GREEN BUDGET GERMANY
FORUM ÖKOLOGISCH-SOZIALE MARKTWIRTSCHAFT

# ECONOMIC INSTRUMENTS IN THE WASTE MANAGEMENT SECTOR

## Experiences from OECD and Latin American Countries

**Report prepared by Green Budget Germany**
**on behalf of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH**

gtz

Por encargo de:
Ministerio Federal de Cooperación Económica y Desarrollo

COOPERACION
ESTADOS UNIDOS MEXICANOS
REPUBLICA FEDERAL DE ALEMANIA

## Report written by:

Kai Schlegelmilch
Eike Meyer
Damian Ludewig

**Contribution by:**

Swantje Küchler, Helen Lückge, Gareth Evans, Ignasi Puig Ventosa, Ana Citlalic González, Barbara Herrero Cangas and Leander Raes

## Contact:

**Green Budget Germany**
Schwedenstraße 15a
D-13357 Berlin
Tel.: +49 (0)3076 23 991-30
Fax: +49 (0)3076 23 991-59
Email: foes@foes.de

CONTENTS ..... PAGE

**ABBREVIATIONS**

| | |
|---|---|
| ABL | *Alumbrado, Barrido y Limpieza* (Lighting, cleansing and waste collection and treatment) |
| ADEME | *Agence de l'Environnement et de la Maîtrise de l'Energie* (Agency for Environment and Energy Management |
| AR$ | Argentinean Peso |
| ARF | Advanced Recycling Fees |
| BMW | Biodegradable Municipal Waste |
| BOE | Board of Equalization |
| BSR | *Berliner Stadtreinigungsbetriebe* (Berlin City Cleaning Services) |
| CIWMB | California Integrated Waste Management Board |
| CLP | Chilean Peso |
| COMLURB | *Companhia Municipal de Limpeza Urbana* (Municipal Urban Cleansing Company) (Rio) |
| CRA | *Comisión de Regulación de Agua Potable y Saneamiento Básico* (Regulating Authority for Water Supply and Sewage Disposal) |
| DEFRA | Department for Environment, Food and Rural Affairs |
| DfE | Design for Environment |
| DSD | *Duales System Deutschland* (Dual System Germany) |
| DTSC | Department of Toxics Substances Control |
| EEA | European Environmental Agency |
| EFR | Environmental Fiscal Reform |
| EPCI | *Établissement public de coopération intercommunale* (Public Institution for Intercommunal Cooperation) |
| EPR | Extended Producer Responsibility |
| GDP | Gross Domestic Product |
| HMRS | Her Majesty's Revenue and Customs |
| LATS | Landfill Allowances and Trading Scheme |
| LCF | Landfill Communities Fund |
| MFWM | Modernization Fund for Waste Management |

| | |
|---|---|
| MSW | Municipal solid waste |
| OECD | Organization for Economic Co-operation and Development |
| PMGRM | *Programa Metropolità de Gestió de Residus* (Waste Metropolitan Program) |
| PRO | Producer Responsibility Organizations |
| R$ | Brazilian Real |
| REOM | *La Redevance Générale d'Enlèvement des Ordures Ménagères* (General charge for garbage collection of household and assimilated waste) |
| RVF | The Swedish Association of Waste Management |
| SAyDS | *Secretaría de Ambiente y Desarrollo Sostenible* (Secretariate for Environment and Sustainable Development) |
| SEK | Swedish Krona |
| SYTCOM | *Syndicat intercommunal de traitement des ordures ménagères* (Intercommunal Union of the Treatment of Household Waste) |
| TEF | Environmental Annual Charge |
| TEOM | *Taxe d'enlèvement des ordures ménagères* (Household Waste Collection Tax) |
| TGAP | *Taxe Générale sur les Activités Polluantes* (General Tax on Polluting Activities) |
| TMTR | Municipal Waste Treatment Charge |
| UF | *Unidad de Fomento* (Accounting Unit for Adaption to Inflation) |
| UK | United Kingdom |
| VAT | Value added tax |
| WDA | Waste Disposal Authority |

