that some such investments are not made because of the requirement for short payback periods, others would actually meet this criterion. In many cases, therefore, there are things that companies could be doing today if they were functioning in an economically rational manner, but which they do not.

The effectiveness of environmental taxes is currently the subject of much empirical investigation. The evidence available thus far is not uniformly positive in terms of the response that such taxes have elicited from the actors targeted. Typically, the response of actors to incentives working through the price mechanism is measured in terms of elasticity. Elasticities are not set in stone, and are influenced significantly by the prevailing institutional setup within which actors function, and the availability of information and the costs of its acquisition. The nature of the problem of information is contained in the paradox that the benefits which flow from acquisition of information cannot be known in advance. The outcome of the process in terms of net costs and benefits cannot be known.

As noted above, the response of companies to a tax will be conditioned by the availability of options facilitating responses in ways which lessen their liability to the tax. This is the necessary but not sufficient condition for improving the elasticity of response to the tax. In addition, actors targeted will need:

- to be aware of the options;
- to be aware of the financial implications of these options for their enterprise or household;
- to have adequate access to financial resources to purchase the necessary equipment; and
- to understand the new skills requirements (if any) associated with the options which they are considering.
Different companies will have access to different sources of information, and will also be able to devote different levels of resources to information acquisition and use. If information and the resources available for its acquisition are limited, the result will be that companies are more limited in their ability to respond to the tax. As the tax increases, those targeted are more likely to perceive the search as worthwhile.

A consequence of the paradox noted above is that some enterprises may perceive, often wrongly, the costs of seeking such information to be beyond what they can afford. They may have limited resources available for such a search process. Alternatively, managers, or those in a position to undertake such a search, may not perceive that the information that might arise is of any utility for their purposes. This suggests the need for complementary measures, which reduce the costs of acquiring information, to increase the elasticity of actors’ response to any given tax.

Some such measures are currently in place. These include the DTI’s Environmental Technology Best Practice Programme in which best practice techniques for a given industrial sector, which often involve waste minimisation processes that result in net benefit to the companies concerned, are identified and promoted throughout the UK. The Environment Agency, within its pilot schemes for a National Waste Survey, has been testing a guide on waste minimisation and waste management (ENDs 1997c). In addition, there are now some 50 waste minimisation clubs operating around the UK, each seeking to benefit from economies of scale in obtaining information, and facilitating an exchange of diverse experiences. The successes of these initiatives suggest that they should be pursued more actively on a wider scale.

At the Local Authority (household) level, information is provided by groups such as Waste Watch and Going for Green. These initiatives depend, for their success or failure, on the quality of information they provide, and the channels for its dissemination.

Another potentially useful measure would be the provision of environmental management training for company managers to enhance their awareness of the relevant issues, and their significance to their company.

4.3 Investment Costs

Even once information concerning waste management options is made available, there is no guarantee that the techniques which have become known will become used. Closely related to the issue of information and the costs incurred in its acquisition, indeed part of it, is the issue of the payback time of investments in waste minimisation equipment, and indeed, of the payback associated with waste segregation. This can be divided into two separate issues, that of an incomplete assessment of the implications of investment, and that of the nature of the decision-making process concerning whether or not to make such investments even when the revenue implications are known with some certainty:
Incomplete assessment: as discussed above, a number of companies have limited resources to seek and acquire information. In addition, once they become aware of, for example, a waste minimisation technology, they may be equally limited in their ability to understand the implications of the particular investment for their business. Thus, waste minimisation processes may be dismissed on grounds of cost without a thorough investigation of the implications for the business concerned. Precisely because of this issue, the ETBPP recently commissioned ECOTEC to produce a booklet aimed at helping companies to make a more informed analysis of the financial implications of investments in waste management (ETBPP 1997):

decision-making process regarding investments: a number of institutional factors operate to weed out many investments in waste management that might otherwise be made. In particular, many companies screen investment decisions on the basis of their payback time. This implies that waste management investments must pass a cost benefit analysis test which uses a very high discount rate. Evidently, removing this obstacle to improving waste management practices is beyond the remit of those charged with waste policy. One factor that may improve matters in this respect would be some factor incorporating expectations of how the landfill tax, and disposal costs more generally, will change over time. Increases, announced in advance, would also facilitate more informed, and more positive decision-making in favour of new investments in this area.

Certainly, there is increasing evidence that the financial environment in which companies function in the UK mitigates against more future-oriented strategies. This implies that the discount rate applied to these activities will continue to be unhelpfully high from the point of view of waste management since the flow of benefits from such investments may be steady over a period of time rather than spectacularly high over the short-term. Even so, waste minimisation schemes, such Aire & Calder, and Project Catalyst have identified a number changes with quite short payback periods. To the extent that these are successful locally, they may provide a useful guide as to what could be achieved in other parts of the country

4.4 Pass Through of the Tax

The idea that waste producers will change their behaviour in response to a tax on the tonnage of waste disposed to landfill assumes that the tax will filter through to them as just that, a tax on the weight of waste being disposed to landfill. It is far from clear that this does actually occur.

