

15.0 THE UK LANDFILL TAX

Introduction

The analysis in Tier 2 suggested that the Landfill Tax was having a number of different effects, potentially both positive and negative, depending upon the waste stream being considered. In what follows, we undertake a more detailed analysis of the environmental effects of the tax, as well as the impact on different sectors of the economy.

We also make reference to some of the issues arising in respect of other countries' experience with the landfill taxes where this is of relevance to this study. We have tried to minimise the extent to which we have duplicated the efforts already elaborated in the Tier 2 study.

Table 84 serves as a reminder as to the nature of this tax.

Table 84: Structure of UK Landfill Tax in £/tonne (EUR/t)

	Oct. 1996	April 1999	April 2000	April 2001	April 2002	April 2003	April 2004
Inert	2 (3.2)	2	2	2	2	2	2
Active	7 (11.1)	10 (15.8)	11 (17.4)	12 (19)	13 (20.6)	14 (22.2)	15 (23.8)

Exemptions specified as of October 1996 were:

- (a) pet cemeteries, as the tax was not intended to make more difficult a distressing time;
- (b) dredgings removed from inland waterways and harbours;
- (c) mining and quarrying waste, which typically remains in the mine itself;
- (d) the reclamation of historically contaminated land, as the tax might penalise the reclamation of contaminated land. A certificate of exemption has to be applied for in this case.

An additional exemption was specified in October 1999 for inert wastes used for backfilling of mineral workings where planning permission requires this, and in the completion of landfill sites. Limits on quantities are set in the latter case.

15.1 *Price and incentive effects*

Incentive Effects

The tax's incentive effect is described separately for inert wastes and active wastes. In what follows, it should be recognised that the price paid to landfill a tonne of waste will depend upon the type of waste and the region in which landfilling occurs. The regional variation in costs reflects both the balance of supply and demand, and the underlying costs of the provision of the service. This is affected by the suitability of the region's geology to the practice of landfilling. Note also that the increases in fuel duty have tended to increase the degree to which markets are 'localised' by the costs of moving waste over greater distances. Hence, the fuel duty escalator has played a role in reinforcing the Proximity Principle especially where wastes for which the gate fee is low are concerned.

Inert Wastes:

Many inert wastes, such as rock, concrete, bricks, soils, clays and some other wastes, had traditionally been accepted at landfill sites for a low, sometimes zero, gate fee. The reason for this was that the materials could be used for engineering the sites themselves and for daily cover material. The situation varied across sites. Some sites might have been in receipt of too much inert waste, and strategically, the filling of valuable void space with material which generated low revenue per unit volume was not seen as desirable.

With this in mind, a tax of £2 (EUR 3.2) per tonne of waste, though small in absolute terms, is large in percentage terms. In a small sample of sites we interviewed, prior to the tax, inert waste could be disposed at landfill sites for inert waste only for between £1 (EUR 1.6) and £3 (EUR 4.7) per tonne. At sites accepting active waste as well, the range was from £1.75 (EUR 2.8) to £5.50 (EUR 8.7) (reflecting the higher opportunity cost of foregone void space at sites able to accept other types of waste). This implies a change in gate fee of between 66% and 200% at the inert waste sites, and an increase of 36% to 88% at active waste sites.

Active Wastes:

The tax on landfilling of active waste is increasing. Gate fees for different active wastes vary according to their hazard. Special waste gate fees can be particularly high (of the order £100 (EUR 158) per tonne). However, the majority of active wastes are landfilled at rates from £5 (EUR 7.9) to £30 (EUR 47.4) per tonne depending upon region. Hence, a tax of £11 (EUR 17.4) per tonne is equivalent to anything from a 35% increase to a 200% increase in gate fees.

Expected Incentive Effect, and Pass Through Effects

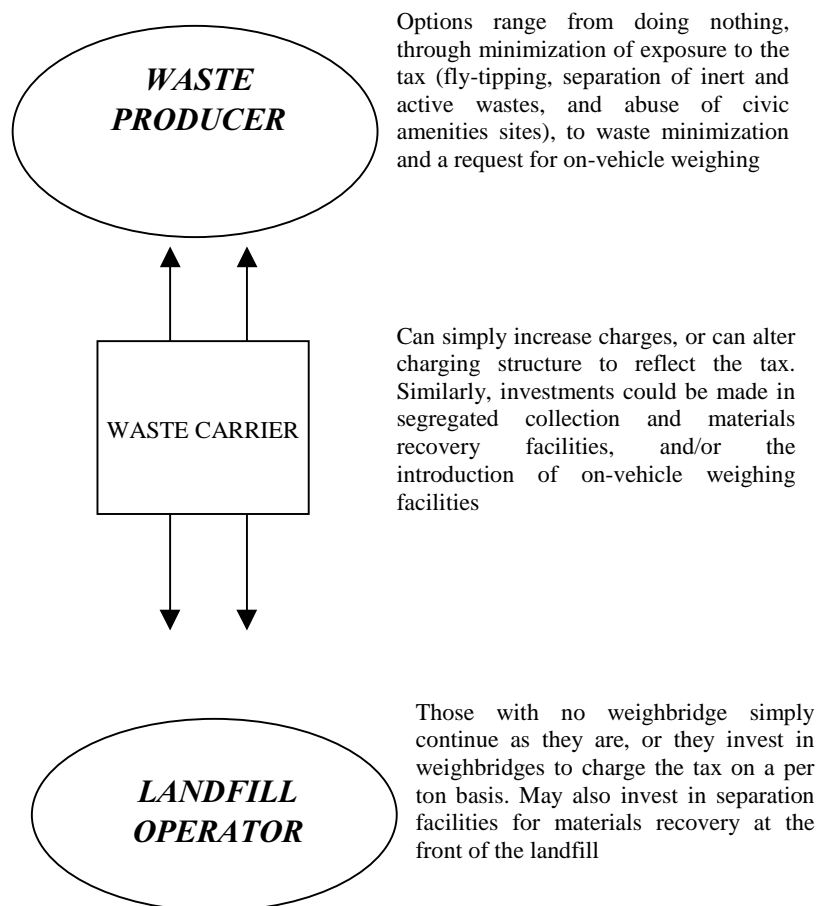
These increases appear substantial when measured against the existing cost of the service. However, UK waste management is regarded as being low-cost by (Northern) European standards, and to some extent, these increases have to be contextualised by the way in which

they are perceived by those from whom a change in behaviour is sought. This, then, is the interesting feature of the Landfill Tax. In many respects, it is a very small tax. Indeed, HM Customs and Excise have commented that it is the smallest tax introduced by Government in recent times (in terms of overall revenue generated). On the other hand, it constitutes a major increase in the cost of the service provided. An analysis of responses to the tax is therefore of some interest as the incentive imparted appears, at one and the same time, large, but also small.

15.2 Possible Responses to the Tax

The tax could elicit a range of responses from those involved in the provision of waste management services. Some of these are described in Figure 5 below.

Figure 5 Behavioural responses to the tax: Flows of Information



Source: Adapted from Hogg (1999).

Waste producers can choose to undertake any of the other options available to them. This assumes, of course, that:

- a) They have an incentive to do so (that is, that there is a benefit from them undertaking such activity). Where waste is collected for a fee which does not reflect marginal changes

in waste set out for collection, the incentive to change behaviour may only exist if a complete switch, from landfill to an alternative option, occurs;

- b) That the alternatives exist. For producers of some wastes in some regions, there may not be a viable alternative in the short-term; and
- c) The actor is free to undertake the change. Contractual rigidities, especially for Local Authority waste disposal, will have restricted some authorities' room for manoeuvre.

