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## **10.0 LANDFILL TAXES**

### **10.1 Introduction**

EU legislation concerning waste, the basis of which is the Waste Framework Directive, increasingly requires Member States to move waste management up the so-called hierarchy, at the bottom of which is landfill. The Landfill Directive will require major changes in the waste management practices of those countries currently reliant upon landfill as the principal method of treating waste.

Landfill taxes are now applied in a number of EU countries. The most recent introduction has been that in Sweden, which came into force at the beginning of 2000. Different countries have taxes with differing scope. For example, Denmark (and Norway) makes use of a tax on waste, which covers not only landfill, but also incineration with and without energy recovery (see next chapter on Danish natural resource tax). Interestingly, though there would be a strong environmental case for doing this, no EU Member State apart from Austria differentiates between tax rates for landfills with and without gas collection for flaring / energy recovery<sup>1</sup>. Other countries, such as the Netherlands, resort to bans on the landfilling of specific waste streams. Landfilling of municipal waste is banned other than in exceptional circumstances.

We have chosen to look at France, Austria, and the UK. The three taxes differ in their scope, and in the way in which revenues are used. The Danish case (not covered by the present study) has also been subject to evaluations. We allude to this situation in Chapter 11 (aggregate taxes) since the tax on natural resources and the tax on waste were introduced simultaneously in Denmark.

There are clear interactions between different policies concerning waste where landfill taxes are concerned. For different streams, key issues are:

- 1) For construction and demolition wastes, policies concerning recycling of these materials and specifically, aggregates taxes;
- 2) For packaging waste, the legislation introduced to implement the Packaging Directive in Member States;
- 3) For municipal waste, requirements to follow the hierarchy (more or less closely) in different countries (some, such as the Netherlands, impose this more or less by administrative fiat); and
- 4) Policies to charge householders for waste disposal (and the mechanisms used for doing this). Typically, more sophisticated approaches exist where waste disposal costs are

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<sup>1</sup> In Austria a surcharge of ATS 400 (14.50 EUR) per tonne have to be paid for the deposit of municipal waste in a licensed landfill unless it has a state-of-the-art system for the collection and treatment of landfill gases

higher (and these enable incentives for diversion of waste for final disposal to be given more directly to householders).

In the future, the way in which Member States choose to implement the Landfill Directive may also influence decisions concerning landfill taxes and their design.

We begin the chapter with the French study. This is followed by the Austrian study, and then the UK study. We conclude with some observations in respect of the use of the landfill taxes reviewed here.

## 10.2 The French Landfill Tax

### Introduction

Arising of household waste (HW) in France are estimated to have undergone a 50% increase between 1960 and 1990. The capacity for waste disposal has become increasingly stretched over that time. In addition, the number of illegal dump sites is still high (approximately 1500). Public opinion is firmly opposed to the construction of new, or the expansion of existing landfill sites. As part of the Waste Management Plan, a tax on “Household (HW), municipal<sup>2</sup> solid waste (MSW) and other mixed industrial waste (MIW)”<sup>3</sup> was set up in 1992 (Act 92-646), according to the definition of municipal waste in the EU Landfill Directive.

An issue affecting the amount of waste taxed under the scheme is the unclear definition of waste to be included in the tax scheme. Authorities acknowledge the “grey area” around the definition of MIW and final waste<sup>4</sup>, and the lack of data in this respect. A 1998 Circulaire attempts to clarify the definition of final waste, while it is recognised that MIW monitoring needs to be improved. A list of the different types of waste falling under the tax is as follows:

Type of Municipal Waste	Examples
<i>Household Waste (HW) collected by municipalities</i>	sorted, and unsorted, including bulky waste
<i>Other Municipal Solid Waste (MSW)</i>	waste from municipal parks, wastewater sewage sludge/residuals
<i>Mixed Industrial Waste collected together by municipalities with household and municipal waste (MIW) or collected by private means (MIWS).</i>	- inert and harmless industrial waste e.g. paper, board, metals, wood and plastics from industry, administrations, retail, services which do not require any special treatment (disposed on Class II landfill sites) - inert and harmless construction waste, inert extraction waste, other aggregates/demolition waste

<sup>2</sup> “Collectivités” such as waste produced by administrations, and other inert municipal solid waste

<sup>3</sup> “déchets ménagers et assimilés” (DMAs) in the official French legislation. Municipal waste in the sense of the EU Landfill Directive.

<sup>4</sup> Waste which cannot be treated or recovered.

Currently, the volume of waste potentially affected by the tax is around 136 million tonnes. This includes: 28 million tonnes of household waste, 14 million tonnes of municipal waste (other than HW), 5 million tonnes of harmless industrial waste collected with municipal waste and 89 million tonnes collected by the private sector (and so are not in the control of local authorities). In fact about 28 million tonnes are taxed, the rest being recycled, composted, incinerated or dumped in private landfill sites.

Despite the tax and the other measures, the volume of household waste steadily grows while the volume of mixed industrial waste seems to decrease slowly due to some waste minimisation initiatives by industry where cost savings are expected. The objective of banning landfill to all but final waste seems to be far from being achieved. 59% of all household, municipal and mixed industrial waste arisings still followed the landfill route in 1997. Since 1993, the first year of implementation of the tax, the share of landfill has decreased by only 4% (8% since 1989) – see Table 42.

**Table 42: Trends in Patterns of Waste (affected by the tax) Disposal in France**

	1989	1993	1995	1997	% Points (1989/1997)
Landfill	61 %	63 %	58 %	59 %	2
Incineration with energy recovery	23 %	22 %	24 %	22 %	-1
Incineration without energy recovery	11 %	9 %	9 %	7 %	- 4
Composting	6 %	4,7 %	5 %	6 %	0
Sorting (recycling)	0	0,01	4,2	5,8	5.8
Biomass Production (methane)	0,02 %	0,015 %	0,02 %	0,02 %	0
					<b>% Change</b>
<b>Total Volume</b>	32 Mt	34 Mt	36 Mt	37,3 Mt	+ 1.6 %

Source: ANRED and ITOM-ADEME (National Energy & Environment Agency)

Note: the above statistics only include waste received by public licensed waste sites with the exception of landfill sites receiving less than 3 000 tonnes/year, the recovery sector (20 Mt plus 60% of sewage sludge valorised by the agricultural sector) and private sites .

#### *Design and development of the tax*

The tax was implemented in 1993 after the Law of 13th July 1992 was enacted. This was followed by two 1993 Decrees (93-169 and 93-745).

As in 1999, the tax rate is 60FF per ton delivered to public landfill sites. Delivery to landfill sites constitutes the ‘taxable event’ and the site operator is liable for paying the tax. The

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minimum tax level per site is set at 3,000 FF per site per year. To ‘break even,’ therefore, a site must receive at least 50 tonnes of waste each year. There is a 50% increase in the rate for waste from outside the area covered by the local waste disposal plan, which covers each district (département).

Effectively, this is a tax on the import or export of waste across districts, so that the Proximity Principle is reinforced.<sup>5</sup> This is made possible since operators of Class II landfill sites are required to keep a register in which, for each waste consignment delivered, the following is to be recorded:

- tonnage and type of waste;
- place of origin and identity of the producer;
- date and time of delivery;
- name of the waste carrier; and
- Registration number of the delivery vehicle.

This registration system has been in place before 1992, under the 1975 law.

The tax is applied to all waste entering landfill sites with or without Prefectoral authorisation to take such waste. Around 2,500 landfill sites are affected - 500 authorised sites with a capacity of over 10 tons per day, 500 authorised sites with a lower capacity and some 1 500 illegal dumpsites. An inventory of illegal sites allows ADEME to collect tax from such sites. Although such sites pay the tax and are known to the authorities, apparently, they are not forced to obtain authorisation, which seems illogical (even though the authorities are keen to eliminate these).

The tax is payable quarterly by facilities authorised to receive more than 20,000 tonnes of waste per year, and annually otherwise. All persons or legal entities liable to pay the tax have to send ADEME notification (in the form of a declaration) of tonnage delivered to them along with the tax payment due. All persons or legal entities operating Class II landfill sites - whether they have been granted authorisation or not –are liable to pay the tax. This applies as long as the site is not exclusively used for internal waste.

The tax has been implemented at national level, and is collected at national level by ADEME. It is applied at local level, taking district’s boundaries into account as a basis for rate differentiation.

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<sup>5</sup> The Proximity Principle is a cornerstone of EU waste legislation and concerns the desirability for waste disposal to occur as close to its site of production as possible.

No explicit externality evaluation has been made. It is solely based on the perceived necessity to reduce the quantity of waste sent to landfill, restricting it to residual, or rest-waste from 2002 onwards. There was no ex-ante assessment carried out.

### *Intentionality of the Tax*

Implicitly, the tax was meant to have a significant incentive effect through the “price signal” passed over to landfill users. It was implemented to streamline French waste management through increasing waste recovery, and providing for full cost recovery of waste management. It is one of the policy instruments of the national strategy to restrict disposal to landfill to final waste only that cannot be recovered by any other treatment by 2002. Indirectly, it was also meant originally to finance the Modernisation Fund for Waste Management (MFWM), created in 1993 and run by ADEME.

### *Historical Profile of Tax Levels*

The 1975 law on Waste Disposal and Material Recovery (75-633) was modified in 1992, where the 2002 objective was stated for the first time, sets in place the principles of the French Waste Management Plan. Each region and district must develop its own waste management plan (Art. 10). Article 22-1 foresees the implementation of a tax of 25 FF/ton on household, municipal and industrial waste by 1994. It explicitly states that the tax rate will be ramped up to 40 FF/ton by 1998 following a 5FF annual increase (see Table 43). The tax rate rise explicitly reflects the government’s intention to move towards more sustainable waste management by 2002.