The process of moving waste from its site of generation to its ultimate point of disposal requires that it be first collected and then disposed. The collection and disposal parts of the process are usually carried out by separate organisations, and even when part of the same company, the collection and disposal operation often function as separate cost centres, allowing the collection arm to follow the least cost route of disposal. The implications for the effectiveness of the tax in terms of changing the behaviour of waste producers is assessed below.
Households / Local Authorities

Clearly, in the case of household waste collection, there is no pass through of the tax in a way which reflects the tax’s purpose. Indeed, there is no standard way in which the tax is passed on from local authorities (LAs) to those who pay the Council Tax, part of which is used to cover the costs of waste collection and disposal. Thus, one LA could have chosen to reduce services in other areas so as to account for the increased costs of waste collection and disposal resulting from the introduction of the tax (especially where expenditure capping is applied), whilst another might simply have added a charge on all council tax payers to cover the added costs in full. Irrespective of the actual path followed in any local authority, the marginal cost of each unit of waste generated by a household and ultimately destined (as is approximately 90% of all household waste) for landfill would remain zero. In other words, there is no incentive for individual households to reduce waste disposal since they will not see the benefits which should arise from their actions. In short, there is no incentive for them to change their behaviour.

Commercial and Industrial Units

Many commercial and industrial units, particularly those that do not generate large amounts of waste, encounter a situation not dissimilar to households in that the tax is not passed through in a way which encourages them to minimise the production of waste. The reasons for this are that typically, the charge for waste collection has not been levied on a per tonne (or on any metric of waste) basis. More usually, the body responsible for collection charges on the basis of a collection visit, the level of charge varying with the size of the container being emptied. In other words, there is no variation in charge from week to week on the basis of weight of waste generated. The variation has tended to come principally through the volume of the container being collected/emptied.

There is every reason to believe that this would be the case even if all landfill sites were equipped with weighbridges that were used to weigh all wastes arriving on site. This is for the simple reason that the collection of waste does not always involve weighing wastes at the point of collection. There is, therefore, an issue as to how waste collection and waste disposal are dealing with the pass through of the tax. For landfill operators equipped with weighbridges, the answer seems simple - the waste arriving at the site is weighed and the charge is calculated accordingly on the basis of whether the waste is active or inactive (mixed wastes falling into the former category with limited exceptions). In practice, different operators have passed on the tax in different ways, with many passing through to customers an administrative charge (whose exact magnitude varies across the industry) on top of the tax.

For waste collectors, the answer is, as yet, less clear. The Landfill Tax has made those charged with waste collection from industry reconsider their charging structures. Broadly, one can say that the tax, and with it, expectations of its increasing, has forced waste collectors to introduce a weight-based element into their charging scheme. The exact nature of this again varies across the industry and is
sometimes applied on the basis of the average weight of one of a number of collections. Thus, the tax is not being passed on in such a way as would create incentives for reducing waste disposal. For a large number of actors, the weight basis of charging is merely reflected through an adjustment of the charge in line with the average density of waste produced.

For some smaller businesses, the tax is simply not an issue since they see it in neither shape nor form. Many are in the same situation as households. One company in the ECOTEC survey rents the premises from which they operate and the rental charge includes the costs of waste disposal. They have no incentive to minimise waste generation.

One impact which a higher weight-based tax might have on companies that have been used to being charged on the basis of a visit to their premises is that the increasing proportion (or absolute magnitude, in the case of rising landfill charges - see below) of the total waste disposal charge that is based on weight will act so as to urge companies to ask that their waste disposal costs be assessed more closely in relation to the weight of wastes disposed. In other words, as the marginal cost of each tonne of waste disposed increases, more firms are likely to be more interested in minimisation, and in reaping the benefits of these efforts in proportion to the reduction in weight of waste disposed. This is likely to increase the demand for on-vehicle weighing systems in the waste management industry.

4.5 Institutional Culture

Other issues which will perhaps limit responses to a tax such as the landfill tax include the culture of some targeted actors, and their perception of the tax and its aims. The attitude of those targeted is an important issue, especially where an individual has responsibility for an enterprise’s response. With respect to perception, the feeling that the tax is merely a burden on industry rather than an instrument designed to prompt a response (which may even be helpful to some of those targeted) potentially dampens the likelihood of such a response. The low priority given to waste management policy in the past also mitigates against a quick and positive response to the tax. Indeed, the desire of local authorities in the past to seek simply to minimise costs of waste disposal may be difficult to overcome.