In practice, for many actors in the economy, fee structures for waste collection are fairly blunt (in the sense of conveying incentive to reduce waste generation at the margin). The tax has changed this, albeit in a limited way. However, fee structures have begun to convey an incentive for reducing waste production at the margin. One can speculate as to whether demands from customers, or the tax's effect on waste carriers, has brought about this change. However, the fee structures now convey some form of incentive to waste producers to reduce / recycle and separate waste. Few did before. In some cases, producers have asked waste carriers to introduce such systems (see Hogg 1999).

Landfill operators could choose to pass on the charge or not, and they also had a choice to make as to how the tax was represented on invoices. Where the tax appeared on the invoice to clients as tax, the landfill operator was obliged to pay that amount of money to HM C&E, but default on payment by a client would allow this to be written off of as a bad debt. Where tax was not explicitly recorded on an invoice, landfill operators were not allowed to write off unpaid tax as a bad debt, but they could separate / segregate materials at the front of at the landfill in designated tax-free zones. The majority who we have spoken to have passed on the tax in full, but have not recorded it on invoices. This allows them to engage in the 'tax-mining' activity just described.

Only in one exceptional case, that of inert wastes, do operators appear to have not passed the tax on in full to their clients. This is because the inert wastes are of some use to landfill operators, but their use in landscaping and other works has meant that many of them are diverted to other uses. To attract them back to landfills, the operators are absorbing some, occasionally all, of the tax. This is broadly consistent with economic theory which suggests that the pass through of the tax will fall where demand for the service / good is most elastic. It is especially elastic in this case as we shall see (and the percentage price increase has been considerable).

It has to be said that the picture on pass through of the tax is somewhat complicated by the strategies followed by companies within the industry, and the current wave of acquisitions taking place in the industry. This appears to be driving operators to maximise revenue, thereby strengthening balance sheets and making companies more attractive for takeover. In addition, the Landfill Directive will change the face of the landfill industry substantially, and this is reinforcing the quest (in some companies) to maximise revenue now. Consequently, some gate fees in some parts of the UK appear to be falling. The reason we do not think this is related to the tax is that there are no price-competitive treatment options in many of the areas where prices are falling.

15.3 Environmental Effects

Data Availability

In order to assess the impact of the tax, one needs a baseline scenario from which to measure one's evaluation of the success or failure of the instrument. It seems fair to say that, with hindsight, UK waste data does not allow us to do this for any category of waste. It is now frequently remarked that the tax has been the principal cause of the generation of reasonable waste statistics on landfill in the UK.

Only two reasonably reliable sources of time series data exist where waste is concerned. Both of these relate to municipal waste. One, in Scotland, stopped in the year the tax was introduced. The other, in England and Wales, began in the year before the tax came in. Neither, therefore, provides an especially useful source of data. In most other cases, the same statistics had been used for the best part of a decade. One attempt was made – on a shoestring budget – to estimate commercial and industrial waste arisings but these are irreconcilable with what has appeared since the tax entered into force. Hence, the data has to be treated with some caution.

Total Waste Landfilled

Ex post assessments of the tax include our own (EF 1998), the more limited survey of Coopers and Lybrand (1997) performed after the tax, our own work on the impact of the tax on inert wastes (ECOTEC 2000) and the work of the College of Estates Management (CEM 1999). In addition, Aspinwall / Oxera (1999) carried out a study (unpublished) for DETR concerning the potential for the tax to meet the objectives of the Landfill Directive.

The weight of wastes being landfilled has fallen over time since the tax entered into force. This can be shown from the figures below imputed from the tax returns submitted to HM Customs and Excise. The thing to note about these figures is that the quantity of inert waste being landfilled has fallen whilst the quantity of active wastes has remained constant. This reflects the discussion above concerning pass through of the tax, and shows that different waste streams have been affected in different ways.

Table 85 : Disposals to Landfill (million tonnes), 1997-98 and 1998-99

Amount related to tax band:	Standard Rate	Lower Rate	Exempt from tax	Total
	Tonnes	Tonnes	Tonnes	
1997-1998	50.05	35.73	9.69	353.22
1998-1999	49.81	30.27	8.87	334.83
Change	-0.24 (0%)	-5.45 (-15%)	-18.39 (-5%)	

Source: HM Customs & Excise

Effects on Municipal Waste

Based on CIPFA (Chartered Institute for Public Finance Accounting) data and more recently the published DETR municipal waste management data, M.E.L Research compiled an overall analysis of the quantities of household waste generated and recycled in England and Wales over the period from 1983/84 to 1995/96. This is shown in Table 86, showing an average growth rate of 3% per annum. The absolute figures are not consistent with what is likely to be more reliable data from DETR for 1995/6 to 1998/9 (Table 87). However, the growth rates estimated for the two sets – and these could be assumed to be more reliable - are entirely consistent. They suggest a pre-tax growth rate of 3% has not slowed. However, the rate at which recycling (and composting) is increasing has doubled in the post tax era from an average of 10% per annum to 20% per annum. In addition, quantities of waste incinerated are increasing.

It seems unlikely that all of this change can be attributed to the Landfill Tax. Two things are acting to complicate the picture. The first is the impact of the Producer Responsibility (Packaging Waste) Regulations (the instrument through which the UK has sought to implement the requirements of the Packaging Directive), although the impact on the municipal waste area in the UK should not be over-stated. Whilst recovery of packaging materials becomes necessary for the UK as a whole, the mechanism used is one which encourages least-cost compliance. Since it is less costly to recover materials from the commercial and industrial packaging stream than from the municipal stream (the costs of collection in the latter case are greater, and the wastes arise in less homogeneous streams), the increase attributable to this mechanism could be assumed to be limited. On the other hand, waste management companies with responsibility for collecting municipal wastes have seen that they can assist companies in meeting obligations under the Packaging Regulations by separating packaging materials from the mixed waste fraction. There will have been some effect here, especially for plastics, but only a limited one.

Table 86: England and Wales Municipal Waste Arisings, Pre-Tax, in million tonnes

	'83/84	'84/85	'85/86	'86/87	'87/88	'88/89	'89/90	'90/91	'91/92	'92/93	'93/94	'94/95	'95/96	Average Annual Growth
Disposed	14.89	15.25	15.72	16.48	17.24	17.31	18.17	18.63	18.9	18.96	19.72	19.99	20.4	
Recycled	0.36	0.38	0.4	0.435	0.48	0.55	0.59	0.65	0.78	0.9	1.02	1.06	1.1	
Composted								0.05	0.06	0.08	0.09	0.11	0.13	
TOTAL	15.25	15.63	16.12	16.915	17.72	17.86	18.76	19.33	19.74	19.94	20.83	21.16	21.63	
		2.49%	3.13%	4.93%	4.76%	0.79%	5.04%	3.04%	2.12%	1.01%	4.46%	1.58%	2.22%	2.97%

Source: MEL (1999)

Table 87. England and Wales Municipal Waste Arisings, Post-Tax in million tonnes

Treatment/Disposal Method:	1995/96	1996/97	1997/98	1998/99
Landfill	21,500	21,970	23,140	23,060
Incineration without EfW	1,036	620	60	20
Incineration with EfW	1,295	1,440	1580	2120
RDF manufacture	259	150	170	130
Recycled/composted	1,813	1,810	2130	2660
Other	0	0	90	10
Total	25,900	25980	27170	27990
Growth Rate		0.31%	4.58%	3.02%

Source: DETR (2000)

Key: EfW= Recovery of Energy from Waste

RDF Manufacture = refuse derived fuel

The second instrument which has played a role has been the Landfill Directive. Although only recently agreed, the minds of municipalities have been very much directed towards its requirements. The need to divert material from landfill is leading to an increase in the number of proposed incineration plants, as well as newer treatments such as pyrolysis and gasification. Unfortunately, the recycling and composting element of these strategies tends to be rather weak by northern European standards, with no requirement for households to engage in source separation of materials. This will have played a role in shaping municipal waste strategies, but it will do so more in the coming years than in the past three.