**Table 43: Evolution of Tax Rates – 1993-1999**

<b>1993-4</b>	<b>1995-7</b>	<b>1998</b>	<b>1999*</b>
20 FF per ton (3.05 EUR)	25 FF per ton (3.81 EUR)	40 FF per ton (6.10 EUR)	60 FF per ton (9.15 EUR)

\* Under the TGAP Tax Scheme (General Tax on Polluting Activities), from 1999 onwards

### *Exemptions*

Exemptions are in place for:

- Internal waste disposal sites;
- landfill sites receiving inert waste only.

The exemption for owner-operated sites affects the volume of MIW falling under the tax, as it is not collected for disposal in a collective landfill site. Of the average MIW volume of 100Mt, about 90% is recycled, incinerated, composted or disposed of at owner-operated sites. The same is true for 90% of harmless agricultural waste (or 360 Mt), but the percentage of mixed agricultural waste is uncertain.

### *Future of the Tax*

The General Tax on Polluting Activities (TGAP, Loi de Finances 1999) integrated the 5 current environmental taxes – including the landfill tax - so as to integrate and simplify the system of environmental taxation and implement the “Polluter Pays Principle” more effectively. The TGAP is administrated by the Excise and Duty Directorate General and will terminate the mandate of ADEME (a different funding line will be set up for ADEME as it will not perceive the landfill tax revenues from 1999 onwards).

### *Revenue and Use of Revenue*

The landfill tax payments received by ADEME (see Table 44) were up to 1999 fed into the MFWM, instituted by a decree of March 1993 (number 93-744) and administered by ADEME. The aim of the MFWM is to promote innovative means of waste treatment and to equip local authorities with necessary funds. This involves four main objectives:

- Financial aid to develop innovative technology for household and assimilated waste treatment;
- Financial aid to install waste treatment facilities, especially those which make use of innovative technology;
- Financial aid to local authorities on whose territory a new public treatment plant for household and assimilated waste is built;
- Financial aid to Council of Districts which are responsible for waste management planning;
- Financial aid for upgrading public landfill sites and restoring contaminated sites.

The distribution of revenue across these categories is shown in Tables 45 and 46.

**Table 44: Tax Revenue and Subsidies in Million FF (million EUR)**

Year	1993	1994	1995	1996	1997	1998	1999	2000	Total
Revenue	181 (27.6)	425 (64.8)	555 (84.6)	643 (98.0)	806 (122.4)	938 (143.0)	1292 (197)	1476 (225*)	3 545 (540.4)
Subsidies	28 (4.3)	235 (35.8)	371 (56.6)	500 (76.2)	457 (69.7)	1 626 (247.9)	N/A	N/A	3 217 (490.5)

Source: ADEME, 2001.

\* estimates. Total subsidies only include years for which data is available. N/A- not available.

**Table 45: Subsidies by Domain of Action – 1993-1997 in Million FF (million EUR)**

Domain of Action	1993	1994	1995	1996	1997	Total
R&D	9 (1.4)	61 (9.3)	65 (9.9)	59 (9)	79 (12)	273 (41.6)
Infrastructure/ Equipment	20 (3)	160 (24.4)	297 (45.3)	428 (65.2)	351 (53.5)	1 256 (191.5)
Landfill Rehabilitation	-	14 (2.1)	6 (0.9)	9 (1.4)	9 (1.4)	38 (5.8)
Municipalities with new plants	-	-	3 (0.45)	4 (0.6)	10 (1.5)	17 (2.6)
Districts	s.o	s.o	-	-	8 (1.2)	8 (1.2)
Total	29 (4.4)	235 (35.8)	371 (56.55)	500 (76.2)	457 (69.6)	1 592 (242.7)

Source: ADEME, 1998.

**Table 46: Shares of Total Subsidies by Waste Programme - 1993 – 1997**

Waste Programme	Total Subsidy MFF (MEUR)	Share (%)
Agriculture	38 (5.8)	2,5
Municipal Waste	1 093 (166.6)	71,8
Mixed Industrial Waste	249 (38)	16,4
Toxic Industrial Waste/Final Waste	26 (4)	1,7
Other <sup>6</sup>	114 (17.4)	7,5
Total	1 521 (231.8)	100

Source: Planistat, 1998.

<sup>6</sup> Different programmes which concern several waste (transport, doctoral thesis, socio-economic studies)

The new TGAP scheme including the landfill tax will be revenue neutral. A raise in the tax rate per ton will be compensated by a 5.5% VAT on waste collection and sorting services (instead of 20.6%) if municipalities sign a contract with authorised companies for household waste packaging. The TGAP scheme was expected to raise 1 900 Millions FF (290 MEUR) in 1999, of which 1 292 MFF (197 MEUR) from the landfill tax (68% of total expected revenue). The actual figures are not available. The revenue will be earmarked to finance the cost of reduction taxes on labour and social security schemes (and potentially, the “35 hours Scheme”). This approach to obtain a “double dividend” has been criticised by business associations, who do not believe it to be realistic in practice.

#### *Organisational Roles and Administration*

The ADEME was set up by the 1992 Law to administer, amongst other things, the tax and the Modernisation Fund for Waste Management. It is in charge of verifying the declarations (notifications) and collecting the tax, working together with the main stakeholders, i.e. waste collection, treatment and disposal operators. Once the tax has been incorporated into the TGAP (General Tax on Polluting Activities – in 1999), the Ministry of Finance, Section Excise and Duty, will take over the administration of the tax.

Table 47 below summarises the roles of different organisations under the two different regimes:

**Table 47: Responsibilities for Landfill Tax and TGAP**

	<b>1992 LANDFILL TAX</b>	<b>TGAP</b>
... is responsible for evolution of the tax	Ministry of Planning/Environment Parliament	Ministry of Finance Section Excise & Duty Parliament
... is responsible for implementation and administration (tax collection)	ADEME And MFWM Committee	Ministry of Finance Section Excise & Duty From 1999 onwards
... decides on exemptions	Ministry of Planning/Environment	Ministry of Planning/Environment

An indicator for the administrative cost is the “frais de gestion” under the Fund: 200 MFF over the period 1993-1997, or 50 MFF per year. But one of the TGAP rationales is to simplify the administration of the taxes, hence reducing the administrative burdens through the centralisation of tax collection and management.

### *Complementarity Within Portfolio of Policy Instruments*

The landfill tax has been classified by the French Environment Statistical Institute (IFEN) as a “product tax”, where the disposal of waste is the product). In this line of thinking, a complementary instrument can be seen in the service charge on waste collection collected by local authorities and paid by users (industry, households). Once the TGAP is in place, the VAT on household waste collection/sorting and reuse will be lowered from 21.6% to 5.5%.

Several instruments complement the workings of the tax to meet the national waste strategy objectives. Several voluntary agreements, also targeting landfill reduction, and promoting waste recovery and recycling, have been signed by industry. These are deemed to allow more flexible and cost-effective complementary approaches than taxes:

- **Voluntary Agreement on End-of-Life Vehicles:** signed in 1993, French car manufacturers committed themselves to achieve a target of no more than 15% of total car weight landfilled by 2002. From 2002, models must allow 90% recovery, re-use or recycling. The lack of monitoring has prevented a clear assessment of its environmental effectiveness (EEA, 1997);
- **The Eco-Emballages and Adelphe Schemes:** this is the mechanism through which France seeks to meet its obligations under the Packaging Directive. An agreement between the government and the organisations seeks to achieve an objective of 75% recovery from all packaging waste in 2003. These accredited organisations take back packaging waste from producers or importers of packaged products. Adelphe was created in 1993 and specifically takes back glass bottles from wine and spirits, while Eco-Emballages covers the largest part of packaging waste. Subscribers, who are charged by cm<sup>3</sup> or kg of waste by Eco-Emballages, are entitled to receive a ‘green dot’ logo for recycling. However, current data shows that the Eco-Emballages scheme has not been very successful between 1993 and 1995 (see figures in Table 48); and
- **CYCLAMED:** another voluntary scheme for treating expired medicines and their packaging.

In addition to the voluntary schemes above, a similar tax on Hazardous Waste Plants and Landfill - also administered by the ADEME and regrouped under the TGAP scheme - has been implemented in 1995.

### *Environmental Effect of the Tax*

Although the tax was designed to have an incentive effect, this effect has so far only been measured by the share of total household waste going to landfill. Overall, extrapolating from current trends, the proportion of household waste still being landfilled has not decreased sufficiently so as to achieve the target of final waste restriction<sup>7</sup> by 2002. In addition to this,

<sup>7</sup> déchets “ultimes” that cannot be recovered by any treatment

ADEME estimated that 59% of total household, municipal and mixed industrial was still being landfilled in 1997 against 61% in 1989 and 63% in 1993 (see Table 42).

The elasticity of demand for landfill has not been estimated. It should be mentioned that in France, as in the UK, relatively few municipalities operate so-called pay-as-you-throw schemes, so the incentive for most households to reduce waste production is, at the margin, zero. Some unidentified soft effects, i.e. innovation, might have been induced by the MFWM, but only to a certain extent: the share of R&D has remained rather limited (around 8% of the total annual Fund over the years). Under the new TGAP scheme, the reduction of VAT on alternative waste treatment technologies suggests that there is also appreciation of cross-price effects. However, no estimates are available.

It is also felt by interviewees that financial support by the ADEME to local authorities has focused more and more on equipment, which led to a sharp increase in related investment. The effectiveness of this new equipment has not been assessed.