In some larger companies, our survey has shown that central headquarters often leave waste management decisions at individual plants to the individual managers. Much depends on the enthusiasm, or otherwise, of these managers for dealing with issues relating to waste generation and disposal. This suggests that individuals’ perception of waste issues can be a significant determinant of responses to instruments such as the Landfill Tax. The perception by individuals of waste issues as deserving low priority in part reflects the UK’s history of cheap disposal mentioned above. A significant barrier to changing such perceptions involves moving waste management up the company’s management hierarchy, hence greater progress up the waste management hierarchy will be assured.
4.6 **Level of the Tax**

The OECD typically divides environmental taxes into those which are intended primarily to generate revenue, and those designed to have an incentive effect on targeted actors. The making of this distinction implies that taxes can generate revenue without creating incentives for behavioural change. This in turn implies one or more of the following:

- the elasticity of response to the tax is very low reflecting the lack of available options; or
- the tax is not sufficiently high to encourage those targeted to adopt alternative courses of action; or
- those targeted are constrained in their behaviour by up- and down-stream actors.

When an environmental tax is low, alternative courses of action are less likely to be explored or considered by a company. Thus, the strength of the incentive given by an environmental tax is an important factor in driving environmentally beneficial changes.

To state that a tax has been set too low to have the required environmental effect is to imply one of two things:

- that the tax, being set on the basis of particular criteria, has not fully met these criteria; or
- that the desired effect of the tax is known in advance, and has not been met.

The first of these is certainly true of the Landfill Tax if one takes as its aims those given in the Waste Strategy. Not all externalities have been fully captured, or accurately assessed, so there may be a case for increasing the tax on these grounds.

However, it has been argued above that it may be better to use the tax as a means of meeting certain agreed policy objectives. In this regard, it should be recognised that the landfill tax is only one of a number of policy instruments that can be used either separately or in combination to achieve a given objective. In this case, the argument is not so much for an increase in the tax per se, but for an increased in effort in general to meet the agreed objectives.

On the other hand, one is forced to ask which other instruments are on the horizon, and by how much are these, and others already in place, likely to reduce waste arisings? If one accepts that the answers to these questions (especially if the Landfill Directive targets are to be met) are, respectively, very few, and an insufficient amount, the issue of the level of the tax becomes more significant. Furthermore, a higher level of tax would increase the stimulus provided to develop alternative options such as recycling and composting, whilst it might also induce institutional and technical changes that facilitate a fuller pass-through of the tax.
A higher level of tax would, it is expected, increase the likelihood of investments being made in waste minimisation; exert pressure on those charged with waste collection to reflect the marginal costs of waste disposal in their charging structures; and increase interest in recycling and composting accordingly, and above the level already stimulated by the tax at its current level. In addition, the higher level could be expected to stimulate greater efforts to seek information concerning alternative waste management options to the status quo.
5.0 EXPERIENCE IN OTHER EUROPEAN COUNTRIES

A number of other European countries have experience with charges on waste disposal. These exhibit variation in what is taxed and in how elaborate the scheme of charging is (see Table 3). There is limited evidence concerning the effectiveness of these charges in achieving their aims. However, in general it can be stated that, unlike the UK Landfill Tax, the taxes have not been set strictly on the basis of an assessment of externalities. However, like that of the UK, they are levied on a per tonne basis. One country which has a good deal of experience with a waste tax is Denmark, where a tax was introduced in 1987. The following assessment is based on work undertaken on behalf of the Danish Environmental Protection Agency for the purposes of evaluating the tax (Andersen 1997).

5.1 Denmark

The Danish tax was conceived in 1985 by the Environmental Protection Agency, and introduced at the start of 1987 after a decision by the Danish Parliament. It is a weight-based tax, and is levied on all waste delivered or processed at landfills or incinerators. The motivation for the tax was the scarcity of available void space and concerns regarding dioxin emissions from incinerators. However, it was also considered to be a key policy tool in helping to meet the recycling target of 54% of total waste by 1996, set in the Action Plan for Waste and Recycling.

Originally, the tax was applied at 40 DKK per tonne to landfill sites and incinerators receiving municipal waste. The tax was then broadened to include smaller private sites at the beginning of 1990. In addition, the tax has experienced several increases, for both fiscal and environmental reasons. The 1989 increase to 130 DKK was to support the Action Plan for Waste and Recycling proposed that year. A differential between landfill and incineration tax rates was introduced in 1992, the rates being increased to 160DKK for incineration and 195DKK for landfills, reflecting the original priorities of the tax, one of which was to minimise landfilling.

A new increase was announced in 1993, designed to take effect from 1997. This aimed to further differentiate the tax by applying different rates to incineration with and without energy recovery. When, in 1996, the Parliament was considering the State Budget, the planned increase was steeped up by a further 50DKK, so that as of 1997, the rates stood at 210DKK for incineration with energy recovery, 260 DKK for other incinerators, and 335 DKK for landfill. This latter increase was motivated primarily by fiscal concerns as the Danish Government sought to shift taxes from income to pollution. Exempt from the Danish tax are hazardous waste, hospital waste, sewage sludge of a quality sufficient for spreading, fly ash, clean soil, straw, and clean wood waste. Waste that is reused or recycled is not subject to the tax, nor is that which is removed from the site.
### TABLE 3: EXPERIENCE WITH WASTE TAXES IN OTHER EUROPEAN COUNTRIES