## TABLES

## EXECUTIVE SUMMARY

This report was commissioned by the *Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH* and written by Green Budget Germany. Its objective is to present an analysis of economic instruments in use in selected OECD and Latin American countries in the areas of waste prevention and integrated municipal and commercial waste management. Economic instruments work with economic incentives to influence the behavior of consumers and producers. Generally speaking, economic instruments compared to other types of policy instruments (e.g. command-and-control instruments) leave a larger degree of freedom to individuals to make the environmental improvements in the most cost-effective manner. Also, administrative costs of implementing economic instruments tend to be significantly lower than those associated with the monitoring of compliance with command-and-control regulation. In the waste management sector, economic instruments can contribute to strengthen waste management systems and the "polluter-pays-principle" by providing revenue – either through user charges or through taxes and charges on waste generation or disposal that can be earmarked for waste management services. Apart from fiscal objectives, economic instruments in the waste management sector can also help to further a number of environmental objectives like reducing waste generation, increasing separated collection and recycling of household waste as well as diverting waste streams from landfill disposal. Economic instruments identified in the countries of the case sample are: **municipal waste charges**, **landfill taxes**, **landfill permit trading schemes, deposit-refund schemes** and **Advanced Recycling Fees**.

**Municipal waste charges**, depending on their design, can make a meaningful contribution to waste reduction and better waste separation. Depending on how charges are calculated for the individual user, they can be differentiated into flat-rate user charges, service-unrelated variable-rate user charges, and service-related variable-rate user charges (unit-pricing). The latter have significant potential to create incentives for waste reduction and improved separation. Generally speaking, the strength of the incentive increases (1) with the rate of the charge, and (2) with the accuracy with which the charge is adapted to the volume collected. The most significant impact on waste generation and separated collection is coming from weight-based systems of user charges. However, collection and billing systems needed for weight based charging are comparably complicated and costly. Container subscription systems, where households can choose from different size containers create a modest incentive for waste minimization and better separation but are comparably easy to manage. A promising model that creates significant incentives for waste reduction and better separation and is comparably easy to manage at the same time is a pre-paid garbage bag model. There is a potential trade-off between strong environmental incentive effects of waste charges and the stability of revenues derived from them. The more accurately the charge adapts to the actual amount of waste collected, the more room there is for temporary revenue volatility. This trade-off can partly be overcome by introducing hybrid systems of waste charges, where one component is a flat-rate charge which covers part the structural costs of waste management services and the other a variable part depending on the amount of waste collected.

**Landfill taxes** are an effective instrument to correct market failures and help internalize external costs, which are caused by the dumping of waste through methane emissions, potential leakage of fluids, amenity costs to neighboring communities and increased transport. Through the price signal, landfill taxes can contribute to diverting waste streams away from landfills to recycling. The effectiveness of the environmental incentive of landfill taxes depends on the tax rate. Rates are very different in those countries surveyed for this report. Most of these countries introduced landfill taxes

together with command and control instruments like landfill bans for certain substances or more ambitious landfill standards. Hence, it is difficult to separate diversion effects by the landfill tax proper. However, there was evidence that the introduction of landfill taxes in Catalonia had the immediate effect that municipalities which had not set up separate recyclable material collection until then did so quickly after the introduction. Like with most environmental taxes the administrative costs for landfill taxes are comparably low. Revenues from landfill taxes can be used to fund activities improving waste management and recycling activities.

While the landfill tax addresses the problematic effects of landfilling by internalizing the negative external effect and by creating incentives to divert waste streams to other modes of treatment and recycling, another possibility is to address this problem through a trading scheme. To date the UK is the only country which has introduced a **landfill permit trading scheme** for biodegradable municipal waste. The Landfill Allowances and Trading Scheme (LATS) sets a limit on the amount of biodegradable municipal waste that each waste disposal authority can send to landfill. It has been proven successful in allowing municipalities a performance corridor during which they were limiting their disposal of biodegradable waste in landfills in order to reach the target of the respective EU Directive in a cost-efficient manner. However, the rising rate of the landfill tax in the UK is increasingly rendering the trading scheme less relevant because the disincentive to deposit waste on landfills is becoming increasingly strong.

**Deposit-refund systems** are in place in a number of countries to create incentives for returning products after the end of their useful-lives. These systems can be implemented, where the product or its packaging does keep its integrity throughout its life-cycle and/or where there is a significant risk of illegal dumping even if households face no direct charge for waste collection and disposal, or where the costs of illegal dumping are high (as in the case of toxic products). Most commonly, deposit-refund systems are implemented for bottles, but sometimes also for potentially hazardous products like batteries. The incentive is created by asking customers to pay a deposit when buying the product concerned and refunding them the same amount upon return of the product. The objective of deposit-refund systems is to make sure that valuable materials are not disposed of but incorporated in a recycling or re-use scheme. They have proven very successful in increasing collection and recycling rates for the products which they are covering. Deposit-refund systems usually address specific products and usually burden the administrative costs on the industry. This increases the probability of significant lobbying and resistance from the affected industry.