Although municipalities typically have fixed-term contracts with landfill operators, some have switched to incineration and sorting / recycling since 1997. Increased recycling rates are not outstanding, as evidence suggests that recycling infrastructure is not sufficiently developed. Sorting has increased to 5.8% from very low levels (almost 0% in 1993 according to ADEME). The volume sorted has risen from 0 Kt in 1989 to 2 154 Kt in 1997 as estimated by ADEME, and so has the number of sorting sites (from 2 in 1993 to 170 in 1997). However, only 6% of total waste falling under the tax was recycled in 1997, against 4.7% in 1993. The increase in recycling cannot clearly be attributed to the tax. Although the tax constitutes a financial incentive for municipalities and companies to reduce quantities of waste sent to landfill, whilst they have contracts with landfill operators, landfilling is likely to increase, and the effect on recycling will be marginal unless the tax is set at a very high rate. Part of the progress in recycling may be due to the Eco-Emballages scheme for household waste packaging (see Table 48).

**Table 48: Volume of Recycled Household Waste (thousand tonnes)**

Household Waste	Volume in Kt		
	1993	1995	1999
Metal (packaging)	175	194	275
Glass	1 005	1 160	1 550
Paper & Board	200	220	585
Plastics (packaging)	7	14	55
Green waste		400*	1 200
Other biowaste	4	20	80

Source: Eco-Emballages. \* estimates.

*Effects on Producers*

Prior to the tax, the landfill cost averaged 80 FF/ton of HW/MW/MIW. The data below (Table 49) shows the evolution of the landfill gate fees per ton of municipal, household and mixed industrial waste:

**Table 49: Pre-Tax Price Per Ton of HW/MIW/MW for One Site, in FF/T (EUR/T)**

01/90	07/90	01/91	07/91	01/92	07/92	01/93	% change
72	79	93	100	150	180	210	191 %
(11)	(12)	(14.2)	(15.2)	(22.9)	(27.4)	(32)	

*Source: Court Decision 98-D-61, October 6th 1998.*

In 1998, the landfilling price paid by municipalities for such wastes varied from 250 FF/t to 600 FF/t depending on the area, and on average, the tax represents 15% of the price (40FF/T in 1998). One municipality of 13,000 inhabitants reported pre-tax prices of 397 FF/ton in 1998, 495 FF/ton in 1999 and 2000. The effects of the tax on landfill gate fees, expressed as a percentage of the pre-tax price, have ranged from 9%<sup>8</sup> in 1993 (tax rate of 20FF/ton) to 15% in 1998. (In the case of the above municipality, the tax represents 12% of the pre-tax price in 1999-2000). This increase in landfill gate fee costs (together with rising household waste flows), for the municipalities, was probably compensated by an increase in local collection fees paid by households (see effect on consumers), although this hypothesis could not be fully verified. The impact of the tax on municipalities' costs cannot be assessed.

Some comments on the potential effect on producers of alternative goods (recycling and reuse) have been made by the Chamber of Commerce and Industry of Paris (CCIP). The implementation of the TGAP and the foreseen increase in landfill tax rates (50% increase), will harm recycling and reuse site operators who annually send 1.5 million tons of their "final waste" to landfill. A 50% increase in landfill tax rate will induce a cost of 90 FF Million on these producers, or 0.3% of turnover, which in turn, could lead to a loss of 3000 jobs.

This statement seems selective at best since the recycling industry as a whole would be expected to grow given that many municipalities are likely to intensify efforts in respect of sorting and recycling because of the tax. Indeed, the same argument could be made in respect of incineration, since 20-30% of incineration residuals may be landfilled if they are not recycled (30%). Yet the tax seems likely to affect this industry in a similar way, encouraging some expansion of capacity, but increasing the costs of dealing with fly- and bottom-ash. No information was found on the impact on other competing waste treatments (e.g., composting, anaerobic digestion).

<sup>8</sup> Based on data from one landfill operator only

### *Competitiveness Impacts*

A legal case was brought by the Ministry of Finance to the Competition Court in 1998. The trade body of waste treatment activities FNADE had called its members in Ile de France to intentionally charge their clients an “administrative fee” of a maximum of 10% of the tax (i.e. 10% of 20FF/t) in addition to the 20FF/ton increase in price. The aim was to fully recover the tax burden, and to cover the administrative burden implied by the tax payment to ADEME. Although the tax pass-through is legal and widely accepted by municipalities, adding an administrative fee to it is illegal. This concerted action has taken place very soon after the implementation of the tax in 1993, among landfill operators benefiting from a dominant market position. The investigation shows a sharp increase in prices/ton in 1993, and on average, prices charged by the group of operators in question were significantly higher than the average prices on the landfill market at that time. The group –including the trade body FNADE – were fined on the grounds of a breach of free market competition and abuse of dominant position.

Consultation shows that these issues constitute a very sensitive topic for most stakeholders. Such practices seem not to have occurred again – no other court case was found. Moreover, the court case mentioned above has made operators less inclined to discuss the tax, preferring to keep their opinions confidential.

Some concerns have been expressed through the Chamber of Commerce of Paris, in a report on Environmental Taxes. Their view is that the TGAP can have a negative effect on industry’s competitiveness at large, via the “double dividend principle<sup>9</sup>”, which, in practice, is not likely to be obtained if the less than 100% of the tax revenue is used to finance the planned labour cost reduction. They fear that the promised decrease in labour cost will not be possible if it is simply to be financed by the TGAP revenue.

These arguments are probably brought out now because the TGAP is very likely to be extended to agriculture and energy. It does not seem to be specifically linked to the landfill tax.

### *Internal Market Effects*

These effects have not been estimated and no figures or estimates have been provided. Evidence suggests however, that cross-border movements of municipal waste are very rare. Since 1992, imports of such waste have severely dropped (430 000 tonnes in 1991 to 5 600 tonnes in 1994) due to a law that restricts imports for recovery purposes only. The linkage with the tax is not clear, and the quantity is rather insignificant. Therefore, these effects can be expected to be small.

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<sup>9</sup> To create jobs while protecting the environment.

### *Impacts on Trade*

These have not been estimated. Trade bodies in the waste sector were consulted but no information was given. Some countries specialise in the provision of equipment for recycling, anaerobic digestion and incineration (i.e. non-landfill waste treatments). Though many of these are outside France, some are French. It would be difficult to comment clearly on the impact of the tax on trade flows in such equipment. Nevertheless, the current trend in gross domestic product (GDP) derived from waste activities since the introduction of the tax (see Table 59b) shows that the tax might have had an impact on the development of this market. The extent and whether the impact was rather positive or negative cannot be assessed with the currently available data. Turnover ranges from 3.3 Billion EUR in 1993 to 4.5 Billion EUR in 1998.

**Table 59b Evolution of the French Waste Activities Market (% of GDP)**

<b>Year</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>
<b>Waste Sector</b>	4.8	7.9	2.7	2.9	3.9	1.8	3.3
<b>GDP</b>							

*Source: BIPE Conseil.*

### *Impacts on Employment*

Effects on employment have been small, although employment in eco-industries, including the waste sector, is growing, the direct effect of the tax is difficult to assess. However; the waste sector currently employs 15 000 people. More and more municipalities turn to incineration and recycling, and the latter in particular should affect employment positively (although this is not the aim of the tax) given the high labour intensity of recycling activities. Having said that, it is frequently in the reprocessing of materials where greatest employment gains are to be made. We understand that plastics and electronic component recycling are at the margins of profitability at the moment.

The main effects of the tax on employment was likely to be found in revenue recycling in the form of infrastructure investment. Over the 1993-1997 period, municipal waste programmes have benefited from 72% of total subsidies (1 093 MFF) from the Modernisation Fund, mainly in the form of equipment investments (78%). Site rehabilitation projects have not been a priority and have only received 2% of total subsidies. Within private sector subsidy recipients, eco-industries have received 50% of grants.

One conclusion from the 1993-1997 evaluation report by ADEME is that the subsidies have not had the expected impact on the short-term take-off of waste recovery and recycling activities. One of the reasons for this delay seems to be the inertia of local authorities to invest in such a field because of the rising waste treatment cost, and the delay in drafting and implementing the waste management plans at district level. Also, it is recognised that the development of such activities requires a long-term and sustained financing, such as under

the Eco-Emballages scheme to support unprofitable plants. The employment impact from current and past revenue recycling is thus considered to be small.

Industry fears that different levels of environmental taxes across the EU, on top of clear-cut differences in labour cost, could harm their competitiveness at large. Yet the minimal cost of waste treatment for the majority of industries seems to make this an unlikely prospect. Indeed, it is often those companies that are most keen to minimise waste that are the leaders in their sector. In relative terms, these are less likely to be affected by waste taxes. Furthermore, a greater number of such firms may be induced into existence by virtue of the fact that waste costs are higher.

#### *Impact on Consumers*

Citizens pay a local tax on household waste collection services offered by their commune<sup>10</sup> or a special fee. In France, the charge consists, in most municipalities, of a flat rate per year and inhabitant, which has steadily increased since 1993. As Table 50 below shows, these costs differ regionally, and even locally. Rural areas face much higher total costs for HW/MW and MIW due to longer transport to small landfill sites generally charging higher landfill gate fees per ton of waste. Collection and transport represents 40% to 65% of total treatment cost. Note that the figures below refer to collection and treatment cost, not only to collection. Separate data on collection taxes were not made available.