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of Introduction</th>
<th>Rate per Tonne</th>
<th>Other Features</th>
<th>Rationale</th>
<th>Tax as % of Pre-tax Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>Jan 1993</td>
<td>25Fr applied to non-hazardous waste. Rate was to be increased by 5Fr per annum to 1998. Tax for hazardous waste due to be introduced in 1995 to be applied with maximum rate to landfill, intermediate rate for incineration and other treatments, zero rate for recycling.</td>
<td>Law passed in 1992 states that as of July 2002, only waste that cannot otherwise be managed should be landfilled (about 50% of waste is currently landfilled), Tax Revenues to be used for improved waste management. Anecdotal evidence suggests these targets will not be met.</td>
<td>✔ ✔ ✗</td>
<td>Approx. 10-30%</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Jan 1995</td>
<td>29.20 NFL</td>
<td>Incineration may be taxed in future - not initially, but intention in tax proposals to do so</td>
<td>✔ ✗</td>
<td>Approx. 33%</td>
</tr>
<tr>
<td>Austria</td>
<td></td>
<td>12.3 ECU per tonne</td>
<td>Treatment and Recycling</td>
<td>✗</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>Waste disposal taxes in 4 Länder</td>
<td></td>
<td>✔ ✗</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td></td>
<td>3.1-18.9 ECU per tonne 1997: 14 - 50 ECU per tonne. Tax rate varies depending on the type of landfill (quality of the engineering) or the type of incinerator (lower taxes when energy recovered). Lower tax rate for some wastes, such as by-products from recycling facilities. Tax rates are based on any technical or economic assessment</td>
<td>Introduced in 1987 at 2-5 ECU a tonne, rates are reviewed annually and have increased substantially. Originally hypothecated to environmental expenditure in Flanders, now a general revenue tax... Effects of the tax are difficult to estimate as there have been many other changes to waste practices. Since 1995 Flanders has a waste export tax of 50 ECU per tonne to prevent waste tourism to Wallonia.</td>
<td>✔ ✔ ✗</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td></td>
<td>270 ECU per tonne for hazardous waste</td>
<td>Waste processing</td>
<td>✔ ✔ ✗</td>
<td></td>
</tr>
</tbody>
</table>

**Sources:** Cambridge Econometrics and Forum for the Future (1995); OECD 1995; country sources.

1 Rationale is given as Tar (taget), Rev (revenue), or Ext (internalising externality)
In Denmark, landfilling and incineration are in the hands, exclusively, of the municipalities. Waste collection and transport is in some cases carried out by private sector contractors but this too is mainly in municipalities’ hands. An important distinction in the Danish case is that between collected waste and instructed waste. Whilst in areas of more than 1000 inhabitants, use of collection systems is compulsory, in sparsely populated areas, the municipality may not collect waste itself, but instruct citizens as to where waste must be delivered, often with instructions for specific waste streams.

As in the UK, the problem of pass-through is significant, though the situation is somewhat improved. Municipalities usually charge a general fee for collected waste and this is usually related the volume of the waste bin. However, the designers of the tax never intended to target householder per se, the intention being to make it more profitable for waste utilities to avoid landfilling and incineration. As regards instructed waste, pass-through is blurred by the fact that waste is usually carried by contractors whose charging structures tend not to reflect the tax, even though the tax may constitute as much as half of the collection bill. Some transporters do present customers with tax bills from the waste site as proof of legal waste disposal.

The Danish tax has reduced waste delivered to sites registered pre-1990 from around 4 million tonnes to 2.7 million tonnes in the 1987-1995 period. In sites registered post-1990, there was a slight increase of 0.1 million tonnes from a base of some 0.4 million tonnes in total in the 1990-95 period. The latter increase was related to an increase in building activity post 1993. Indeed, from 1993-1995, the net delivered waste increased for the sites registered pre-1990 as well.

The decline in waste has been most significant for household and construction wastes, whereas industrial wastes have increased slightly. This is perhaps to be expected given the fact that the tax is based on weight. Of total building and construction waste arisings, estimated at 2.2 million tonnes, only 230,000 tonnes arrived at waste sites in 1993. About 1.2 million tonnes of asphalt, tile and concrete was crushed and reused in road building. Composting has increased significantly in recent years, increasing sixfold from 86,000 tonnes in 1990 to 500,000 tonnes. This takes place at central facilities organised by municipalities or regional utilities. Glass and paper recycling have increased, respectively, from around 50% of potential total to 70%, and from 30% of total to 50%.

As with any tax, the impact of the tax in isolation is difficult to separate from the impact of other measures. Indeed, the value of such an attempt is questionable, particularly if the tax is in place as one of a number of instruments. In Skou-Andersen’s (1997) mini-survey of 16 companies, 13 had actively tried to increase recycling. One had sought to alter suppliers’ behaviour. However, regarding their motivations for such activity, only 2 pointed to the waste tax as being significant in their decision to reduce waste whilst 6 said it had had no influence on their behaviour. As in our survey, Skou Andersen confirms the significance of the fact that knowledge about waste issues is limited in many

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11 These figures are for net delivered waste (i.e. gross delivered waste minus out-weighed waste, which is waste for which a refund has been obtained).
companies, and responsibility for waste management is usually separated from the accounting function.