**Advanced Recycling Fees** (ARFs) are fees paid by the consumer on product sales and used to cover the cost of recycling. ARFs are often assessed per unit of the product sold but can also be assessed on a weight basis. The objective of ARFs is to internalize the costs of the recycling of products after the end of their useful lives already in the purchasing price and thus to guarantee that prices better reflect products' life cycle costs. Advanced Recycling Fees have proven successful in Japan and California to provide funding for the recycling of certain products like electronic goods or end-of-life vehicles. While they do not create an incentive for increased recycling (this is done through mandatory recycling quotas) they generate revenues for the recycling process. From a social perspective ARFs burden the costs of recycling on the consumer. In California, ARFs have contributed to the creation of a strong recycling market in the course of only a few years. In both cases surveyed for this report administration costs were comparably high and revenue and cost projection turned out to be difficult.

# 1 INTRODUCTION

This report was commissioned by the *Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH*. Its objective is to present an analysis of economic instruments in use in selected OECD and Latin American countries in the areas of waste prevention and integrated municipal and commercial waste management.

Solid waste quantities and related environmental problems are growing quickly around the world. Broadly speaking, solid waste generation is a function of private consumption and thus correlates with the gross domestic product (GDP), the size of population and average income. In high-income countries, private consumption is generally between 50-70 per cent of GDP and has grown 20-50 per cent in absolute terms over the last decade[1]. High-income countries produce about three times more waste per person than developing countries, and significantly higher quantities of hazardous waste[2]. Growing concern with the costs and externalities of waste management – including the negative health and environmental effects of landfilling and incineration, pollution, resource- and energy scarcities – has led many countries to develop advanced policies designed to reduce the volume of industrial and household waste as well as the proportion of waste that is disposed of in landfills or incinerated and to minimize the environmental risks associated with the treatment of products at the end of their useful life. Among these policy instruments are a great variety of administrative, informational and economic instruments.

## 1.1 Economic Instruments

While command-and-control instruments work with bans, requirements and standards, which are set and monitored and informational instruments follow the intention to influence people behavior by informing and educating them, economic instruments work with economic incentives to influence people's behavior. The crucial difference between command-and-control instruments and economic instruments is that, when confronted with command-and-control policy instruments the individual has no choice but to fulfill the standard or obey the regulation, while with economic instruments, the individual is free to choose his/her behavior. The rationale is to influence his/her behavior via the price-mechanism making a specific behavior more or less expensive. Hence, economic instruments comprise all levies, permit trading schemes, and subsidies that create incentives and disincentives mobilizing the self-interest of consumers, producers, and service providers to make environmental improvements or reduce adverse environmental consequences. In environmental policy, the most prominent among these instruments are certainly environmental taxes and levies. These instruments may be used to address basic environmental needs, or may motivate actions to address environmental protection beyond the prescribed minimum accepted standards. A large and growing number of economic instruments with positive effects on the environment are applied in OECD member countries. Economic instruments do not substitute but complement and strengthen regulatory and other approaches in the respective policy area. Economic instruments should therefore be thought of as important and so far often underused components of policy mixes and not as "stand alone" policy packages.

[1] OECD 2001: Environmentally Related Taxes in OECD Countries: Issues and Strategies.

[2] Cointreau et al. 2000: Private Sector Participation in Urban Solid Waste Management.

Enforcing environmental regulations can be difficult if prices are sending the wrong signals, which can happen if market failures are not corrected and economic activities are producing external costs to environment or society or if environmentally harmful behavior is even subsidized. Environmental levies, for example, have the potential to internalize negative environmental impacts and establish the right price signals creating direct incentives for minimizing pollution and resource consumption, by reflecting the true cost of pollution or the scarcity of natural resources through the price mechanism. Permit trading schemes establish maximum levels for environmentally harmful behavior (e.g. emissions of a specific pollutant). The level is determined politically and can be adjusted to solve an environmental problem. "Pollution rights" are distributed among the polluters who are participating in the trading scheme so that the cap is met. The trading of permits among the polluters promotes environmental improvements where they are most efficient. As long as the abatement cost of polluting are lower then the price of the permits, there will be a stimulus to invest in technologies which help avoiding pollution. Subsidies may help to overcome market-entry barriers of innovative products, which may be environmentally beneficial but more costly at an early stage of development due to high development or labor costs. In addition to providing incentives to comply with environmental regulations, economic instruments can make additional funding available, which is always the case with environmental levies and usually with permit trading schemes, when the permits are not just given out for free but sold or auctioned. This additional funding can go either to the general budget or can be used specifically to refund the costs of environmental programs and services.