**Table 50: Ranges of Estimated Costs of Collection and Treatment of HW/MW and MIW in FF (EUR)**

Area	Per tonne		Per inhabitant per Year	
	Total	Subsidised	Total	Subsidised
Urban Area	890 – 1150 (135.7 – 175.3)	575 – 820 (87.7 – 125)	460 – 595 (70.1 – 90.7)	340 – 425 (51.8 – 64.8)
Semi-urban Area	1020 – 1445 (155.5 – 220.3)	755 – 1065 (115.1 – 162.4)	435 – 645 (66.3 – 98.3)	320 – 475 (48.8 – 72.4)
Rural Area	1230 – 2010 (187.5 – 306.4)	945 – 1570 (144.1 – 239.3)	395 – 630 (60.2 – 96.0)	305 – 565 (46.5 – 86.1)

*Source: SOFRES Study on behalf of ADEME and AMF, 1998.*

<sup>10</sup> TEOM: "Taxe d'Enlèvement des Ordures Ménagères"

### 10.3 The UK Landfill Tax

#### *Introduction: Design and Development of the Tax*

The UK Landfill Tax was introduced in October 1996. The tax level was based on work which attempted to measure the externalities associated with landfill and incineration, and the proposals for the tax were widely consulted on before being introduced. The initial rates at which the tax was set were:

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|-------------------|-------------------|---------------------------------|
| (a) Inert Wastes  | lower rate tax    | £2 (approx EUR 3) per tonne     |
| (b) Active Wastes | standard rate tax | £7 (approx EUR 10.5) per tonne. |

Mixed wastes are taxed as active wastes if certain minimal levels of mixing are exceeded.

The tax affects all sectors of the economy. In the UK, landfill is the most important form of waste disposal with only small volumes of waste being incinerated. As such the tax on landfilling is close to being a general 'waste tax' even though incineration is currently untaxed. However, there is some concern (ECOTEC 1997) that the lack of a tax on incineration will simply lead to a switch from one linear form of waste treatment – landfill – to another – incineration – unless other measures are put in place.

#### *Process Development of the Tax*

The introduction of the Landfill Tax was preceded by an assessment of the external costs associated with landfill and incineration (CSERGE et al 1993) and by work assessing waste management options in the UK after the introduction of such a tax (Coopers & Lybrand 1993). A proposal for a tax based on a percentage of disposal costs (an ad valorem tax) emerged, with the order of magnitude of the tax heavily influenced by the external costs study.

An intention to introduce the Landfill Tax was announced in November 1994. In March 1995, a consultation process was undertaken to elicit the views of industry, environmentalists, and local authorities. Its major outcome, as announced in the November 1995 Budget, was a change in the tax design, from a percentage of disposal cost system, to a weight-based tax. Furthermore, it was intended that there should be no exemptions from the tax.

Local authorities were the most numerous respondents to the Consultation Paper. Municipal waste management is financed by local authorities, so local authorities could see that the tax would significantly affect their waste management costs. Fees at landfill sites for disposal of

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municipal waste vary across the country from about £8 to £20. Therefore in percentage terms the increase implied by the tax was significant.

Local authorities perceived that they had limited scope to influence the amounts of waste generated by householders. Under existing UK legislation, Local Authorities are unable to introduce variable charging schemes (known in the United States as ‘Pay as you Throw’ systems, in which citizens pay a fee in proportion to some measure of waste disposed), which would convey some form of incentive to householders to reduce disposals. Also contractual rigidity meant that they had little control over the cost or method of disposal. Some local authorities are locked into contracts which specify that they will deliver minimum quantities for disposal to landfill. In addition, they bear the costs of clearing up waste that is fly-tipped on public land, and there was a strong suspicion that such practices would increase after the tax’s introduction. Lastly, there was some concern that waste which was previously in the commercial and industrial stream might enter the household stream through being taken to civic amenity sites (sites where householders can take bulky wastes) and even to the homes of the owners of small businesses.

The tax was supposed to be revenue neutral. It was estimated initially that the tax would generate some £500 million, the figure was revised to £450 million in November 1995 (Riley 1995). This cost to business was to be offset through a reduction in the cost of employing labour. Employers’ higher rate National Insurance Contributions (NICs) were to be reduced from 10.2% to 10%. In addition, an element of hypothecation of revenue was made possible through the channelling of some of the funds into waste management research and improvement projects around landfills. To access these funds, groups register as environmental bodies under a new organisation named ENTRUST. Once the details of the tax were finalised, it was introduced in October 1996.

#### *Detailed Design and Administration*

After the Consultation period, political lobbying continued with specific industries and sectors claiming exemptions from the tax. Some of the lobbying led to some wastes being moved into the lower rate band for ‘inert’ materials. Complete exemptions were instated for:

- (a) Pet cemeteries;
- (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.

The point at which the tax becomes payable is when the waste is discarded to a licensed landfill site. The significance of the fact that the tax applies only at licensed sites will be

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explored below. Site operators can apply for designation of areas at the front of landfills as tax-free zones. Here they can separate wastes either for recycling, for use on site, or for separating into inert and active fractions. The latter activity enables site operators to ‘mine landfill tax’ from those delivering waste as long as payment of the tax is not explicitly defined as such on invoices.

### *Evolution of Tax Levels*

The lower rate of tax has remained constant over time. However, due to a drop in inert materials arriving at licensed landfills and quarry operations, two new exemptions were introduced in October 1999 for inert wastes used for backfilling of mineral workings and in the completion of landfill sites. Another exemption for waste from US armed forces was also specified. There is a possibility of removal of the exemption from tax for landfilling of material cleared in the redevelopment of contaminated sites.

The standard rate was increased from £7 (approx EUR10) to £10 (approx EUR 16) in April 1999. In the Budget of 1999, it was announced that the standard rate would increase by £1 (EUR 1.6) a year until 2004 (when it will be £15, or EUR 24 per tonne). The increase in the tax represents a departure from the original philosophy behind the setting of the tax level relating to the externalities of landfill.

### *Use of Revenue*

The tax was designed to be revenue-neutral. At the time the tax was introduced, it was announced that the tax paid by employers in respect of their employees (Employers’ National Insurance Contributions, or NICs) would be reduced from 10.2% to 10%. There was some discussion, notably in a submission by Forum for the Future and Cambridge Econometrics, as to the targeting of the reduction on higher rate NICs, the rate applicable to higher paid employees. The submission made the point that the reduction might have been more equitable had it been targeted at the lower rate employers’ NICs which apply to those in lower paid jobs. This might also have reduced the perception that the tax hit hardest the manufacturing industry (low labour intensity and wages, high waste intensity) whilst benefiting the service sector (high labour intensity, low waste intensity).

In addition, an innovative scheme was developed to enable the use of some revenue for environmentally and socially beneficial projects. The scheme, the Landfill Tax Credits scheme was designed in the following way:

- Of landfill operators’ tax liabilities, 20% can be put to use in funding projects falling under an agreed set of criteria defined by Government.
- The tax credit received in respect of the funds made available through the scheme would be equivalent to 90% of the funds. Hence, either the landfill operator, or a third party, would have to contribute 10% of the funding for the projects involved.

- In order to receive funding, projects had to be carried out through an Environmental Body. Registration of such bodies was made the responsibility of a new organisation named ENTRUST.

This creative design was in part intended to overcome the UK Treasury's traditional opposition to hypothecation. This design deviated from strict hypothecation in that it appeared to require operators to make some contribution to the activities funded, though in practice, it has often been third parties putting in the 10% funding that leverages in the additional 90% funding. Also, it does not make use of all the revenue raised.

The fact that the allocation of the funds would be decided by landfill operators was considered bizarre by many observers. Whilst there are mechanisms designed to ensure that operators are not 'direct' beneficiaries, the public relations benefits that they could generate was thought likely to be significant.

#### *Intentionality of Tax*

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

*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).*

From this, it seems clear that the aim of internalising externalities is the primary one, with the aims of increasing recycling and valorisation of waste, and reducing disposal of wastes to landfill following from this aim.

It is worth noting that the externalities from landfill as assessed prior to the tax's introduction included those from transport of material to the landfill and the return journey from it. These transport-related externalities are now addressed through an escalator on fuel duty which was introduced after the externality assessment was carried out. As with other analyses of this kind, the externality estimate was heavily skewed in favour of global air pollutants (see ECOTEC 2000 for a discussion).

It is clear that the tax was also seen as having a role to play in raising revenue. Its revenue raising importance is limited as the tax is one of the smallest new taxes introduced in recent times though as discussed above, the rate is now increasing.

#### *Complementarity Within Portfolio of Policy Instruments*

The tax was implemented as a stand alone instrument. However, it was also recognised that the UK would have to change its approach to waste management given EU policy

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developments. The Packaging Directive was in place and in the second year of the tax the Packaging Waste (Producing Responsibility) Regulations were introduced. This resulted in the emergence of a de facto tradable credits scheme, the currency of exchange being evidence of reprocessing of packaging waste. Other linkages are to the proposed aggregates tax (see next Chapter) which could slow down the creation of void space for landfills and could possibly give a further stimulus to recycling of construction and demolition waste.

### *Environmental Effect*

Although some ex ante analysis was carried out in preparing the ground for the tax, there was limited analysis of the potential impact of the tax on waste being sent to landfill prior to its introduction. Data on UK waste arisings and disposals is still appalling. The Landfill Tax has helped improve the availability of data, but that still makes definition of the pre-tax baseline difficult. There are major problems in respect of understanding what has happened to construction and demolition wastes since these are a) difficult to measure, b) known to be large in volume and c) very much affected by the tax. The magnitude of the potential error in the estimates of arisings is enormous.

Before the tax was brought into force, there was some speculation that official figures on landfill waste, which had remained largely static for a number of years, were incorrect. One of the major waste management companies suggested that the weight of waste being landfilled would be around 70-80 million tonnes rather than the 100 million or so estimated by the Government.

HM Customs & Excise had predicted, in advance of the tax, a split of 60:40 on a total of 100 million tonnes assumed to be going to landfill, giving some (£420 + £80 =) £500 million before the deduction of Landfill Tax Credits as a result of contributions to Environmental Bodies.