The third instrument is the tax itself. A glance over a sample of consultants' reports written for Local Authorities suggests that consultants have promoted a view that local authorities should expect Landfill Tax to increase rapidly in the coming years. They also tend to project rising pre-tax gate fees. As such, there has been something of a response to the tax itself, and to the expectation of much higher landfill prices in the future, related not only to the tax. Ironically, these projections have proven wrong in many parts of the UK. The tax has increased only slowly, and industry strategies have led to falling pre-tax gate fees.

That having been said, it seems fair to attribute approximately 60% of the changes in treatment relative to a pre-tax baseline to the tax itself. There is really no way of disentangling the different effects, and this figure is merely a plausible estimate based on the author's knowledge of the situation.

The issue of waste arisings and their continued growth is another interesting aspect of the Landfill Tax. In the UK, waste arisings are believed to be related both to GDP and to the number of households. The latter has increased as social change has continued, leading to greater individualisation of society and smaller family units. In the case of municipal wastes, the lack of any impact on arisings (and to some extent, the low levels of recycling and composting, though here, service provision is clearly a pre-requisite for the activity) can be traced principally to the fact that there is no mechanism for channelling the incentive which the tax might have provided back to the householder. 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 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.' Presently, the fee for waste collection is effectively subsumed within Council Tax payments, which are levied on the basis of property values. There is no 'variable' component, though some authorities now charge for bulky waste collection.

Many believe that far from reducing growth rates, the Landfill Tax actually increased them. The change to the year 1997/98, recorded at 4.58%, is relatively high by historic standards.

Some individual authorities report rates as high as 7% in recent years.¹ Table 88 below shows that non-household wastes have increased in quantity much faster than household wastes in the total municipal stream.

Table 88. Municipal Waste in England and Wales by Collection Method in Million tonnes

	1996/7	1997/8	1998/9	Average Growth
Regular household collection	14.9	15.2	15.3	1.1%
Other household sources	0.9	0.8	0.9	0.4%
Civic amenity sites	4.0	4.2	4.1	0.6%
Household recycling	1.6	1.8	2.0	14.3%
Total household waste	21.5	22.0	22.3	2.0%
Non household sources (excl. recycling)	1.9	2.1	2.3	9.8%
Non household recycling	0.1	0.1	0.3	125.8%
Total non-household waste	1.9	2.3	2.6	15.2%
Total municipal waste	23.4	24.3	24.9	3.2%

Source: DETR Municipal Waste Surveys

The figure that is most difficult to square with reported experience is that for Civic Amenity sites. ECOTEC has carried out a number of consultations with Local Authorities over the post-tax years and in this project, and it is clear to us that many authorities have witnessed (to varying degrees) increases in wastes received at Civic Amenity sites. In some cases, increases post tax have been as high as 50%. Many authorities are now paying closer attention to these sites to ensure that only waste from households is accepted there.

Others claim to have experienced increases in illegal fly-tipping, but our belief is that this owes as much to an increased awareness of the potential problem as it does to the actual state of affairs, so the actual effect (which is no less real) is difficult to measure. In any case, the pre-tax baseline is poor since different authorities defined 'fly-tipping' in different ways.

The general conclusion to be drawn is that the landfill tax has probably not affected household arisings that much (and the Table above appears to confirm this). These may have increased owing to growth in consumption over time, but the lack of incentives provided by the landfill tax (and any other instrument) for households to change their behaviour makes it unlikely that the tax has had a significant effect in this regard. If there has been a reduction relative to the counterfactual in, for example, the amount of packaging used, this could be traced to general trends in lightweighting. If policy has had an effect, it will most likely have been the Packaging Regulations which will have played a role in this regard (as opposed to the Landfill Tax) since companies' requirement to recycle and recover packaging is related to

¹ The LGA (Local Government Association) made observations of this nature in comments to the House of Commons Select Committee on Environment, Transport and Regional Affairs, as presented in their report on Sustainable Waste Management (see HoC 1998).

the amount of packaging they handle (there is an incentive for minimisation of the packaging fraction of the household stream).

Municipal waste, on the other hand (as distinct from household waste), has, in our view, almost certainly increased as a result of the tax. This is a consequence of the shift in materials from one waste stream to another in an attempt to avoid payment of landfill tax. This can be done through, as local authorities anticipated, taking trade waste to Civic Amenity sites, taking trade waste home (so that it enters the household stream rather than the commercial and industrial stream), and through fly-tipping on public land. The abuse of CA sites and the stealth tipping phenomenon may be more important than the fly-tipping in weight terms, but the environmental impact of the latter is disproportionate (both in terms of disamenity and financial costs of removal) to the weights involved. Evidently, this has implied a shift in the distribution of costs associated with treatment of certain wastes (away from industry and commerce and towards local authorities, and ultimately, tax payers).²

Effects on Construction and Demolition Wastes

The stream which has, almost without doubt, been most affected by the tax has been the construction and demolition (C&D) wastes. A detailed exploration of the change in fate of these wastes can be found in ECOTEC (2000). In this sub-section, we seek to explore some of the key issues.

First of all, as with other wastes, pre tax data has not been good. There are problems with trying to quantify the C&D stream, not least because a significant fraction may be used on site for 'useful purposes' or simply for burial within a given development. The 'official' estimate of C&D waste arisings remains that produced by Howard Humphreys (1994). Their estimate of 70 million tonnes is probably out of date. Early results of an Environment Agency, carried out in March 2000, estimate that the figure for all C&D wastes and soil in England and Wales is 72.5 million tonnes, with a range of approximately $\pm 35\%$ at 95% confidence. Other recent estimates include that of BDS Marketing (1997) who place the figure at 88 million tonnes. Industry operators with whom we have spoken believe the figure may be closer to 100 million tonnes. The margin of error is large (equivalent to the total weight of municipal waste arisings in the UK).

What is known about C&D wastes is that landfill operators were inclined to accept materials such as uncontaminated soils, clays, concrete, brick and other hardcore materials at low or zero charge (as discussed earlier). This is because the materials could be used in the construction of access roads, for cover material, and for site remediation at the end of the landfill's life. For sites accepting inert wastes only (for example, quarries whose planning permission requires them to backfill the quarry as material is excavated) these bulk materials

² As a group, taxpayers are also consumers of the products manufactured by industry and commerce and as such, the net effect is simply a redistribution from consumers of specific products to taxpayers as a group (assuming the tax is passed through in product pricing).

were essential in order for quarry companies to meet the requirements of their planning consents (which might require them to backfill as excavation proceeds).