Recycling of paper and glass by municipalities is compulsory according to Ministerial Decrees issued in 1986. Significantly, the most important reason given by municipalities for establishing recycling facilities was the desire to improve recycling. Thus, the reasons were political rather than economic in the strict sense. Cost factors, including those related to the waste tax, were the second most important factor. The waste tax was a particularly important driver behind the economics of recycling of garden waste, bulky waste and building waste. 50% of municipalities accorded the tax a decisive influence regarding the economics of recycling construction wastes (recall that a tax on raw materials was also in place).

8-10 municipalities have introduced weight-based waste charges. The most successful of these schemes have seen reductions in residual waste (waste after recycling) of some more than 50% (though two have actually seen a marginal increase,). These reductions are matched by increased recycling rates (the waste is not being disposed of illegally). Skou Andersen notes that these schemes may be difficult to operate in smaller rural communities, but that they offer some evidence of the fact that methods of charging for waste disposal which do not convey the marginal cost of waste production (or the marginal benefit of reducing waste disposed) mute the impact of the tax through failing to allow the incentive mechanism to operate in the desired manner.
6.0 OPTIONS FOR CHANGES TO THE TAX

ECOTEC has been asked by Friends of the Earth to investigate a number of options for the future of the tax. These are:

- introducing a £2 per year escalator
- bringing incineration within the tax
- introducing a virgin aggregates tax

These will be examined in turn below.

6.1 Introducing a £2 per year Escalator

It is the general perception of industry, both waste producers and waste managers, that the tax will rise. In other European countries, waste taxes have been stepped upwards over time in support either of fiscal or environmental objectives, or both. The evidence to date as regards the impact of the tax suggests that an increase would produce relatively little impact on competitiveness, yet it might achieve further success in encouraging firms to adopt more sustainable waste management practices.

Amongst firms surveyed, there was a strong belief that the tax would increase in the future, and indeed, waste management companies are advising their clients of what they perceive as the likelihood of an increase. Even so, although expectations can lead to pre-emptive behaviour, there is also good reason to believe that much hinges on the confirmation of expectations. In other words, though firms may expect the tax to increase, they may not adjust behaviour (and/or investment decisions) until the expected increase is announced, or implemented.

Given the fact that the tax has increased awareness of disposal costs, and given the interest in recycling that the tax has developed, it would seem reasonable to suggest that the escalator would increase interest in such activity so as to divert waste from disposal landfill. However, this supposition is dependent upon companies realising the marginal benefits from reduced waste disposed to landfill. In terms of the barriers mentioned in Section 4, the escalator would increase the incentive to seek information which reduces companies’ exposure to the tax. This may not always imply that waste minimisation is the route followed - some companies may simply switch to a cheaper waste contractor, whilst others who may not already be doing so may segregate inert and non-inert wastes. Others, however, may find that a higher tax tilts the balance in favour of investment in proven waste minimisation technologies.

One of the most potent arguments in favour of a higher Landfill Tax is that it would encourage waste producers to ask for their waste arisings to be charged on a per tonne basis (see above). In other words, the visibility of the tonnage element of the tax would encourage firms to request (as indeed
some in our survey have) that their waste be weighed separately. Not only would this ensure the tax is passed through as intended, but it would encourage increased sophistication in the waste management industry, and the production of improved statistics as regards an audit trail for waste.

A potential advantage of an escalator is that it sends clear messages to firms, and perhaps more importantly (because of budgetary constraints) to local authorities concerning the future evolution of the tax. At present, although as noted above most of those surveyed felt it likely that the tax would increase, there is great uncertainty concerning where the tax will be in the future. For local authorities assessing their waste disposal plans, this is not at all helpful, and mitigates against prudent planning (especially given the 6-10 year term of contracts under compulsory competitive tendering).

Presumably, in the absence of any tax on incineration, WDAs would tend to look to incineration first as an alternative route to landfill, and, notwithstanding problems that might be encountered concerning planning permission, a shift in the medium- to long-term from landfill to incineration would occur. It is important that policy makers consider whether this is indeed what they wish to see, bringing us back to the question of how taxes are set, and how they are used. Specifically, it should be asked if, and how, incinerators can play a role in future waste management without affecting progress towards reduction in waste arisings and maximum valorisation of resources. This brings us neatly on to the second option.

6.2 Bringing Incineration Within the Tax

If the Landfill Tax is to be a real tax on waste, as it was characterised by the previous Chancellor, and if the tax is to do more than simply shift waste from landfill to incineration, it would seem sensible to tax incineration too. As seen above, this is a practice followed by all European countries with experience of such a tax.