The weight of wastes being sent to licensed landfill sites has fallen over time. This can be shown from the figures provided in the tax returns submitted (see Table 51). Most apparent from these figures is that the quantity of inert waste being landfilled has fallen whilst the quantity of active wastes has remained constant. It is almost certain that different waste streams have been affected in different ways.

**Table 51: Quantities of Waste to Landfill, and Tax Revenues in £ (EUR)**

	Standard Rate	Lower Rate	Exempt from tax	Total Tax Yield	
1997-1998	50.05	35.73	9.69	353 (560)	
1998-1999	49.81	30.27	8.87	335 (530)	
<i>Changes in % (1998/9 relative to 1997/98 - negative signs indicate decline)</i>					
	Active Tonnages (t)	Active Tonnages (%)	Inert Tonnages (t)	Inert Tonnages (%)	Change in Tax Yield (%)
TOTALS	-0.24	0%	-5.45	-15%	-18.39

Source: HM Customs & Excise

### *Municipal Wastes*

In advance of the tax, it was estimated that total household waste amounted to approximately 20 million tonnes. It has become clear that this was a considerable underestimate.

Since the tax's introduction, UK municipal waste arisings are believed to have increased by approximately 3% per annum. Some individual authorities report increases in arisings much greater than this. To discern any trend from the data available is possibly reading too much into the available evidence.

Consultations with Local Authorities over the post-tax years, suggest that many authorities have witnessed increases in wastes received at Civic Amenity sites. In some cases increases have been as high as 50%. Others claim to have experienced increases in fly-tipping, but this may relate as much to an increased awareness of the problem as it does to the actual state of affairs. In any case, the pre-tax baseline is poor since different authorities defined 'fly-tipping' in different ways.

Over the post-tax period, the recycling and composting of municipal waste has increased, but from a very low base. Of approximately 26 million tonnes of domestic waste in England and Wales in 1995-96, the total amount recycled and composted was estimated at 4.7% of the total. This percentage has increased to approximately 8.5% in 1999, owing to growth in kerbside collection schemes and composting. Provision of facilities for recycling varies enormously from one local authority region to another. There are no obligations on authorities to make provision for recycling and Government targets have had no statutory force.

The landfill tax has probably not affected household arisings as it provides no incentives for households to change their behaviour. Municipal waste (which includes, in the UK definition, all waste collected by or on behalf of local authorities), on the other hand has almost certainly increased as a result of the tax. This increase (above what might otherwise have occurred) 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 taking trade waste to Civic Amenity sites (which is not legal, but easy to do if small traders pose as householders), taking trade waste home (so that it enters the household stream), and through fly-tipping on public land.

There is some evidence that the landfill tax has had an effect on the disposal of commercial and industrial waste. An ECOTEC survey shortly after the tax was introduced indicated that 31% of industries questioned had stepped up, or began, to reduce, re-use or recycle wastes (EF 1998). Such evidence has been backed up by work undertaken for the Environmental Technology Best Practice programme, a UK Government initiative that provides free advice to industry on environmental performance. The landfill tax has been highlighted as the reason behind many waste minimisation, recycling and segregation initiatives identified by the programme.

#### *Construction and Demolition Wastes*

The waste stream which has been most affected by the tax has been the construction and demolition (C&D) wastes. Landfill operators used to accept C&D wastes such as uncontaminated soils, clays, concrete, brick and other hardcore materials at low or zero charge. This is because the materials could be used in the construction of access roads, for cover material, for engineering cells, and for site remediation at the end of the landfill's life. Because the fees for these wastes had been so low the tax implied a significant increase in the disposal costs.

As with other wastes, pre tax data has not been good. Estimates of waste volumes vary dramatically. Shortly after the tax was introduced, a survey of landfill operators, 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.

The arrival of the tax has seen the further development of an industry recycling materials suitable for (re)use in construction (previously this was noticeable principally in areas where landfill void space was scarce). Alongside the tax, other initiatives may have assisted in this development. These are:

1. The increase in transport costs (owing to the fuel duty escalator in the UK);
2. The desire of the primary aggregates industry to be seen to be 'doing something' under the threat of an aggregates tax (see next chapter); and
3. The combined effect of a number of initiatives started by Government and by 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 (ECOTEC 2000).

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The magnitude of the reduction in C&D waste disposals to landfill that we have estimated cannot be accounted for by increased recycling and re-use alone. There has been significant concern over the development of disposal to sites exempt from waste management licensing, and therefore, not liable to pay landfill tax.

Work commissioned by the Government suggests 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 industry estimates are accepted, there has been an increase in recycling and re-use of C&D wastes of 12 million tonnes in the last decade. The increase in the amount of inert wastes disposed through exempt activities is likely to have been of the order 24 million tonnes a year. This waste is being used in the construction of bunds, hardstanding on farms, landscaping (including golf courses), levelling of fields, and other such purposes (principally, exemptions specified under Paragraphs 9 and 19 of the Waste Management Licensing Regulations).

Concerns arise out of the fact that because the sites are unlicensed, an inadequate level of inspections are being carried out by Environmental Agencies to ensure the exemptions are not being abused. The licensing system is essentially one of cost-recovery so where no license is paid, the resources do not exist to police these sites. We estimate that there may be close to 6000 such sites in operation at any one time. Not all of these will be operating outside the law, but some almost certainly are. Recent investigations by journalists in the UK have revealed some of these malpractices and the same journalists have presented evidence to the Minister for the Environment, Michael Meacher.

#### *Incidence of the Tax and Pass Through*

Immediately after the tax came in, a survey of major landfill operators found that disposal fees were routinely increased by the amount of the tax, especially with respect to the standard rate tax. This can be traced to the facts that landfill operators function in spatially limited (because of transport costs) oligopolies, and that the development of alternative options for treating waste requires time and resources. Typical disposal fees pre-tax for municipal wastes, or non-inert industrial wastes were between £7-£25 (approx 11.2-40€) per tonne so that the tax implied an increase of between 30-100%.

The case of lower rate tax is different and reflects a) the need that operators have for some of this material for operational purposes; and b) the wider range of options, specifically the emergence of exempt sites for recovery of waste, available to producers of inert wastes. In some cases, in attempts to acquire material from waste producers some inert waste landfill operators have effectively paid the tax on behalf of the waste producer. There may be some regional variation here reflecting the local prevalence of exempt sites. The pre-tax gate-fee

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for inert wastes was of the order £0-2 (0-3.2€) per tonne so in percentage terms, the tax has had a significant effect (>100% increase).

In most cases it is difficult to know exactly what effect the tax has had on product prices. It is almost certainly true that the impact on end product prices is negligible because for most sectors, the tax expressed as a percentage of turnover is miniscule (see Figure 2). The total tax take is very small in terms of the UK economy, so is distributed across a range of sectors, and therefore products. In addition the tax was introduced at the same time as employers' NICs contributions were reduced by 0.2%. The net effect on the financial situation of waste producing companies was therefore determined by the balance of their waste intensities and their employment intensities. Service sector companies will have gained whilst manufacturing industries will have seen a net loss. However, this reveals only the static picture. In some enterprises, the signalling effect of the tax led to re-appraisal of waste management expenditures and, subsequently, to changes in behaviour which left the company in a better financial position after the tax than before.

To our knowledge, aside from the firm-specific issues raised during the consultation period, the tax has had a major effect on the pricing structures only of the waste management industry itself. For example, with skip hire firms, prices appear to have roughly doubled in the wake of the tax. This is another reason why waste delivered to CA sites has increased. Waste from some home improvement projects will now be taken to CA sites in hired vans instead of being disposed of in skips as might have been the case previously.

### *Competitiveness Impacts*

Probably the most important competitive effect of the tax has been confined to the UK in relation to the position of landfill relative to other waste management options. The landfill tax is seen as a key reason for the increasing interest in incineration, and recycling and composting in local authority waste management (though this is assisted also by the ramifications of the Landfill and Packaging Directives). In addition to these options, industrial and commercial concerns are acting to minimise waste production at source.

Another effect confined to the UK is that on the aggregates recycling industry. Traditionally the area of concern of a small number of relatively specialised companies, large construction and demolition firms, as well as landfill operators and the operators of exempt sites are all moving in to an industry attracted by the commercial possibilities promoted by the tax (and the proposed aggregates tax). Note that in respect of inert wastes, some operators have simply closed, or reduced operations at licensed facilities for inert wastes and begun operating exempt sites instead. Some have commented to us that it is no longer possible to run a licensed inert landfill site on a commercial basis.

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Evidently, if one looks at the tax / NIC reduction package, one can see that there has been a decline in competitiveness of specific sectors whose waste production is high and whose employment intensity is low. For industries where the opposite is the case, competitiveness will be increased.

One would expect companies that assist in offering adaptive strategies to benefit from the tax. For example, in regions where the recovery of material at exempt sites has made inert waste material scarce, landfill operators seeking cover materials have begun to buy alternative cover materials e.g. hessian fabric. In addition, there is also now a larger market for the provision of advice concerning waste minimisation.

#### *Impacts on Internal Market*

There are no reasons why the UK Landfill Tax presents any issues of concern in respect of the Internal Market. Revenues are not used to support industries involved in traded goods and services other than through the NICs reduction. No products are being prevented from being sold into the UK, nor are service providers discriminated against in any way.

#### *Impacts on Trade*

We are not aware of any major impacts on trade. Sectors which have been most affected by the tax are those whose wastes arise in the context of local activities (e.g. construction and retail) so that the issue of competitiveness does not arise.

As regards waste itself, the costs of waste management already vary across countries depending upon the legislative (regulatory) framework and the mix of waste management options available. Three issues make it unlikely that waste will move across borders to take advantage of differential pricing:

- a) landfill disposal costs, even post landfill tax, are still low in the UK compared with most other EU countries;
- b) the costs of transporting waste are great (in terms of any savings which might be derived from their movement); and
- c) the geographical position of the UK makes movement of waste across borders unlikely.