Because the gate fees for these wastes had been so low, and because they are typically quite dense, the tax implied a significant increase in the disposal costs. The other significant cost element associated with C&D wastes is transport costs, and these have also been rising recently as a consequence of the fuel duty escalator in place in the UK. Hence, both transport costs and disposal costs have been increasing in the post-tax period.

Historically, because of the lack of landfill in the area, and because of the costs incurred in importing raw materials and exporting wastes from and to appropriate destinations, the South-east of England has seen the development of an industry engaged in recycling materials suitable for (re)use in construction. The arrival of the tax has seen this approach being adopted more widely, so that there is now increasing competition between, for example, low grade primary materials, and the products produced by mobile and static crushing plant operated by various actors who are now entering into this field of activity. Indeed, those traditionally in this industry appear to have witnessed a surge in competition as a consequence of the behavioural changes initiated by the tax.

Alongside the tax, one can point to other initiatives that may have assisted in this development. These are:

1. The increase in transport costs (fuel duty escalator);
2. The desire of the primary aggregates industry to be seen to be 'doing something' under the threat of an aggregates tax; and
3. The combined effect of a number of initiatives started in DTI and by the industry to promote changes in building practices.

Though these other aspects may be of some significance, our own work suggests that the tax is the most important driver. One can say this with reasonable confidence on the basis of the timing of changes (they occurred at the tax's implementation or soon after), and on the basis of the responses of companies who we have interviewed from construction and demolition, waste management, and primary and secondary aggregates industries. Further details can be found in ECOTEC (2000).

As a consequence of changes in the way in which C&D wastes are managed, the fate of these wastes is changing. Obviously, the initiatives mentioned above would be expected to make themselves manifest through reductions in disposal to landfill. However, the magnitude of the reduction that has been experienced cannot be accounted for by increased recycling and re-use alone. There has been significant concern over the developments in respect of disposal to sites exempt from waste management licensing, and therefore, not liable to pay landfill tax.

Exemptions from waste management licensing follow from the UK interpretation of the Waste Framework Directive, and are set out in Schedule 3 of the UK's Waste Management Licensing Regulations (WMLR) (by which the Framework Directive on Waste was transposed into UK law) (HMSO 1994). The two exemptions of most significance in the context of C&D wastes are those under Paragraphs 9 and 19 of Schedule 3 of the WMLR. Paragraph 9 relates to

'the spreading of waste soil, rock, ash or sludge, or waste from dredging any inland waters or arising from construction or demolition work, or any land in connection with the reclamation or improvement of that land if-

- a) by reason of industrial or other development the land is incapable of beneficial use without treatment;*
 - b) the spreading is carried out in accordance with a planning permission for reclamation or improvement of land and results in benefit to agriculture or ecological improvement; and*
 - c) no more than 20,000 cubic metres per hectare of such waste is spread on the land.'*
- (HMSO 1994)

The last clause can be converted, roughly, into a tonnage requirement. A number of different factors are proposed for different types of waste. Taking the figure recommended by Customs and Excise for converting volumes of inert wastes to weights, the factor would be 1.5 tonnes per cubic metre, giving a maximum per hectare weight of material recovered of 30,000 tonnes.

Paragraph 19 refers to the use of waste materials from demolition and construction and other activities for *'relevant work if the waste is suitable for those purposes.'* These relevant works include *'provision of recreational facilities'* or *'the construction, maintenance or improvement of a building, highway, railway, airport, dock or other transport facility on that land but not including any deposit of waste in any other circumstances or any work involving land reclamation'* (the full wording of these exemptions can be found in Annex 1). There is no limit placed upon the quantities which can be used for 'relevant work' although Para.19 does also refer to storage of waste, and there is a limitation on the weight of waste that can be stored where road planning are concerned.

Since any site which is exempt from licensing does not fall under the scope of the Landfill Tax, it becomes clear that whilst (depending upon the fee structures) prior to the tax those responsible for managing inert wastes might have been indifferent as to the status (licensed or unlicensed) of the site, in the wake of the tax, the incentive structure has shifted in favour of sending waste to sites exempt from licensing, and hence exempt from the tax. To this extent that the letter of the law (laid down in the WMLR) is adhered to, this is in complete accord with Government policy, and indeed, is seen as desirable where the exempt site is operating within the terms of exemptions as specified. Through this process, waste is moved up the so-called 'waste management hierarchy', away from landfill and toward recovery (and recycling) activities.

The advantages, in terms of the costs of inert waste disposal / recovery, of being close to an appropriate exempt activity can be significant. Our consultations suggest also that owner operated exempt activities are a prevalent phenomenon, just as is the case with licensed landfill sites. The low or non-existent gate fee at sites exempt from licensing also makes it financially worthwhile to transport inert materials a significant distance to the site. Indeed, the fact that gate fees can be set on the basis of transport costs to maximise revenue for a given load has been used to good effect by some exempt operators who may vary gate fees depending upon the distance a load has travelled. Wastes travelling further can be accepted at lower gate fees if they have 'passed' existing licensed sites. Consultees gave varied responses when asked how far wastes could be transported to their sites. The longest distance was 50 miles, though some operators who had contracts with those generating waste nearby mentioned that typical distances were much shorter.

Conversely, those operating licensed inert waste landfills comment that running such sites is no longer profitable. Some of these landfills are quarries which are having problems meeting the terms of their planning consents. The period taken to restore such sites has, in the view of planning officers, doubled.

Shortly after the tax was introduced, the Environmental Services Association (ESA), on the basis of a survey of its members, estimated that there had been a reduction in inert wastes being landfilled from 42 million tonnes to 24 million tonnes, a reduction of 18 million tonnes from the pre-tax situation. They argued that this was leading to a lack of daily cover and engineering material and was leading to an increase in demand for primary materials. Indeed, ECOTEC (2000) surveyed a small number of companies selling alternative cover materials and some had clearly benefited from the tax's introduction.

The House of Commons Select Committee for the Environment, Transport and Regional Affairs recently reported on Sustainable Waste Management. It noted: 'We are concerned that some activities and facilities currently exempt from waste management licensing, and from the Landfill Tax, are of questionable environmental benefit.' It recommended 'that the Government commission a review of all such exemptions, and research the practicability of monitoring operations which will continue to be exempt.'

This led to the commissioning of work by ECOTEC (2000) on the effects of the tax. That work suggested that as much as 36 million tonnes per annum of inert wastes might have been diverted away from landfill in the wake of the tax. If one accepts the Quarry Products Association's estimates that there has been an increase in recycling and re-use of C&D wastes of 12 million tonnes in the last decade, then the increases in recovery of inert wastes through exempt activities is likely to have been at least 24 million tonnes per annum. This waste is being used in the construction of bunds, hardstanding on farms, landscaping (including golf courses), levelling of fields, and other such purposes.

This would be of less concern were it not for the fact that because the sites are unlicensed, and because license fees are intended to cover costs of inspection, the only resources

available to recover the costs of the inspection of exempt sites are those resources made available to the Environment Agency and the Scottish Environmental Protection Agency under Government grant-in-aid. This leads to a frequency of inspection which is most probably inadequate to ensure the exemptions are not being abused, especially since the activities have increased significantly in the wake of the tax. ECOTEC (2000) listed a number of specific sites which were identified by planning officers and Environment Agency staff as being 'of concern'.