The rationale for an incineration tax can be considered from two perspectives. In the first perspective, one starts from the view that the landfill tax is intended to cover the difference in externalities associated with landfill and incineration (the Treasury’s view). From this perspective, if the landfill tax were to be increased, it would seem odd if incineration were not also taxed. Thus, from this perspective, an incineration tax should follow any further increase in the landfill tax.

The second perspective is more pragmatic. The importance of bringing incineration within the tax is that once both major routes of waste disposal are taxed, the message in favour of recycling, re-use and waste minimisation is strengthened. Furthermore, a message is sent to those responsible for waste disposal plans that the benefits of recycling and reuse are increased relative to the disposal costs of incineration. Thus, to the extent that waste disposal plans may seek, especially with the Landfill Directive looming, to address targets set within the Directive through investing in incinerators, the relative costs and benefits of doing so are moved in favour of recycling.
Again, in terms of the barriers mentioned above, the aim of taxing incineration would be to ensure that the development of alternative options is not skewed towards incineration. There is a danger that such a view might result in investment in incinerators which become over-specified. The possibility, some would say probability, of this happening has been strengthened by poor performance in recycling in the past owing in part to the cheapness of disposal options (landfill).

6.3 **Introducing a Virgin Aggregates Tax**

The possibility of a virgin aggregates tax has been mooted for some years now, and the new Government’s first budget, in July 1997, announced the intention to lay the groundwork for such a tax. If such a tax were successful in reducing demand for virgin aggregates, it would slow down the creation of void space for landfill. As such, through reducing the supply of void space, it would increase the cost of landfilling over and above what it might otherwise be.

Another impact would be that the market for secondary and recycled aggregates would be stimulated. To the extent that some materials are simply being diverted from landfill at present, they are deemed to be of zero value. However, these are materials that could be used for various purposes, and a tax on virgin aggregates would increase interest in, and valorisation of them. In Denmark, a raw materials tax was introduced in conjunction with the waste tax with the aim of supporting the reuse of building materials for construction. As seen above, the tax was extremely successful in this regard.

Again, with regard to the barriers mentioned in Section 4, the aim of this option is to foster the development of alternative options for the treatment of waste, in this case, construction wastes, so that the value recovered from these wastes is maximised. That having been said, the aim of an aggregates tax should not be simply to close a loophole in the workings of the landfill tax. The instrument is deserving of further consideration in its own right concerning its aims and purpose.
7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

A number of conclusions follow from the above study,

- though the tax has encouraged more sustainable waste management in some companies, may others have not changed their practices in this regard-

the most significant conclusion from ECOTEC’s survey is that, although the tax has affected the way in which many companies view their waste, and has inspired some companies to invest in waste minimisation technologies and begin waste minimisation programmes, 42% of those surveyed have done nothing to reduce their wastes. Thus, it is ECOTEC’s belief that though the tax is working, it is not being as effective as it might be. This raises questions as to whether the tax should be increased and whether the complementary instruments in place are sufficient to encourage a stronger response.

- overall waste arisings are probably lower than would otherwise be expected, especially due to the reduction in inert wastes arising-

it is difficult to comment on the overall impact on waste arisings of the landfill tax. Waste statistics are virtually non-existent, and one of the positive spin-offs of the tax’s coming into force will be, or so it is hoped, improved statistics on waste arisings, although the tax did not make the use of weighbridges mandatory at landfill sites as some believe it should have. Whatever the nature and quality of statistics now being gathered on waste, the pre-tax baseline statistics are simply not good enough to give any reliable indication of how aggregated waste arisings have changed as a result of the tax. For example, work recently commissioned by the DoE has indicated, through a survey, that household waste arisings, for which the figure of 20 million tonnes had been used for several years, were of the order 26-27 million tonnes (ENDS 1997a).

One of the few comments that can be made with any certainty, on the basis of interviews with landfill operators, is that inert wastes being disposed to landfill are lower than they were before the tax was implemented. There is anecdotal evidence that fly-tipping and abuse of civic amenity sites has increased, the latter being backed up by sound evidence in some cases. There is a suggestion that household waste arisings may still be increasing despite the tax.

- the externality approach is not helpful regarding progress at the policy level-

to set a tax on the basis of externalities alone is to diminish its potential role in the meeting of strategic targets. Internalising externalities will not in general guarantee that the tax will affect waste producers’ behaviour in the manner predicted by theory (see Box 1).
• alternative options are poorly developed:

even with the tax in place, landfill remains, in many cases, the cheapest option for disposal. The alternatives to landfill remain poorly developed. At the cultural level, the equivalent statement is that waste is still perceived as something to be jettisoned into a single waste bin rather than as a resource with the potential to be re-used and recycled several times. The limitations which this lack of alternatives, and cultural perception places upon any strategy aimed at sustainable waste management are becoming clear now that the Packaging Regulations are in place. In the absence of a coherent and integrated strategy for the waste sector, those who seek to increase valorisation of waste will be frustrated by the mis-match between supply and demand for recovered materials. Perhaps the key change in terms of alternative options, at least at this stage, has been the investment made by a number of waste management companies in materials recovery facilities (MRFs) both in advance of, and since, the tax’s introduction.