The area where cross-border movements might be more likely is Northern Ireland. We have no information to suggest, however, that movements of waste into Ireland are occurring (which is not to say that it is not occurring).

#### *Impacts on Employment*

The tax was introduced with the explicit aim of increasing employment through NICs reduction. At the firm level, this reduction has had too small an effect to generate any

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immediate changes, though the impact may have been felt at the margin in shaping investment decisions (especially where they make use of considerable amounts of labour, e.g. retail stores development). An assessment of the effects of the tax and NIC reduction, made prior to its introduction, suggested an increase in employment of the order 1200 jobs. However this is a negligible impact given the accuracy with which such changes can be modelled.

Three other effects of the tax deserve mention in the context of employment generation. The first is the fact that several companies have begun to employ waste minimisation officers, partly or wholly as a response to the tax.

The second is that the tax has almost certainly had an impact on recycling of waste. Recycling tends to be more employment intensive in the sorting and collection phases. In addition, for materials that are used domestically which would otherwise be imported, recycling can have an impact on jobs through the manufacturing processes involved in secondary production. Much recycling which has occurred in industry and commerce may be motivated by the Packaging Regulations. However, the development of recycling and composting in municipal waste management is more likely to have been related to the tax. Waste Watch has estimated the impact of higher recycling rates in the UK.

Thirdly, under the Landfill Tax Credits scheme, various projects are carried out by bodies approved by ENTRUST. The scheme has proved popular with some £80 million or so distributed through the scheme. There will undoubtedly be some employment effect associated with these projects (as would be with any such spend).

A more complete treatment would account not only for the indirect employment generation, but also, the employment effects of the re-directing of funds into waste management that would otherwise have been used elsewhere. For example, if a local authority spends more on waste management, and in doing so, employs more people in the process, it is either diverting funds which it may have spent elsewhere, or using funds which would not otherwise have been used but which have been sourced through general taxation.

#### *Impact on Other Sources of Finance*

There has been an impact on local government spending arising from the imposition of the tax. Local authorities have a duty to collect household waste, and yet there are no effective policies (variable charging would require change in primary legislation) to reduce generation of household waste, or its disposal to landfill.

When the tax was first introduced, many authorities were operating at, or close to, capping limits to their expenditure, these having been set by Government. The fact that more resources had to be devoted to waste management implied that resources were taken away from other

functions. This has had impacts upon spending on schools, roads etc., especially in respect of maintenance.

There is a suggestion that local authorities are teaming up with landfill operators to 'get their tax back' through the landfill tax credits. Some may have set up environmental bodies (eligible for funding through landfill tax credits), reducing their own environmental programmes at the same time. Where they have done so, some voluntary groups have claimed that they have been disadvantaged by the change since the types of project they carry out have been less likely to be supported by bodies with landfill operators on their Board. Some have mentioned candidly that operators seem not to support waste minimisation projects. The evidence is beginning to acquire a status stronger than the merely anecdotal.

Another effect has been the impact on payment of recycling credits. These are paid by local authorities on a discretionary basis to third parties carrying out recycling and the amount paid is meant to be equivalent to the marginal cost of the avoided disposal. Post-tax, the Guidance from Government was that the credit should include the tax element since this was part of the avoided disposal cost for the marginal unit of waste where disposal was to landfill. Some councils subsequently stopped paying these discretionary credits.

## 10.4 The Austrian Landfill Tax

### *Introduction: Design and Development of the Tax*

In 1999, 53 landfill sites for the disposal of residual waste were in operation in Austria. A part of residual waste, bulky waste, construction debris, mixed industrial waste, road sweepings, sewage sludge, rakings and residual matter from waste treatment are disposed of in landfills. More than 50 % of municipal waste is collected separately and recovered. Only 28,5 % were disposed directly and untreated in landfills in 1999.

The Austrian Landfill tax ‘Altlastenbeitrag’ was introduced in 1989 through the Clean-Up of Contaminated Sites Act. The tax is set at a national level for all landfill sites with rates according to weight, type of waste and the standard of technology at the landfill site (see Tables 52 and 53) and on exports of waste for the purpose of landfill deposit abroad. The aim of the tax is to raise revenues for the clean up of contaminated sites.

**Table 52a: Tax Rates for Landfills *not* Conforming to ‘State-Of-The-Art’ (Or ‘Best Available’) Technology in Austrian Schillings (EUR)**

Per tonne or part tonne as of:	Demolition waste <sup>11</sup>	Excavated Soil share of non-soil components > 5%	Excavated Soil <sup>2</sup> not according to Annex 1 Tab.3 and 4 of landfill ordinance	Waste according. To Annex 1 Tab. 3 and 4 of the legislation <sup>12</sup>	Other waste <sup>13</sup>
01/1997	60 (4.42)			120 (8.84)	150 (11.04)
01/1998	80 (5.76)	80 (5.76)		150 (10.81)	200 (14.41)
01/1999	80 (5.81)	80 (5.81)		300 (21.80)	400 (29.07)
01/2001	100 (7.20)	100 (7.20)	200 (14.50)	600 (43.6)	600 (43.6)
01/2004			300 (21.80)		900 (65.00)
01/2006					1200 (87.00)

*Note: from 2000 the waste in the last two columns are treated the same, and a new distinction is made for excavated soil.*

<sup>11</sup> 30/t ATS (2.10EUR) surcharge in case of inadequate insulating system or without vertical enclosure

<sup>12</sup> 200/t ATS (14.50EUR) surcharge in case as in 1.

<sup>13</sup> 400/t ATS (29. EUR) surcharge for case as in 1. 400 ATS/t (29. EUR) surcharge for the deposit of municipal waste in a licensed landfill unless it has a state-of-the-art system for the collection and treatment of landfill gases.

**Table 53: Tax Rates for Landfills With ‘State-Of-The-Art’ Technology (EUR)**

<b>In ATS per tonne or part tonne as of:</b>	<b>Demolition waste landfill</b>	<b>Residual waste landfill</b>	<b>Mass waste landfill</b>
January 1, 1997	60 (4.4)		
January 1, 1998	60 (4.4)	150 (10.9)	200 (14.5)
January 1, 2001	80 (5.8)	150 (10.9)	200 (14.5)
January 1, 2004	100 (7.2)	200 (14.5)	300 (21.8)

*Process Development of the Tax*

In 1989 the Clean-Up of Contaminated Sites Act provided the legal basis for a landfill tax to alleviate and contain the problems arising from contaminated sites – through the revenue to be collected from the landfill tax. Previously the Water Act had dealt with most issues regarding contaminated land and landfill sites. The new legislation was introduced as a result of a number of contaminated soil incidents such as the ‘Fischer Deponie’. The Act foresaw increased work in surveying and identification of potential problem sites and thereafter funding for operations to contain and treat them.

The regulations were amended in 1996 with an increase in the level of contribution, particularly for insufficiently equipped landfill sites. In this way the amendment sought to act as an incentive to landfill sites to invest in upgrading their facilities and thus also as an instrument to create a more level playing field between plants with differing levels of technology. Its regulations were based on the Ordinance on Landfill, which defines ‘state-of-the-art’ technologies.

Before 1997 many older landfill sites, licensed previously under the Water Act, did not fall under the remit of the newer legislation. Through the Amendment to the Water Act (1997) the older plants were integrated into the framework and regulations of the Ordinance on Landfill. Existing older landfill sites are obliged to bring their technology up to the definition of ‘state-of-the-art’ by the latest 2004 (1999 for landfills taking construction rubble), though there are thought to be some potential “exceptional cases” with later deadlines. The timescale depends on the nature/quality of the waste and hence the “ease” with which technical standards can be met.

To put this into context, sixteen of the 60 landfill sites (existing in 1997) for household waste had been recognised as contaminated sites by March 1997 and a further fifteen had been registered as suspected sites (Umweltbundesamt 2000).<sup>14</sup> In total there were around 2 500 suspected contaminated sites across Austria at the start of 2000. Of these 168 were recognised as requiring remediation work (Umweltbundesamt 2000).

<sup>14</sup> In 8 of these cases the entire landfill site was being considered as contaminated, whilst the other 15 cases considered contamination of some parts of the landfill site.

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After adaptation of the landfill sites (2004 or 2008) the revenue for the support of cleaning up contaminated sites will decline. That is why alterations to the landfill tax regulations are currently being discussed in the Environment ministry and a study has been carried out of (other) sources of finance for cleaning up contaminated sites.

The rate of increase of this waste tax is significantly above inflation for the period 1997-2004, even for sites with 'state-of-the-art' technology. This increase will not only lead to additional revenue to address contaminated sites, but also offer incentives to reduce the level of waste disposed of in landfills. The sharp difference in tax rates for landfill sites with differing technologies also aims to eliminate distortion in competition during the transition phase from older to 'state-of-the-art' technologies. Previous European experience suggests that the price differentials arising from different standards of 'landfilling' can lead to waste being transported significant distances to avoid paying higher gate fees.

#### *Revenue and Use of Revenue*

The legislation clearly states the aim of the waste tax as financing the containment and treatment of contaminated sites, i.e. to pay for externalities arising from landfill. Austria is the only EU Member State (also the case for Switzerland) where revenue from landfill taxes is currently exclusively used for this purpose (Umweltbundesamt 2000). The activities supported (Altsanierungsgesetz 1989) include:

- The identification of sites
- The administration of sites
- The direct containment and clean-up of sites
- The construction or improvement of waste treatment plants as far they are required for the clean-up of sites
- The development of new technologies for containment or treatment

The subsidies given to firms to support the improvement of landfill sites were re-tailored to follow EU state aid policy in 1996-1997. According to these regulations landfill sites that are not involved in a competitive market for the disposal of waste can receive up to 65% of the funds required for the clean-up. In contrast, those private companies competing for business may receive up to 15% of any work to bring sites up to legal requirements or up to 30% for work that will take standards above the requirements. Small and medium-sized enterprises may receive up to 10% extra funding. Private companies may receive up to 65% funding if the polluter can not be identified or be forced to pay for the clean-up work (Umweltbundesamt 1997).