We have found that many actors, from area Environment Agency officers, to County Planning Officers, through to landfill operators themselves, as well as waste management consultants, all raise concerns regarding these exempt activities. It is believed that many accept wastes that should not be accepted at such sites, including large quantities of (methanogenic) wood, and hazardous wastes such as asbestos and contaminated soils. Furthermore, in England, waste disposal matters are dealt with (for the most part) by a separate tier of local government from that which deals with planning applications (which are a free-standing requirement for most exempt sites other than those counted as permitted development). The waste planners feel that those granting planning permissions are not fully aware of the issues surrounding waste disposal and grant permissions that are too lax. They find that it is close to impossible to prosecute those who clearly abuse their exemptions by constructing vast 'landscaping'

This aspect of landfill taxes is under-explored. In discussions with both Austrians and Danish stakeholders, we have been led to believe that similar 'diversion' of waste from landfill is occurring. Whether there is reason for this to give rise to the level of concern merited in the UK case would require further investigation.

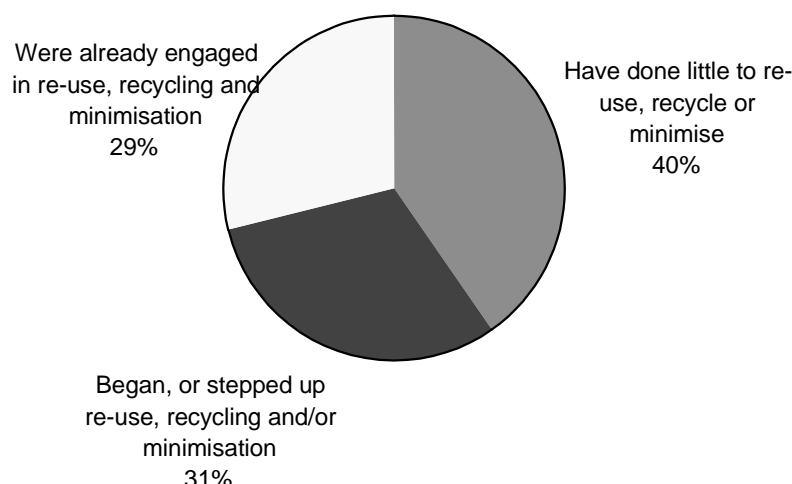
Effects on Commercial and Industrial Wastes

There is no data from which one can really elicit the change in quantities of commercial and industrial waste landfilled since the tax was introduced. Our own survey suggested that many commercial and industrial waste producers were responding to the tax, but that the responses exhibited enormous variation (even within sectors and across what seemed otherwise similar companies). It is generally believed that the elasticity of response to the tax from commerce and industry will be greater than that for municipal waste, but lower than that for construction and demolition waste. In recognition of this Figure 6 seeks to capture the actual response to the tax of companies surveyed.

The range of responses prompted by the tax was quite considerable. 31% began or stepped up efforts in waste minimisation, re-use and recycling, whilst 40% of the sample have done nothing in this regard. Five companies implemented waste minimisation schemes as a result of the landfill tax (see Box 12). Fifteen companies in the survey mentioned the Packaging Directive when asked about other issues concerning waste that were affecting their outlook. Obligated companies are required to recover a percentage of the wastes that they produce under the Producer Responsibility Obligations (Packaging Waste) Regulations. This is leading to a heightened awareness of the need to recycle packaging wastes. Thus, as

mentioned above, it seems that some of the increased recycling activity is due not to the landfill tax *per se*, but to the combination of the tax and the Packaging Regulations.

Figure 6: Companies Recorded Response to the Landfill Tax



Source: EF (1998)

Note: based on 72 responses (one response for each company)

Notwithstanding the influence of other instruments, the response to the tax of some companies has been positive. Many others remain largely unmoved by it, raising questions as to how its effectiveness can be increased to encourage more companies to undertake schemes involving minimisation, re-use and recycling of wastes.

The range of responses lends to the tax a paradoxical character. On the one hand, one could argue that the tax has had a more limited effect than might have been expected, perhaps owing to the fact that its impact on overall costs (and pricing and competitiveness) has meant that its impact in terms of encouraging waste minimisation has been minimal. On the other hand, one could argue that it is quite odd that such a minuscule tax should have had as significant an impact as it has on industry even at this early stage.

In the absence of data concerning the effect of the landfill tax on industry, we have calculated the strength of the exposure of different sectors to the tax through combining data sources. The Environment Agency for England and Wales has recently published preliminary data on industrial and commercial waste arisings. This is the result of a survey of around 20,000 companies undertaken in 1998 and 1999. Using this data the burden of the tax on different sectors has been calculated by comparing the possible tax burden on industry with the turnover and employment of each sector. The calculated figures will slightly underestimate the burden as the turnover and employment figures relate to the UK as a whole rather than just England and Wales. However, England and Wales account for some 85-90% of all UK wastes and a similar proportion of industry.

BOX 12: EMBARKING ON WASTE MINIMISATION

Five companies in the ECOTEC survey undertook waste minimisation as a result of the tax. 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.

To the extent that the tax has failed to affect the behaviour of some companies, this may be a lost opportunity. 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. Ten companies in our survey were able to give some response when questioned as to the percentage of total costs accounted for by waste. Of these, seven were able to place a figure on their response. Typically, companies who can estimate a figure estimate the percentage of costs to be of the order of a few percent of total costs. This is much greater than the proportion of total costs accounted for by waste disposal, which is typically of the order of a thousandth of a percent (see below).

Our hope, in advance of the survey, was that the tax would encourage firms to look not just at the costs of waste disposal, but also at the costs of waste materials. In a sense, the tax would act as a lever to persuade companies to look at waste costs as they began to track the costs of waste disposal. However, many companies appear to have changed their attitude to waste in incremental ways, some doing nothing, others simply seeking a cheaper contractor, or a separation of inert and active wastes so as to reduce their exposure to the tax without altering the amount of waste they produce.

The following examples of benefits reaped by foundries are indicative of the potential gains from waste minimisation. Typically, payback periods were between a year and a half and two years.

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 receive 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.

A foundry in Bedfordshire invested in a sand attrition unit in 1994, more than a year before the tax was introduced. The company was producing 1000 tonnes per year of waste sand. The unit has reduced waste sand to 35 tonnes, a reduction of 97%. This would reduce the tax alone by £1930 per year, whilst disposal costs in total fell from £12,000 per annum before the tax to £300 per annum afterwards.

Another foundry invested in a sand attrition unit in 1994, more than a year before the tax was introduced. The unit subsequently reduced sand wastage from 1040 tonnes to 64 tonnes per annum. The costs of waste disposal for the company fell from £13,624 to £3,700 as a result of their investment, with sand waste falling to 10% of its original level. 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.

Source: EF (1998)

Different estimates of the burden on industry have been made. This is because no data has been found on the relative amount of industrial and commercial waste that is classified as active or inert waste and hence attracts a differential rate of tax. In the high estimate, all the waste generated in 1998 was assumed to be active waste, so attracted a tax rate of £7 per tonne in that year. The low estimate assumes that all waste was inert, thus attracting a tax rate of £2 per tonne. Evidently, for some industries, the majority of wastes can be ‘guessed’ to be active, and for others, inert. However, the range gives the complete boundary to all estimates in the absence of more detailed knowledge.

The tax’s impact, expressed as a percentage of turnover, is clearly miniscule (see Table 89). The education sector accounts for the highest burden. This is consistent with the fact that the wastes generated arise from the presence of large numbers of students in a relatively low turnover sector.