• the tax is not being passed through in such a way as to encourage actors to reduce waste whilst many commentators understood, in advance of the tax, that the producers of municipal waste would not benefit from any marginal reduction in waste generated, it was less well appreciated that the same applies to many industrial and commercial waste producers. The tax is not being passed through to all actors as a tax on the weight of waste produced. Consequently, the incentive to reduce the weight of waste being disposed is limited. More enlightened companies appear to understand that the benefits of waste minimisation are to be found not only in reduced disposal costs, but also in reduced costs of waste materials.

• donations to Environmental Bodies are a small fraction of the possible maximum

the Environmental Bodies scheme was an innovative step in the development of the Landfill Tax. The potential revenue derived from this could help to fund a number of schemes of environmental, and other benefit. Thus far, only £1.8 million of a potential £20 million have been donated. This may be due to cash flow issues, but other reasons may also be significant.

7.2 Recommendations

On the basis of these observations, the following recommendations can be made. These concern the tax itself, tightening up loopholes, and complementary measures:

Changes to the Tax

• the tax should be used to meet strategic targets
the tax would be strengthened if it were explicitly recognised not as a number meant to signify the size of (incompletely captured) externalities but as a strategic tool to be used in conjunction with other measures in guiding the UK down what is deemed to be the most desirable path regarding waste management strategy. The significance of this is that it removes from policy makers the pressure to justify any change in the tax on the basis of an assessment of externalities. The tax, and other instruments, could be tuned so as to meet the objectives set out for waste policy.

- an increase in the tax should be implemented:-

if the aim of the tax was to ensure that all waste producers would be made to take a hard look at their waste disposal costs, this aim has not been met. Given that the tax, as it currently stands, has affected some companies but not others in this regard, a higher tax could be expected to make more companies pay closer attention to their wastes. To the extent that some companies may not have looked at the possibilities for waste minimisation with the tax as it stands because the benefits of such activity are not passed through to them, a higher tax may also help in increasing the pressure for change such that wastes are weighed at the point of collection. In the current framework within which LAs function, these should be announced in advance so that contracts for waste disposal and collection could be considered in an environment of greater certainty. There may be a need to consider phased exemptions for local authorities.

- a tax on incineration should be introduced:-

in order to make the landfill tax a true waste tax, incineration should also be taxed so as to ensure the incentive framework functions to minimise waste.

Closing Loopholes

- review regulations governing exempt activities:-

one way of ensuring that inert materials are not simply buried in the ground, as opposed to being used as secondary materials, would be to re-visit the regulations concerning exempt activities which allow unlicensed landfilling. This would prevent the effective avoidance of the tax, and if a virgin aggregates tax were introduced at the same time, the likelihood of the value in such materials being realised would be increased.

- minimise perverse responses through regulation and/or developing alternatives:-

as waste disposal taxes increase, in the absence of options enabling actors to respond in such a way as they realise benefits from reducing waste disposed to landfill, the incentive for fly-tipping and illegal disposal is enhanced. This problem highlights two issues which arise in conjunction with the
introduction of environmental taxes. The first is the issue of sequencing. One could argue that without ensuring that alternative waste management options were developed in advance of the tax being introduced, or would be developed quickly thereafter, the introduction of the tax was not well timed. Sequencing of policy measures is important, and it may be requiring too much of the tax to expect alternative options to be developed on the basis of its introduction alone (see below).

Without these alternatives (i.e. in the short-term), the need for regulatory activity is imperative. The maximum fine for fly-tipping of £20,000 is rarely imposed on the few occasions when fly-tippers are brought to book. Some have suggested measures for policing the issue by exception (Anon 1997) whilst some LAs have taken measures to clamp down on abuse of CA sites. However the issue is not straightforward.

- **review the impact of NFFO scheme on waste management options**;

the debate over the appropriateness of subsidising energy from waste through NFFO has been raised before. It continues to be raised and not without good reason. The scheme has been used to subsidise both energy from landfill gas and from incineration. The wisdom of subsidising plants which require waste for their proper functioning is questionable, especially if such investments have pay-offs only realisable in the long-term. Not only does one need to consider the immediate priorities for waste management, but a long-term strategy would need to consider the sorts of levels of recycling that would be desirable not only early in the next millennium, but in the year 2020. The possibility of being left with a significant number of white elephants may be very real indeed.