The level of revenue accruing from the waste tax grew sharply from 1996 to 1997 and then doubled between 1998 and 2001. It is expected to level off around 2003 and then fall from

2004 as the plants update their technology (BMU 1998, Umweltbundesamt 2000 – see Table 54). This would imply a gradual transition to 'state-of-the-art' technology. Anecdotal evidence suggests that landfilling in plants with new technology will be substantially more expensive for customers than those without (even when taking into account the staggered waste tax – see below). Landfill prices for household waste varied by 500 ATS within all provinces apart from Vienna in 1999 (Umweltbundesamt 2000) and therefore other varying factors may predominate over the tax in these prices. There is a complementarity between the incentive explicit in the tax structure to encourage people to upgrade landfills and the revenue accruing being used to support this conversion.

**Table 54: Waste Tax Accumulated 1990- 2000 in MATS (MEUR)**

Income (MATS)		Funds available			
Year	Waste tax	Subsidy	%	Supplementary Examinations	%
1990	142.6 (10.36)	128.4 (9.33)	90	14.3 (1.04)	10
1991	172.7 (12.55)	155.4 (11.29)	90	17.3 (1.26)	10
1992	167.3 (12.16)	150.1 (10.91)	90	16.7 (1.21)	10
1993	215.7 (15.68)	172.6 (12.54)	80	43.1 (3.13)	20
1994	211.1 (15.34)	168.8 (12.27)	80	42.2 (3.07)	20
1995	285.2 (20.73)	228.1 (16.58)	80	57.0 (4.14)	20
1996	290.4 (21.10)	246.9 (17.94)	85	43.6 (3.17)	15
1997	447.7 (32.54)	380.5 (27.65)	85	67.2 (4.88)	15
1998	597.7 (43.44)	508.1 (36.93)	85	89.7 (6.52)	15
1999	878.1 (63.81)	746.4 (54.24)	85	131.7 (9.57)	15
2000	970.6 (70.54)	825.0 (59.96)	85	145.6 (10.58)	15
<b>Total</b>	<b>4 379.1 (318.25)</b>	<b>3 710.7 (269.67)</b>		<b>668.4 (48.57)</b>	

**Table 55: Waste Tax: Predicted 2001-2004**

Income (MATS)	
Year	Waste tax
2001	1 160 (84.30)
2002	1 230 (89.39)
2003	1 230 (89.39)
2004	690 (50.14)

Source (BMU 2001)

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The revenue from the waste tax allocated to containment and treatment for the period 1991-2000 totalled 2104 MATS. Over the period 1991-2000 a total of 99 contaminated sites were funded, with total finance provided being 5 272.5 MATS (383.2 MEUR)

### *Organisational Roles and Administration*

As outlined above, the tax level is set nationally. The federal financial authorities (Bundesfinanzbehörden) are responsible for the collection of the waste tax. It is the role of provincial authorities to report possible contaminated sites to the Ministry of the Environment. In consultation with the Federal Environment Agency, the Ministry then decides whether further investigation of the site is needed. The Ministry is responsible for undertaking further research work as well as distributing the funds for clean up operations.

The owner or operator of any landfill site is liable to pay the tax. Furthermore, anyone using waste to carry out structural work (e.g. for road surfacing) is also liable. It is the responsibility of the landfill operator to provide a yearly statement on the level of waste deposited and the accruing taxes (this data can now be provided in paper or electronic form). In addition the tax also falls on anyone exporting waste from Austria for the purpose of depositing, the tax is due at the beginning of the waste's journey. There have been some proposals for simplification of the procedures in the national environmental plan including the transfer of more responsibility for the clean-up of sites to property-owners.

The subsidies arising from the tax revenue are managed and paid out by a bank. Applicants apply directly to the bank that has a section of specialists and experts to assess the potential projects. The final decision is taken by the Environment Minister on the basis of the level of technology. The bank carries out monitoring to ensure that approved measures are implemented.

### *Complementarity within the Portfolio of Instruments*

Given the intention of the tax to support the clean-up of contaminated sites the connection with the municipal waste charge is unclear. The latter charge covers the cost of collection and disposal of household waste. Rates differ considerably among municipalities with taxes reaching up to 40 ATS (2.9 ECU) per m<sup>3</sup> (DG Environment database). As mentioned above, it is likely that there has been an increase in the municipal solid waste charges as a result of the introduction of the landfill tax.

As regards municipal waste, the following policies are worthy of note: At the national level the *Federal Waste Management Act* (Abfallwirtschaftsgesetz) determines the objectives and principles of waste management in Austria in general. Furthermore it regulates the collection and treatment of hazardous waste in any respect. The collection and treatment of non-hazardous waste is regulated by provincial governments. These 9 regional Waste Management Laws contain basic regulations for the collection and treatment of household

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waste. The municipalities are obliged to collect and dispose the waste from households and small enterprises. The technical and financial details are determined in *local waste ordinances*.

Municipalities can set charges for collection and disposal of waste, and these can be levied on a variable basis (i.e. in accordance with the amount of waste produced by householders – householders can select frequency of collection or the size of the bin). The charge is usually differentiated by residual and separated organic fractions (so that those carrying out home composting are exempt from charging for the organic fraction

- The Ordinance on the Separate Collection of Biowaste (1995); this specifies materials which the householder must either compost at home, or must separate for collection by local authorities;
- The Landfill Ordinance (Deponienverordnung 1995); this requires waste to be treated before landfilling where the organic content exceeds 5% of the total. There is an exception clause for residual municipal waste after application of biological-mechanical treatment. The treatment which stabilises the organic fraction.
- The Ordinance on Packaging (Verpackungsverordnung 1996); this *Ordinance* obliges the producers, importers and distributors of packaging, of packaged goods or products from which packaging is made, to take back the packaging and to finance the collection and recovery of packaging waste. The collection costs of the municipalities are compensated by the collection and recovery systems (private organisations) according to contractual agreements.

### *Environmental Effects*

The primary environmental effect of the ALSAG tax is to help clean up contaminated site. As noted above, over the period 1991-2000 a total of 99 contaminated sites were funded.

Regarding the secondary environmental effect – on municipal waste and landfills, there is little analysis of the influence that this waste tax has had on landfill operators, nor on businesses or other landfill ‘customers’. The reported masses of primary wastes have continued to grow at an average rate of around 10% in the period 1992-1996 and approaching 20% over the whole period until 1999 (see Table 56 for data on dangerous primary waste (BAWPL 1998 and 2000) and therefore there is little evidence to suggest that the tax has had an impact in reducing waste.

The predictions on revenue from the waste tax (see Table 55 above) suggest that by 2004 it will have fallen back to levels below that in 1999. Given an increase in waste tax rates of at least 67% during this period this suggests that the volume of waste going to landfill will halve over the period 1999-2004.

**Table 56: Total Reported Mass of Dangerous Primary Waste in Tonnes for Austria 1992-1996**

	1992	1993	1994	1995	1996	1997	1998	1999
<b>Weight</b>	398000	478000	498000	595000	607000	629000	918000	972000
<b>% Annual Change</b>	N/A	20.1%	4.2%	19.5%	2.0%	3.6%	46.0%	5.9%

Source (BMU) and BAWPL (2000). Note that values for 1995 and 1996 in the second source are different for values in the BMU source which used BAWPI 1998 estimates. The values above are the actual arisings.

Between 1989-99 the share of household waste whose final deposit was landfill fell from 75% to 43%, and this drop can mostly be attributed to an increase in recycling and composting. Over the same period the share of household waste being recycled rose from 22 to 50%. It is unclear to what extent this transfer of waste management can be attributed (if at all) to the landfill tax or more to the various regulations, and awareness measures to encourage recycling and composting (on the latter, see DHV 1997). More likely, it seems reasonable to suggest that the landfill tax has effects which are aligned with other instruments of waste policy in Austria that seek to move waste management up the hierarchy of options. We are unaware of any studies assessing the relationship between the landfill tax and recycling.

Furthermore, the implementation of the Packaging Directive in Austria will have affected the recycling rate for packaging in Austria. The share of municipal waste undergoing incineration also rose from 6% to 16% (BMU 1998) in the seven years following 1989. Therefore there is some evidence of a transfer of waste from landfill to incineration. There is, however, no way to link this development with the waste tax and there are many other possible explanations. Purely on a cost basis the prices for thermal treatment of waste are now similar to those of landfills but there is no tax on incineration.

The variable tax levels seem to have had the intended incentive effect on landfill operators to invest in new technologies. In 1996/97, 21 of the household waste, landfill sites definitely did not conform to BAT. In 1999 this figure had fallen to only four landfill sites<sup>15</sup>.

Tariffs for disposal at a landfill can vary between 500-2000 ATS /tonne (35-145 EURO/tonne) depending upon the technology (e.g. the use of thermal pre-treatment) and the concentration of certain chemicals in the waste. For household waste Austrian landfill prices varied between 800 and 1800 ATS (58 - 131 EURO), excluding the landfill tax, with some strong regional variations (Umweltbundesamt 2000 (2)). Tariffs also vary strongly between landfill operators working with, or run by, local authorities, who are legally obliged to deal with waste, and on the other hand, privately owned and managed sites working in more price-

<sup>15</sup> Two landfill operators were not prepared to give details of the exact status of technology on their site and nine of the total of 61 operators had closed down.

driven markets (as opposed to those where contracts are more the norm) (Umweltbundesamt 2000 (2)). The balance between these two types differs strongly between the provinces.