Table 89: Effect of Landfill Tax on Company Turnover

	Turnover	Tax as % Turnover	Tax as % Turnover	Tax as % Turnover
	In £m (MEUR) Excluding VAT	High Estimate 2000	High Estimate 1996	Low Estimate
Tax Rate Used for Estimate		£11.00	£7.00	£2.00
Industrial Companies				
Food, drink and tobacco	73,246 (115,729)	0.008%	0.005%	0.001%
Textiles, wood, paper	71,185 (112,472)	0.023%	0.015%	0.004%
Chemicals, rubber, mineral products	81,963 (129,502)	0.052%	0.033%	0.010%
Metals, metal products	47,075 (74,379)	0.018%	0.011%	0.003%
Other manufacturing	170,240 (268,979)	0.038%	0.024%	0.007%
Coke, oil, gas, electricity, water	63,314 (100,036)	0.043%	0.028%	0.008%
Transport, storage, communications	131,724 (208,124)	0.028%	0.018%	0.005%
Miscellaneous	-	0.000%	0.000%	0.000%
Total Industrial	638,747 (1,009,220)	0.034%	0.022%	0.006%
Commercial companies				
Wholesale	488,178 (771,321)	0.007%	0.004%	0.001%
Retail	217,710 (343,982)	0.027%	0.017%	0.005%
Hotels and Catering	48,451 (76,553)	0.068%	0.043%	0.012%
Education	5,349 (8,451)	0.309%	0.197%	0.056%
Other business and public administration	2,430,626 (3,840,389)	0.004%	0.003%	0.001%
Total commercial	3,190,314 (5,040,696)	0.008%	0.005%	0.001%
Total industrial and commercial	3,829,061 (6,049,916)	0.012%	0.008%	0.002%

Viewed in this way, it is noteworthy that this small tax has promoted any effect on waste at all. It suggests the significance of signalling mechanisms, prompting companies to re-examine their position in respect of waste when this low cost service increases significantly in percentage terms (albeit fractionally in absolute terms).

These figures are, if anything, slightly higher than those gained in an earlier survey by ECOTEC (EF 1998) (see Table 90).

Table 90: Survey Results Concerning Waste Disposal Costs as a Percentage of Total Costs (see Key)

Sector	Average Waste Disposal Cost (range) (pre/post tax) (number of data points)
Food	0.00029 (0.00027-0.0003) (pre-tax) (2) 0.0005 (0.0001-0.0009) (post-tax) (4)
Metal goods	0.0035 (0.0007-0.009) (pre-tax) (4) 0.0038 (0.0002-0.01) (post-tax) (7)
Construction	0.0038 (pre-tax) (1) 0.004 (0.0009-0.0075) (post-tax) (4)
Education	0.0011 (0.0005-0.0018) (pre-tax as % salaries) (5) Two increases reported were 17% and 70%
Clothing and leather	0.0004 (0.0001-0.0006) (pre-tax) (2)
Manufacturing	0.00017 (0.00004-0.0003) (pre-tax) (2)
Mechanical Engineering	0.0002 (pre-tax) (1) 0.0003 (post-tax) (1)
Non-metallic Mineral Products	0.0007 (pre-tax) (1) 0.006 (0.00075-0.015) (post-tax) (3)
Retailing	0.025 (0.0072-0.033) (post-tax) (3)

Source: EF (1998) (Please confirm!)

Note: Does not include small construction companies where percentages are of the order 5%.

Soft Effects

Based on stakeholder consultations, one of the most powerful effects of the Landfill Tax has been the effect on the waste management industry itself. Previously dominated by landfilling, as it still is, the industry has begun to change its perspective on waste. Change is uneven across companies. Some clearly believe that landfill is an environmentally safe option, and many still point to instances where landfill is the 'best practicable environmental option'. Others, however, are changing practices, seeing the new move to take waste away from low cost landfilling as an opportunity to provide higher value added services to local authorities and industry. There is, therefore, diversification occurring in treatment methods for waste.

15.4 Competitiveness Effects

In our experience, there is a good deal of X-inefficiency in UK companies where waste is concerned. Performance within sectors varies enormously, with plenty of room for companies to adopt cost-effective waste reduction and minimisation techniques, as well as re-use and recycling approaches. The tax has clearly stimulated some such activity, though the extent is very much unknown. For construction and demolition wastes, the amount of recycling occurring due to the tax is probably in the order of millions of tonnes, complemented by millions of tonnes of recovery activity.

The miniscule impact on turnover needs re-stating here. Industry has seen very little impact on competitiveness. Set alongside the influence of fluctuating exchange rates, the landfill tax appears (if it appears at all) as ‘noise.’

It should be recalled that the tax was introduced alongside a 0.2% reduction in employer National Insurance Contributions (NICs) and that consequently, the overall impact of the tax / NICs reduction would have been positive for those sectors with high employment intensity, and low waste production per unit of turnover.

ECOTEC (EF 1998) estimated that the effects of the tax would be such that the winners and losers from the package would emerge. It was not possible to conduct a calculation of the net impact on companies surveyed as one would need not only data concerning the tax’s impact on waste disposal costs, but also, information concerning the amount of money spent on salaries which are subject to employer NICs at the higher rate. This would also need to differentiate between those who are contracted out of SERPs (State Earnings Related Pension Scheme) and those who are not since the net benefit to an employer is different in the two cases. However, one can make some rough calculations concerning the break even point for companies in respect of the landfill tax package (see Box 13).

According to the calculation in Box 13, and bearing in mind the caveats stated there, one would expect companies producing less than 3 tonnes per employee to be almost certainly better off as a result of the landfill tax package (using the higher rate tax figure). Those producing between 3 and 10.9 tonnes per employee might be better off (depending upon the mix of active / inert wastes). Those producing more than 10.9 tonnes would definitely be worse off under the package. From Cambridge Econometrics sectoral data, the average for the UK was given as 8.35 tonnes per employee (see EF 1998). ECOTEC Survey data (from EF 1998) are given in Table 91.

BOX 13: WINNERS AND LOSERS FROM THE LANDFILL TAX PACKAGE***Benefits From Reductions in National Insurance Contributions (NICs):***

In 1997, a company paid employers' NICs at the higher rate if an employee earned above £210.00 per week. However, the system works differently for those who are contracted out of State Earnings Related Pension Scheme (SERPs) and those who are not. For employees not contracted out of SERPs, employers will pay 10% NICs whatever the level of earnings. For those contracted out, in 1997, the first £62.00 per week attracted a 10% contribution, and earnings between £62.00 and £465.00 per week attracted a rate of 7% or 8.5% depending on whether the scheme to which the employee belongs is of a salary-related, or money-purchase nature respectively. Above £465.00 per week, the 10% rate was payable. The change in NICs related to the Landfill Tax's introduction affects the 10% figure only.

If it is assumed, for the sake of argument, that each employee remains within SERPs, and that, for the purposes of arriving at a conservative estimate under this assumption, the employee is just within the higher rate band, the benefit to the company from the reduction in employers' NICs is equivalent to at least 0.2% of the lowest salary qualifying for higher rate employer NICs.

i.e. $0.002 \times £10,920.00$ per annum, or £21.84 per annum

Losses Due to Tax on Landfilled Waste:-

If the same company were producing waste that is liable for landfill tax, it could be charged anything from £2 to £10 per tonne, and possibly more, in excess of its previous bill, depending on its waste management company and the nature of its waste. A conservative estimate, therefore, would suggest that as long as the increased disposal costs per employee did not exceed £21.84, the company would be a net beneficiary of the landfill tax package. This would occur wherever:

$(\text{tonnes of waste per employee}) \times (\text{increased disposal cost per tonne}) < £21.84.$

Using the same method as used for calculating the impact of the tax on turnover, we have estimated the costs of the tax per employee. Where this is greater than £21.84, the company was a net loser in 1997.