Generally speaking, economic instruments compared to other types of policy instruments (e.g. command-and-control instruments) leave a larger degree of freedom to individuals to make the environmental improvements in the most cost-effective manner. Also, the administrative costs of implementing economic instruments tend to be significantly lower than those associated with the monitoring of compliance with command-and-control regulation. For example, the administrative costs of the German eco-tax introduced in 1999 amount up to only 0.13 per cent of its overall revenue[3]. On the other hand, an inherent weakness of economic instruments (with the exception of certificate trading schemes) is that they do not serve to binding restrict environmentally harmful behavior. Whereas command-and-control instruments have the potential to ban certain practices, economic instruments merely create incentives to make these practices less attractive.

Economic instruments in general and can be classified as follows:

**Table 1: Types of Economic Instruments**

| Revenue-generating instruments | Revenue-providing instruments | Non-revenue instruments |
|---|---|---|
| **e.g. charges, fees and taxes** | **e.g. direct subsidies, tax exemptions, etc.** | **e.g. permit-trading schemes, deposit-refund systems, etc.** |

[3] Deutscher Bundestag 2002: Drucksache 14/9993.

Revenue-generating instruments certainly make up the largest share of economic policy instruments in use. The European Environmental Agency (EEA) classifies revenue-generating instruments in three main categories, according to their policy objective[4]:

- **Cost-covering charges** are directly levied on a specific service or act of pollution in order to provide revenue. This can either be used for:
  - covering the costs of environmental services and abatement measures, such as water treatment or waste collection and treatment (**user charges**), or
  - other environmental expenditures (**earmarked charges**).
- **Incentive taxes or charges** are levied on pollution or resource consumption, with the objective of changing the behaviour of producers and/or consumers.
- **Fiscal environmental taxes** are levied on pollution or resource consumption, but primarily with the objective of raising revenues.

In most cases charges and taxes existing in real life are hybrid forms which show a mixture of these functions. The development of environmental taxes (in Europe) has generally been from cost-covering charges in the 1960s and 1970s, to a combination of incentive and fiscal environmental taxes in the 1980s and 1990s, and then their more recent integration into comprehensive "green tax reforms" where taxes on "bads" such as pollution are supposed to increasingly replace taxes on "goods" such as labour.

## 1.2 Economic Instruments in the Waste Management Sector

In the waste management sector, economic instruments can contribute to strengthen waste management systems and the "polluter-pays-principle" by providing revenue – either through user charges or through taxes and charges on waste generation or disposal that can be earmarked for waste management services. Apart from these fiscal objectives, economic instruments in the waste management sector can also help to further a number of environmental objectives, for example:

- reducing the generation of household, commercial and industrial waste (e.g. through user charges for waste collection and treatment services on the basis of the quantity of waste collected),
- increasing separated collection and recycling of household waste (also through variable user charges and the introduction of deposit-refund systems for specific product or waste types),
- reducing the quantity of waste disposed of in landfills and instead increase of incineration and/or recycling (e.g. through landfill taxes).

For furthering these environmental objectives economic instruments can create incentives and disincentives at different stages of the waste management process, most importantly at the stage of waste generation, waste treatment and waste disposal (see figure 1 below). At each stage of the waste management process, different economic instruments may be appropriate to further the respective environmental objectives. For example waste charges may create incentives for improved

[4] European Environmental Agency 1996; Environmental Taxes. Implementation and Environmental Effectiveness.

separation and general waste reduction at the stage of waste generation. Deposit-refund systems may create incentives for better collection at the same stage. At the stage of waste treatment, Advanced Recycling Fees (ARFs) (see Chapter 6.2 for more details) can provide the revenue for the recycling processes so that recycling of certain products is increased. At the stage of waste disposal, landfill taxes can create disincentives for landfill disposal and divert waste streams to other waste management methods (e.g. recycling or incineration) instead. Similarly, Landfill Allowances Trading Schemes (LATS) can be implemented to introduce a maximum amount that may be deposited of a specific waste stream and allow actors to trade allowances among each other (see Chapter 5 for more details).