- **review the development of Environmental Bodies to assess their contribution to reducing waste in particular**;

if the Environmental Bodies scheme is to be a success, at least one key obstacle needs to be removed from its path. This relates to the issue of the treatment by the Inland Revenue of contributions to these Bodies. Clearly, a number of businessman are not satisfied with the announcements given thus far by the Revenue, which suggest a substantial degree of equivocation. It remains to be seen whether this would unlock a flow of funds. Due thought should be given to this issue at the end of December when it becomes clear how much money (and what percentage of the maximum possible) has been given to Environmental Bodies. Alternatively, different institutional forms might be considered to ensure that landfill tax revenues are channelled in the quantities envisaged to the Environmental Bodies. Given the difficulties being experienced in meeting targets for waste recycling set in

**Complementary Measures**

- **review instruments aimed at enhancing provision of information and education**
as regards complementary instruments, the importance of information has been highlighted in Section 4. Information and its provision can help to overcome some of the inertia that may affect a number of companies. The costs of seeking and acquiring information can be reduced through various channels, some of which are already being explored though perhaps not with the vigour, and in some cases, not with the focus that they might have. Even where information is available, it is by no means assured that a positive response will be forthcoming. The significance of training schemes for managers should not be overlooked or under-estimated in this regard.

- examine the option of using accelerated depreciation deductible from tax on investments in waste minimisation, composting and recycling:

the Government should consider the possibility of using accelerated depreciation allowances on investments in waste minimisation and recycling. This would help to promote the growth of alternative waste management options.

- introduce a change in (central and local) Government procurement policy and/or targets for use of products made from secondary materials:

the role of government as a buyer of goods and services from industry is not a small one. Central Government expenditure other than pay-related spending and transfer payments amounted to around £40 billion per annum, most of which was spent on procurement (cited in BGPSD 1997, 10). The British Government Panel on Sustainable Development commented that it was ‘disappointed that the Government has not adopted a more pro-active policy in this area despite its commitment “…to make sustainable development the touchstone of its policies”’ (BGPSD 1997, 10). To the extent that the market for products of recycled materials is in need of stimulation, a change in Government procurement policy could play a significant role, both in terms of its absolute impact, and in the demonstration effect of such a policy.

- increasing recycling credits and stimulating the market for recycled materials:

if, as studies based on externality estimates suggest, recycling is an environmentally desirable option (in many cases), and given that the Government’s Waste Strategy lends some support to this view, then given also that the targets set in the Waste Strategy seem unlikely to be met, there would seem to be an arguments for making recycling more attractive than it currently is. In addition to the above measure, from the externality viewpoint, recycling credits should include both the avoided financial costs of disposal as well as (since the landfill tax externality assessment did not include the foregone benefits which could have been realised through recycling) a component reflecting the net environmental benefit derived per tonne of recycled material.

- local authorities should be encouraged to explore the possibilities for unit charging of municipal waste:


according to some commentators, the requirements of the Environmental Protection Act 1990 impose barriers to Local Authorities in seeking to ensure pass through of the tax. Chapter 43, Part II, Section 45 (1) makes it the duty of the waste collection authority to arrange for the collection of household waste in its area, as well as commercial waste if asked to do so, with limited exceptions concerning inaccessible locations and instances where the authority is satisfied that adequate arrangements have been made for disposal by the person who controls the waste. Section 45 (3) continues: ‘No charge shall be made for the collection of household waste except in cases prescribed in regulations made by the Secretary of State.’ Section 46 concerns the receptacles used for household waste. LAs are allowed to require households to place waste for collection ‘in receptacles of a kind and number specified’ (Section 46 (1)). The collection authority may, in this regard:

(a) determine that they be provide by the authority free of charge;
(b) propose that they be provided, if the occupier agrees, by the authority on payment by him of such a single payment or such periodical payment as he agrees with the authority;
(c) require the occupier to provide them if he does not enter into an agreement under paragraph (b) above within a specified period; or
(d) require the occupier to provide them.

Section 46 (7) gives an occupier who is asked to provide receptacles the right to appeal against requirements such as that under paragraphs (c) and (d) above. This leaves it somewhat open as to whether (b) above permits LAs to charge for MSW collection through asking households to pay for bags in which they dispose of their waste for collection. Some local authorities are already investigating the possibilities for unit charging schemes. A clarification of the law in this regard would be helpful. A number of countries now have experience with unit pricing of municipal waste. Usually, these schemes function on the basis of a charge on bags, or on tags, which identify the waste as requiring collection by the body charged with waste collection. Alternatively, they work through variable charging for different size bins, or more rarely, they operate on the basis of the weight of waste disposed. The bags and bins cases seem to be legitimate schemes under the EPA 1990 (see above).

Experience with these schemes has been varied, but one condition that seems necessary, though not sufficient, for their successful operation is the functioning of aggressive recycling schemes. A number of issues are worthy of close attention, including those of the physical practicalities of such schemes, and problems of collection of such charges (municipalities in Denmark add the charge to a property tax at the end of the year).

Each of these recommendations have been considered here in isolation. It is clear, however, that there are complementarities, and that sequencing issues are important. For example, there may be
little point in considering unit charging in advance of putting in place aggressive recycling strategies, which in turn, would benefit from measures to stimulate the market for products manufactured from recycled materials. Thus, careful thought is needed in putting any changes into context within an integrated waste management strategy.

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