Evidently, the accuracy of this calculation for any given company is affected by:

- the salary distribution in the company; and
- the proportion of employees who are contracted out of SERPs

At the sectoral level, a further issue of importance is the number of workers who are self-employed since these people do not pay Class 1 contributions and are unaffected by the NICs changes.

Table 91: Waste Per Employee for Firms in the ECOTEC Survey

Sector	Turnover in million £ (MEUR)	Number of Employees	Waste Landfilled (tonnes)	Waste / Employee
Distribution	250 (395)	1000	270	0.27
Manufacturing	21 (33.2)	400	150	0.38
Manufacturing	50 (79)	600	250	0.42
manufacturing	200 (316)	600	316	0.53
retailing	6,000 (9,480)	69000	40000	0.58
retailing	10,752 (16,988)	121600	100000	0.82
non-metallic mineral products	23 (36.3)	220	216	0.98
clothing and leather	12 (19.0)	150	168	1.12
food		289	385	1.33
food	40 (63.2)	550	1500	2.73
mechanical engineering	10 (15.8)	120	336	2.80
food	618 (976.4)	1500	4500	3.00
construction	5 (7.9)	17	121	7.12
metal goods	2.7 (4.3)	67	650	9.70
electricity	1,750 (2,765)	3500	35000	10.00
metal goods	11 (17.4)	200	2000	10.00
non-metallic mineral products	3.5 (5.5)	28	400	14.29
metal goods	0.6 (0.95)	19	300	15.79
food	100 (158)	1700	33264	19.57
metal goods	1.7 (2.7)	50	1000, now 60	20, now 1.2
basic metals	25 (39.5)	250	6500	26.00
metal goods	30 (47.4)	581	16000	27.54
metal goods	1.5 (2.37)	23	1040, now 64	45, now 3
metal goods	9 (14.2)	80	4794	59.93
metal goods	12.5 (19.8)	148	9750	65.88
paper, print and publishing		390	30000	76.92
metal goods	0.7 (1.1)	13	1018	78.31
Electricity	3,300 (5,214)	3700	2000000	540.54

The average figure for waste per employee for firms reporting is 37.2. It will be recalled that the survey focused on what Cambridge Econometrics suggested were high waste intensity sectors so one would expect this high average. We have recalculated the figures on the basis of National Accounts data using the same approach used earlier to calculate tax as a percentage of turnover. This gives the results shown in Table 91. ‘Losers’ are those sectors for whom tax per employee is more than £21.84.

Table 92: Winners and Loser from the Tax / National Insurance Contribution Package

	Employment	Tax per Employee	Tax per Employee	Tax per Employee
	(000s)	High Estimate 2000: £ (EUR)	High Estimate 1996: £ (EUR)	Low Estimate in £ (EUR)
Tax Rate Used for Estimate		11.00 (17.4)	7.00 (11.1)	2.00 (3.2)
Industrial Companies				
Food, drink and tobacco	521	11 (17.4)	7 (11.1)	2 (3.2)
Textiles, wood, paper	984	17 (26.9)	11(17.4)	3 (4.7)
Chemicals, rubber, mineral products	715	60 (94.8)	38 (60.0)	11 (17.4)
Metals, metal products	561	15 (23.7)	10 (15.8)	3 (4.7)
Other manufacturing	1,639	39 (61.6)	25 (39.5)	7 (11.1)
Coke, oil, gas, electricity, water	184	149(235.4)	95 (150.1)	27 (42.7)
Transport, storage, communications	1,488	25 (39.5)	16 (25.3)	4 (6.3)
Miscellaneous	-	£0	£0	£0
Total Industrial	6,092	36 (56.9)	23 (36.3)	7 (11.1)
Commercial companies				
Wholesale	1,723	19 (30.0)	12 (19.0)	3 (4.7)
Retail	2,700	21 (33.2)	14 (22.1)	4 (6.3)
Hotels and Catering	1,498	22 (34.8)	14 (22.1)	4 (6.3)
Education	140	118 (186.4)	75 (118.5)	21 (33.2)
Other business and public administration	6,957	15 (23.7)	10 (15.8)	3 (4.7)
Total commercial	13,018	19 (30.0)	12 (19.0)	3 (4.7)
Total industrial and commercial	19,110	24 (37.9)	16 (25.3)	4 (6.3)

Only two of the sectors listed have all columns emboldened. Only these – coke, oil, gas, electricity, water, and education - are certain losers. These two sectors are the smallest employers of those listed, and the education sector is unlikely to have its ‘competitiveness’ eroded by this effect since the service is not really traded in any sense of the word. The former sector is heterogeneous as the sectoral classification related to the waste data. The lack of sectoral specificity in general makes it difficult to draw firm conclusions, but the analysis clearly shows what one would expect – that commercial sectors gain, and that heavy industry loses (though apparently, some industrial sectors may be winners too).

The construction and demolition industry was not included in the above analysis. This sector, as we have seen, had significant room for manoeuvre through the existence of exemptions from waste management licensing. There will have been some impacts, but this sector is changing quickly. Again, the degree to which this can be said to have led to inter-Member State competitiveness issues is unlikely given the location-bound nature of landfilling / management of heavy wastes. Within the construction and demolition sector, bigger players have entered what was previously a niche market for those crushing aggregates for re-use in construction projects. This market is changing rapidly in size and structure.

UNICE (1995) claims that the main impacts of environmental regulations are; a) increased operating costs, b) diversion of capital expenditure; and c) diversion of management time. Our view is that in the case of the Landfill Tax, the first of these is offset in many cases by the NICs reductions. Given the offsetting effect, and the low level of the tax overall, the diversion of capital expenditure is likely to have been small. But the last point seems to miss the point completely where environmental taxes are concerned. If it is intended to imply that management time should not be spent thinking about things which become ‘taxed’, then whilst this situation certainly reflects the reality in some firms where waste is concerned, others have found that spending management time addressing waste issues generates positive outcomes for their company (see Box 13 above).

15.5 Other Effects: Employment and Distributional

At the macroeconomic level, the impact of the tax at current levels is likely to be minimal, and the same applies in the case of the tax / National Insurance Contributions (NICs) package. As indicated above, however, the ‘losing’ sectors are those which employ fewer people.

An interesting aspect to the tax is the effect of the Landfill Tax Credits scheme, through which as much as 18% of tax revenue can be used for environmental projects / research approved by ENTRUST, a body established precisely for that purpose. On the plus side, projects sponsored can be relatively labour intensive, some being of an intermediate labour market nature (specifically designed to assist in training). However, the net employment effect of this revenue has to take into account the employment that could otherwise be generated through alternative use of revenues (from general taxation) or through reducing

taxes by the equivalent amount. No information exists that would enable such an analysis to be carried out. Given the sum total (of £90 million or so), the number of jobs created through the scheme could be as significant as those created in the winning, mainly commercial sectors, where the cost of each job created may be somewhat higher.