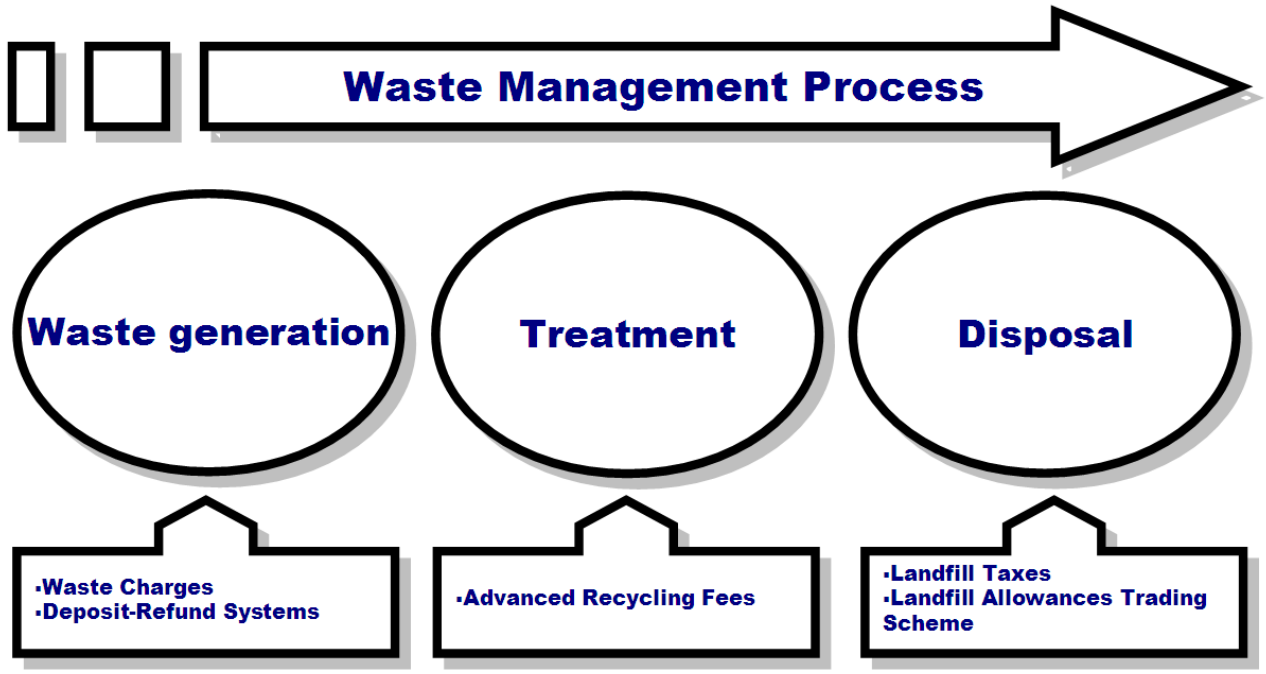



**Figure 1: Economic instruments of the different stages of the waste management process (Source: Original illustration)**

## 2 METHODOLOGY

In a first working package, the economic instruments implemented in the countries in the case sample were identified. The case sample was defined by GTZ. It comprises five European countries (France, Germany, Spain, Sweden and the United Kingdom), four Latin American countries (Argentina, Brazil, Chile and Colombia), the United States and Japan. Economic instruments identified in these countries where classified into the four following groups:

- Municipal waste charges
- Landfill taxes
- Landfill allowances trading schemes
- Deposit-refund schemes and Advanced Recycling Fees (ARF) (both being economic instruments related to extended producer responsibility [EPR] policies[5])

In a second working package, each instruments was analyzed following the 18 analytical categories, presented in Annex 1. This analysis was primarily based on the review of existing literature (reports, legislation, books, academic articles, internet sites) and complemented by a number of interviews with researchers and public officers knowledgeable on the respective instruments and their effects. The chart with analytical categories for each instrument are enclosed with this report in Annexes 2 – 23.

This report presents the main findings of the analysis conducted. In the following chapters each instrument is discussed along the lines of the following categories:

- **Environmental effects**: To what extent are incentives created by the instrument capable of effectively contributing to environmental objectives?
- **Revenue generation**: What is the revenue potential of the instrument? To what extent are revenues reliable and stable?
- **Market effects**: In which way does the implementation of the respective instrument influence competitiveness of specific sectors?
- **Social effects**: In which way does the implementation of the instrument have an influence on income distribution?
- **Administrative costs**: What are the administrative costs of the implementation of the instrument (e.g. tax and data collection, monitoring, etc.)?
- **Political acceptance**: Has there been any significant political or social opposition against the implementation of the instrument?