From these figures, one can see that the level of the tax seems to be between 3-15% of the landfill price for demolition waste and 6-12% for other waste in plants conforming to best available technology (BAT). For plants not conforming to BAT, the price for disposal of waste is significantly lower at 700 ATS/tonne (51 EURO/tonne). Thus the tax rates for waste other than demolition or soil are between 20% and around 170% of pre-tax landfill disposal prices. The latter figure reflects the extreme scenario where the landfill does not conform to BAT and there is insufficient ground and gas containment (see table footnotes) and the landfill tax is 1200 ATS/tonne (87 EURO). The development in pre-tax landfill prices is difficult to judge but increasing landfill prices are to be expected.

Concurrently the costs of waste management for local authorities are growing sharply. In the province of Steiermark they have more than doubled between 1987-1996. The treatment costs for landfill and inspections in 1996 were 1 802 ATS/t. The total costs are expected to rise by 110ATS/t by 1998 and 510 ATS/t by 2001 (also as the volume of waste increases, then so will the total costs).

### *Competitiveness Impacts*

While the primary aim of the landfill tax is to finance the clean up of contaminated sites and not to provide a price signal to waste producers, there is almost certainly price pass-through of the tax to commercial waste producers. On a theoretical level the demand for landfill services is fairly inelastic as alternatives will take time to develop. An analysis by the Austrian Environmental Agency (Umweltbundesamt 2000 (2)) finds an increase of 450 ATS/tonne (33 EUR/t) for the average price of landfill of household waste between 1995 and 1997. Around 300 ATS/tonne of this may derive from the landfill tax with the remainder coming from investments in technology. There is no evidence of an effect on product prices arising from the introduction of this tax; the level of this tax as a percentage of turnover, for construction firms for example, is very small.

The level of tax as a percentage of the disposal cost varies quite strongly. Therefore it is likely that some sectors will be more affected than others. Three or four different bands of tax rates cannot fully compensate for the multitude of different waste disposal costs. On the other hand a more complicated system of variable tax rates would lead to a greater administrative burden.

The Construction industry will clearly be strongly affected by this waste tax in terms of volume of waste being produced, however the rate for demolition waste is low and therefore the burden should be acceptable.

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The level of the tax as a proportion of the landfill price is relatively low as are the relative differences in levels of tax levied on different types of waste (as a proportion of the landfill price). Therefore it is unclear that items that pose the most risk of contamination of landfill sites will provide a fair level of revenue-raising according to the 'producer pays' principle. Nor does it act as an incentive to businesses to reduce their usage of materials which are potentially dangerous in the future.

Anecdotal newspaper evidence suggests that older sites that do not have to comply with the new technology regulations until 2004 will have a strong competitive advantage in the transitional period. This is despite the higher and staggered waste taxes that they have to pay. Several sources suggest that landfill prices are around 700 ATS for older plants against 2000-3000 ATS for plants with new technology and thermal treatment. Even taking into account waste tax rates of 600 ATS the older plants seem to offer disposal at half the price of newer plants. Therefore some 'waste tourism' within Austria is to be expected with businesses seeking out older sites. It is thought that this will only be a transition measure as older plants upgrade to meet technological standards.

In order to combat this development e.g. the province of Salzburg has introduced a new waste law in July 1999 stating that, 'waste should be transported to the geographically and logistically nearest landfill'. This fits in with the EU framework directive which asked member states to give regard to the 'proximity' principle'.

#### *Internal Market and Trade Impacts*

In European terms the level of Austrian landfill tax is one of the highest (approximately twice the level in the UK for example) and landfill prices of household waste are also well above other European rates. Nonetheless the tax only makes up around 5-15% of total disposal costs which is small compared to potential internal transportation costs. In addition exporters of waste from Austria are also obliged to pay the waste tax, therefore Austrian firms should find it more difficult to find attractive cost regimes through international waste tourism.

Nonetheless the Austrian government seems to be concerned about this issue and commissioned a study on landfill taxes across Europe, completed in early 2000 (UBA, 2000). In 1996 around 40 000 tonnes of hazardous waste were exported, making up around 5% of the total mass produced in Austria. Furthermore, around 20 000 tonnes of hazardous waste were imported from other countries to use the thermal treatment capacity in Austria (BMU 1998). We are not aware of any major effects of the waste tax on trade. The Construction sector, which will be particularly affected since the mass of material is high, normally remains close to their local market.

### *Impact on Employment*

The impact of the tax in terms of employment is difficult to judge. We are unaware of any studies or investigations to address these questions in Austria.

### *Data Availability and Reliability*

Given that landfill operators are obliged to provide quarterly statements on the waste deposited on sites, the Hauptzollamt (Federal Customs Office) should have detailed data by site and tax band. This data should be relatively reliable given its importance for legal matters. A waste data network provides information on the type, quantity, origin and deposition of hazardous waste. Data on the effectiveness of clean-up operations is only available in so far as sites move onto or off the register of contaminated sites requiring clean-up. There are, however, no studies at a national level (by end of 2000) to look at the aggregate impact of the measures

The Federal Ministry for the Environment has set up a pilot project on the most economical measurement processes for determining the quantities of waste in landfills. Its aim is to assess the reasonableness of fees payable to landfill operations (according to the Clean-up of Contaminated Sites Act).

### ***10.5 Summary***

Landfill taxes are relatively ‘easy’ taxes to introduce. Public attitudes towards landfill, irrespective of whether gas collection equipment is in place, are generally unfavourable. Several EU countries now have these landfill taxes in place.

Designs differ in the three Tier 2 cases explored here. The UK and Austrian taxes are relatively comprehensive in scope whilst the French tax is more limited. In addition, the number of different rates varies across the studies with the Austrian tax having the most complex structure.

In two of the countries studied here (France and the UK), the level of the tax is relatively modest, certainly relative to, for example, the tax in Denmark. Some of the rates in Austria are much higher, but there is differentiation across landfill types and waste types.

Landfill taxes clearly affect different materials in different ways. In the UK, the fate of construction and demolition wastes has been heavily influenced by the tax, but the fates of municipal wastes have changed far more slowly. The same low level of effectiveness in respect of municipal waste is seen in France. One of the problems here is that those generating waste which finds its way into household bins have no direct incentive to minimise waste when payments for municipal waste are through flat rate fees. In the UK this is prevented by existing legislation. As a consequence, neither in France nor in the UK has there been much impact seen in respect of reducing municipal waste sent to landfills. In Austria, there has been a significant shift in fates of municipal waste over time, but it is difficult to know the extent to which this is attributable to the tax itself or other instruments operating to move waste management up the hierarchy.

The literature on waste taxes frequently speaks of the possibility for evasive behaviour. This is an issue in the UK with fly-tipping and abuse of Civic Amenity sites. It is also an issue in respect of sham recovery with increasing quantities of waste being sent to unlicensed sites. We understand that the issue of ‘landfill evasion’ through resort to recovery options is also an issue in Denmark and Austria, yet in France, unlicensed dumps are supposedly liable to pay tax as well as licensed sites.

There are no Single Market issues which have arisen. Realistically, these could only arise in the context of revenue use, and quite clearly, most if not all revenue is derived from taxation of domestically produced waste. This has been used for NICs reductions in the UK, for clean up of landfill sites in Austria and for funding waste management projects in France (which, in the case of municipalities, would have to be funded from local government finance in any case).

Trade patterns in the provision of landfill services may be altered by the shifts in relative prices. The Austrian case is the one where this is most clearly a concern, although there may

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be some link in the French case also. Both countries appear to be taking measures to ensure the tax does not lead to significant movements of waste material through implementing measures designed to re-enforce the Proximity Principle.

The impact on the cost of disposal to landfill implied by these taxes varies by material, but it also varies regionally and by country in accordance with the prevailing pre-tax gate fees and the level of the tax itself. The percentage change appears relatively high in the UK, reflecting an increasing rate of tax as well as a low pre-tax gate-fee. Even so, the costs to industrial waste producers of waste management, before and after the tax, appear to be a small fraction of turnover in most cases. As such the taxes have limited effects on competitiveness.

Employment effects would be worthy of further investigation. Work in the UK by Cambridge Econometrics suggested that even without any revenue recycling, the tax would have a positive employment effect presumably due to the fact that impacts upon industry would be concentrated on sectors of lower labour intensity rather than on the activities funded by public expenditure.

In addition, a shift from landfill disposal of bin waste to source separation of materials (for composting or recycling) can have significant effects. As mentioned above, the degree to which one can actually attribute responsibility for such a shift to the tax itself (as opposed to other measures) is unclear, but to the extent that it plays a role (and in the UK and Austria, there is certainly some suggestion that this is the case), the employment impacts may be positive and non-trivial.

Revenue uses are more closely tied to the source of revenue in France and Austria. In the UK, the use of some of the funds is channelled through an innovative scheme. However, this scheme is now under scrutiny as it stands accused of fraudulent use of revenue, and inappropriate uses of funds (landfill operators are possibly using these funds to exert leverage over local authorities).

Competitiveness issues are largely confined to the competing fractions in the waste management industry itself. Landfill taxes raise the price of landfill relative to other treatment options. As such, the level and rationale for these levels would be expected to be controversial. However, it is extremely difficult to set such taxes at an 'efficient' or 'optimal' level if only because the sources of pollution are not always the treatment options per se, but the pollutants associated with them and the disamenity effects they generate. Even so, the UK sought to base the tax level on such an analysis. In the UK, there are organisations which believe that extension of the landfill tax to cover incineration would be appropriate and consistent given the ordering of the waste management hierarchy and continuing growth in the waste stream.