On the downside, the ENTRUST scheme has become the subject of some controversy related to misallocation of funds and accusations of fraud. If these are true, the sum of money being allocated to projects that would otherwise generate jobs maybe rather less than is stated. Although there is a strong feeling that ENTRUST ought to channel more funds towards projects supporting sustainable waste management, actually, ENTRUST has no powers to do this. This has led to criticisms concerning the continuing level of control exerted by landfill operators over what is a substantial sum of money.

An ex ante assessment of the employment impact of the tax only, as predicted by CE, suggests this is relatively small. Even in the case of an escalating tax, with revenue used to fund offsetting NICs reductions, net employment generation, 7,200 in 1997, rises to 21,000 in 2000 and 36,200 in 2005 for the UK economy. Note that if the revenue is not used to offsetting reductions in NICs, there is still a net employment gain. The contribution of the revenue refunding mechanism over the 'tax only' scenario (representing structural adjustment owing to the changes set in place) was estimated at 1600 in 1997, and only 4700 by 2005 under an escalating tax scenario.

The adjustments taking place in the CE model seem not to account for the employment changes due to changes in waste management. We argued above that some 60% of the post-tax increase in recycling due to the tax was due to the tax itself. This amounts to 60% of half the increase in recycling over this period, or 60% of some 800,000 tonnes. Hence, we estimate the tax-related increase to be of the order 500,000 tonnes.

Whilst Waste Watch estimates that job creation in sorting and reprocessing can reach 20,000 at 25% recycling rates, and 36,000 at 30% recycling rates in 2010 (both for municipal waste), Murray estimates that intensive recycling in Britain provides scope for 15,000 jobs in collection and sorting, and 25-40,000 jobs in manufacturing and reprocessing. Murray sites a German report that found that Germany had 1000 firms employing an average of 150 people each in the waste and recycling industry. 17,000 of the 150,000 jobs were believed to have been related to packaging recycling alone.³

On this basis, we estimate that 40,000 jobs could be created through recycling 9 million tonnes of municipal waste (30% of UK municipal waste). This implies that the extra 500,000 tonnes recycled may have created as many as 2,000 jobs.

³ Waste Watch (1999) *Jobs from Waste: Employment Opportunities in Recycling*, London: Waste Watch; Robin Murray (1999) *Creating Wealth from Waste*, London: Demos.

In all respects, the employment analysis seems favourable. At the macroeconomic level, sectors with low employment intensity are being taxed, and in the round, even if this is not used to offset NICs contributions, the effect of public expenditure is such that there is a net employment gain. The technological changes set in train also seem to favour more labour intensive activities, whilst ENTRUST projects certainly have the potential to be viewed as net creators of employment, especially where they support intermediate labour market projects. In fact, though, some of the latter projects are not necessarily intensive in their use of labour so it may be unwise to assign employment gains to this type of activity.

The distributional effect of the tax deserves some mention. Householders will have been barely affected by the tax through any change in prices. However, the tax has to be paid on municipal waste disposal and this requires local authorities to pay extra to have their wastes accepted at landfills. Even if the whole tax were incident upon households, and given that householders generate, on average, about 1.2 tonnes of waste per annum in the UK, the implied additional outlay for households would have been of the order £8.40 (1997) and £13.20 (2000). The fact remains, however, that this revenue would be collected through a combination of central government revenues, and the local Council Tax taxation system. The latter is levied on the basis of house prices (albeit historic ones), so it bears some relation to wealth, and mechanisms exist for assisting low-income households in paying this tax. Hence, the effect on households is likely to be small. There is, in any case, some evidence from survey work undertaken by Waste Watch that households believe they pay much more for waste collection and treatment than they actually do at present.

Furthermore, some local authorities have made use of the landfill tax credits scheme to set up grant-giving bodies, using landfill tax credits, whilst scaling back expenditure on environmental projects funded from their own resources. Hence, some local authorities may have seen the net requirement for additional revenue rise by less than the tax would suggest. This would reduce the already small burden on households.

The more worrying thing for local authorities has been the fact that municipal waste has almost certainly grown at a faster rate than would otherwise have occurred due to waste from more and more small businesses being delivered into the municipal stream. As a result, local authorities are paying an increasing proportion of overall tax revenues. In some cases, inert wastes from small traders are delivered to sites where they are not kept separate for recycling or other treatments. The trader avoids a £2 per tonne tax, whilst the authority picks up an £11 per tonne tax liability because the waste (by virtue of being mixed with other materials) becomes taxable at the higher rate. There is, therefore, an effective shift of the tax burden away from commerce and industry and onto Council Tax payers.

15.6 Conclusion

The Landfill Tax in the UK has exhibited positive and negative aspects. Some of the more negative aspects can probably be traced to a more widespread malaise in UK waste management. The Landfill Tax was intended (at least superficially) to shift waste away from landfill, but very few instruments and initiatives accompanied the tax's introduction. There is, perhaps, a lesson here for the introduction of environmental taxes: it is no good expecting a tax to achieve everything on its own – the tax should be part of a wider package.

The impacts upon municipal waste have been rather limited, and other factors may have played a role in any changes that one might seek to attribute to the tax. Critically (for many authorities) the tax has led to large increases in municipal waste as traders have sought to escape higher costs by dumping waste at home, or at civic amenity sites.

Commercial and industrial waste producers almost certainly have responded to the tax, but again, in some cases, the role played by the packaging regulations has been a complementary one.

Abuses of the exemptions from waste management licensing, as well as fly-tipping, are probably the areas of greatest concern, these having increased as waste producers sought to evade the tax. In part, this has to be traced to an overly lenient response to the Waste Framework Directive, and a lack of adequate resourcing for inspection tasks to regulate a rapidly growing activity. The legacy of this activity can only be guessed at, but the introduction of a landfill tax so soon after widespread exemptions from waste management licensing (and therefore landfill tax) were specified has probably had quite serious ramifications for the rural and peri-urban environment.

The competitiveness effects are barely detectable owing to the fact that the tax is so small. Some sectors, notably construction and demolition, are affected more than others, but construction and demolition have been well-placed to make use of the exemptions discussed above.

Local authorities (and ultimately Council Tax payers) have probably been the biggest losers. Arguably, the net effect of this tax, as long as systems for direct charging of householders are still illegitimate, has been to transfer money from the tax payer to the Treasury. The lack of a serious and coherent policy for dealing with municipal waste has been a major problem. A strategy is beginning to emerge, but it is controversial (relying heavily upon incineration) and ironically, Local Authorities complain that the targets specified (at least in England) are not sufficiently well resourced.

One way forward, which has wide support, would be to make use of the tax revenue to develop the provision of recycling and composting facilities by local authorities for citizens. Not only has ENTRUST failed to deliver much in terms of sustainable waste management, but with no ear-marking of funds for waste management by local authorities, the funding

available to promote sustainable alternatives to landfill may be limited. There are discussions currently ongoing concerning both the future of the landfill tax credits scheme, and the future levels of the tax. Thus far, however, government has opposed extension of the tax to incineration.

The employment effects of the tax have to be considered alongside the effects of the one-off reduction in National Insurance Contributions that accompanied the introduction of the tax. Almost certainly, the net impact of the tax will prove positive over the longer term since typically, the larger burdens fall upon less labour-intensive industries. The effect of the ENTRUST scheme has not been properly analysed.

In conclusion, the tax has good and bad points. The plus points are related to the incentive and signal conveyed by the tax. The bad points can generally be attributed to design issues, and to the wider framework for waste management in which the tax functions.