[5] Extended Producer Responsibility (EPR) aims to reduce the economic and environmental costs of waste management by extending the responsibility of producers for their products (including its packaging) to include the full social and environmental costs of waste management after the end of their useful life. EPR-policies by themselves are command-and-control instruments, which would not be treated in this report. However, in some of the countries surveyed, there are a number of economic instruments in place supporting take-back obligations and recycling quotas, either by creating incentives for a product to be returned or by levying a charge on consumers or producers in order to provide funding for the implementation of collection and recycling (see below).

Effects in each of these categories are discussed in some details in the following chapters. To facilitate an overview and allow for tentative comparison, the effects of each instrument are evaluated as a short summary at the end of each chapter using the following symbols:

**Table 2: Indicators used for the short evaluation of the instruments in each analytical categories**

| | Environ. Effects | Revenue generation | Market effects | Social Effects | Admin. Costs | Political Acceptance |
|---|---|---|---|---|---|---|
| -- | Strong negative effects | Very weak/unstable revenue generation | Very negative competitiveness effects | Very negative social effects | Very high administrative costs | Very low political acceptance |
| - | Negative effects | Weak/un-stable revenue generation | Negative competitiveness effects | Negative social effects | High administrative costs | Low political acceptance |
| **0** | No effect | Neutral | No competitiveness effects | No social effects | Regular administrative costs | Neutral |
| + | Positive effect | Strong/stable Revenue generation | Positive competitiveness effects | Positive social effects | Low administrative costs | High political acceptance |
| ++ | Strong positive effect | Very strong/stable revenue generation | Very positive competitiveness effects | Very positive social effects | Very low administrative costs | Very high political acceptance |

# 3 MUNICIPAL WASTE CHARGES

## 3.1 General Remarks

In most countries, collection and treatment of municipal solid waste is organized locally by the municipalities, either through public or private waste management services. On the revenue side the costs of waste management may be either paid from the general municipal budget or passed on to the citizens either through a local waste tax or through user charges for waste management services. User charges for waste collection and/or disposal are relatively easy to implement and useful for generating the revenue to cover the costs. Depending on their design they can also make a meaningful contribution to waste reduction or an increase in waste separation. As suggested above, revenue-generating instruments can be broadly differentiated in user charges, earmarked charges, environmental incentive taxes, and environmental fiscal taxes[6]. Municipal waste charges are user charges in this typology: designed to cover or contribute to the costs of waste collection, treatment and disposal. Depending on how these charges are calculated for the individual user, they can be further differentiated into the following three categories:

- **Flat-rate user charges**, which are paid specifically to cover the costs of waste management services, but where all users pay the same amount independent of the quantity or quality of waste;
- **Service-unrelated variable-rate user charges**, where the individual rates for users vary but with the nature of the variation being unrelated or only indirectly related to the quantity or quality of waste generated (such as property tax, water or energy consumption, income tax, number of dwellers); and
- **Service-related variable-rate user charges (unit-pricing)**, which vary with the amount or quality of waste generated, thus creating an environmental incentive for waste reduction and better separation. These types of charges are also often referred to as “direct charging” or “pay-as-you-throw” systems.

Strictly speaking, the treatment of charges of the second category as user charges could be debated, as their level does not depend on the level of the service delivered. In fact, in many cases these charges are denominated as “taxes”, especially if they are collected – mostly for administrative reasons – as a proportion of other municipal taxes (e.g. the property tax). Nevertheless, they are considered user charges in this study owing to the fact that they are earmarked for the service provided.

Unrelated charges can be based on household income, the size or the value of the property, the number of persons living in a household, or other variables. For service-related charges there is a need for establishing a measure for the usage of the service (i.e. the amount of waste generated). As with water user charges, which require water meters, service-related waste charges also have special requirements. Generally, these charges can be based on the volume or the weight of waste. Many different models and technical solutions have been chosen by municipalities in the eleven countries surveyed for this report. Examples include the usage of containers of fixed size and design and bas-

[6] European Environmental Agency 1996; Environmental Taxes. Implementation and Environmental Effectiveness, http://www.eea.europa.eu/publications/92-9167-000-6

ing the charge on the number of containers put out for emptying, using special bags of a given size, which are sold at prices that cover service costs, or installing scales on collection trucks or on the containers and using computerized systems that weigh and record the weights for automated customer billing.

**Table 3: Overview of the different types of municipal waste charges and the type of assessment unit their level is based on**

| | Flat-rate charges | Unrelated variable-rate charges | Service-related charges |
|---|---|---|---|
| **Assessment Unit** | • **per household** | • **size of building or estate**<br>• **household income**<br>• **number of people living in a household** | • **volume of waste collected**<br>• **weight of waste collected** |

## 3.2 Experiences with Municipal Waste Charges

### 3.2.1 Country Overview

In 2007, according to an OECD survey, unit-pricing models of user charges were applied in about 80 per cent of municipalities in one fourth of OECD countries, while in the rest of the OECD countries unit-pricing models were in use in at least some of the municipalities[7]. In most Latin American countries, the costs of waste management are recovered through user charges for municipal services, which are either flat-rate charges or service-unrelated variable user charges (mostly based on the value or the size of property). These charges cover waste collection and treatment but usually also street-lightning, cleaning and other services. Among the Latin American countries surveyed for this report this is the case in **Argentina**, **Chile** and **Colombia**. In **Brazil**, costs for waste management are covered from the general budget in most municipalities, except for in a handful of larger municipalities (e.g. Rio de Janeiro, Sao Paulo, San Jose), where a user charge (*taxa de lixo*) has been introduced in recent years.

In Europe, municipalities in most countries levy user charges specifically for waste management services. In **France**, national legislation mandates that municipalities can choose between (1) a waste collection tax (which in reality is a service-unrelated user charge in the typology above), (2) a service-related user charge for household waste collection set by the municipal council or the assembly, or (3) paying waste management services from the general municipal budget. Each option is implemented by roughly one third of the municipalities, with a trend in the direction of more and more municipalities applying direct pricing models. However, the “waste tax” is applied by almost all larger municipalities, so that roughly 80 per cent of the population are subject to this way of charging. In **Germany** constitutional provisions authorize municipalities to levy taxes or fees for management of municipal waste. Local regulations vary considerably. All municipalities collect separate waste charges for households. In general, municipalities opt for a collection of waste containers charging households either a variable fee based on the size of the container or on the frequency of collection, sometimes in combination with a flat-rate basic charge. Also there are charges

[7] OECD 2007: Instrument Mixes Addressing Household Waste.

varying on the basis of the number of household members, on size of property, or on various measuring technologies for the volume or weight of waste. Similarly, in **Sweden**, most municipalities have been using user charges to finance waste management since the 1960s. They are generally based on the volume of waste and frequency of collection. Like in Germany, user charges are often split into two portions: a fixed portion based on the total service provided and a variable portion based on the amount of waste produced. User charges are based on weight of waste in about 5 per cent of municipalities, and on size or number of containers in some others (this is more common).

In **Spain**, the methods for financing municipal waste management vary from one autonomous region to another. The cities of Madrid, Córdoba and Pamplona finance waste collection through the property tax, while the cities of Barcelona and Seville integrate a fee based on household water use into the property tax. Recently there has been increasing experiments with unit-pricing models.

In the **United Kingdom** municipal waste management costs are covered through parts of the Council Tax, a general municipal tax. The tax is levied by local authorities on the basis of property values. The level of the tax is determined by the expenditure of the local authority net of grants provided by Central Government (i.e. through the Standard Spending Assessment, which establishes, on the basis of a number of formulae, the amount to be awarded to each local authority). It is a fundamental principle of the funding process that funds are not earmarked to specific services (this is thought important to guarantee local democracy). However, the expenditure on each item is usually revealed by the local authority in reports explaining the composition of the Council Tax.

In the **United States**, municipal waste management system had been traditionally highly decentralized to a degree that householders were taking their own waste to dumps or hiring their own waste collection company. Today, most municipalities have centralized waste management services and organize them through publicly owned companies or contract them out to private companies. Municipalities employ mostly flat-rate user charges or (increasingly) variable-rate charges based on the amount of waste collected. In 2006, 26.3 per cent of all municipalities in the United States where applying unit-pricing models, while in California this rate was at almost 50 per cent. Most unit-pricing schemes in the US were based on the size of containers or the number of standardized bags[8].

Similarly, in **Japan**, in most municipalities unit-pricing models of user charges are in place. In most cities this in implemented via paid-for garbage bag programs, where garbage bags of different sizes are given out in exchange for a particular charge that varies with the volume of the garbage bags. Household and commercial waste is only collected in these bags.

### 3.2.2 Country Examples for Flat-rate User Charges

Flat-rate user charges are charges levied on each individual subject (in this case households) at the same rate. Flat-rate user charges for waste collection and management are implemented in some Latin American municipalities and rather rare in Europe and the United States. As an example, the flat-rate waste charge collected in the City of Santiago (Chile) is explained in some detail below.

**Chile: City of Santiago**

In the city of Santiago costs for waste collection, transportation and general cleansing services are recovered from households through a flat-rate user charge, collected quarterly. Its rate is determined

[8] http://www.epa.gov/waste/conserve/tools/payt/states/06comm.htm

so as to cover the actual costs of those services. It is adjusted annually and is a result of the actual service costs of the preceding year divided by the number of users. In Santiago, the charge adopts two different values depending on the location and the frequency of waste collection (which can be daily or three times a week). In downtown Santiago the value is 7,103 UF (*Unidad de Fomento*[9]) as the collection is more frequent, while in the periphery is 4,766 UF.

**Table 4: Rates of the municipal waste charge in Santiago, Chile**

| Downtown (higher collection frequency) | Periphery (lower collection frequency) |
|---|---|
| 7.103 UF → 151,549 CLP / ~ 230 Euro | 4.766 UF → 101,687 CLP / ~ 154 Euro |

The charge is paid by households with the automatic exception of those with low income. The indicator used for this threshold is the fiscal value of the house (≤25 tributary units [10] per month)[11]. As a result of this exception, around 90.000 households are exempt from the charge in 2010.

Since a modification of the Local Treasuries Act of 1995 (*Ley de Rentas Municipales*), municipalities are responsible for collecting the waste charge. Since the early 1980s, municipalities in Chile have had the option of subcontracting the collection and transport of municipal solid waste to private companies. The 56 municipalities comprised in the Metropolitan Area of Santiago hire private companies to collect and transport solid waste. Generally, waste is collected from the kerbside.

Generation of solid waste from households and businesses in Santiago de Chile is estimated at 568 kg/person/year in 2010 (up from 277 kg/person/year in 1994)[12]. Around 50 per cent of the collection and transport waste costs are recovered. In Santiago, in 2005, this charge represented around 8 per cent of the revenue from taxes and charges and 4.7 per cent of the total municipal income. Revenues in 2005 were 3,358,411 CLP for the domiciliary waste charge while total municipal income was 74,104,797 CLP[13]. CONAMA calculates an average costs of collection, treatment and disposal between 15,000- 20,000 CLP per ton of waste.

**Table 5: Waste generation, revenues from charges, and overall municipal revenues in Santiago, Chile**

| Year | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | n/a | n/a | n/a | n/a | 4,548 |
| **Total revenues from charges (in million Euro)** | 0.0050 | n/a | n/a | n/a | 0.0063 |
| **Total municipal revenues (in million Euro)** | 0.134281 | n/a | n/a | n/a | 0.112472 |

[9] UF is an accounting unit adjustable to inflation used in Chile: 1UF = 21.346 CLP whereas 1 Euro = approx. 660.42 CLP in September 2010., current rates at: http://valoruf.cl

[10] A tributary unit is the quantity of money, determined by law (Art. 8 DL published 31 December 1974) and continuously updated, that is used as a tributary reference point (current values in Chilean pesos at: www.utm.cl)

[11] Comisión Nacional del Medio Ambiente 2005: Política de gestión integral de residuos urbanos.

[12] http://www.conama.cl/rm/568/printer-1594.html

[13] http://www.municipalidaddesantiago.cl

### 3.2.3 Country Examples for User Charges Based on Household Income or Property Value

Variable-rate user charges, if they are not based on the actual amount of waste collected, are often based on either household income or property value. As an example for the former, regulations in Colombia (and the City of Medellin) are described in detail below. Additionally, Colombian regulations also determine a mechanism for allocating waste charges between "service areas" according to the actual costs of waste services in these areas. As an example for the latter (charges based on property value) regulations in the cities of Paris (France), Buenos Aires (Argentina) and Rio de Janeiro (Brazil) are described.

**Colombia: City of Medellin (User charge based on Household Income)**

The costs for waste collection, transport, treatment and final disposal as well as for the cleaning of public areas in Colombia are covered by means of a user charge, which varies depending on household income. According to National Decree 351 of 2005 which regulates the charging for waste collection and the cleaning of public areas the same mechanism is applied in all Colombian municipalities to determine the rates. The same amount is paid by all households in one "service area" which is to be smaller or equal to 1 km². Until 2005 the charge was a flat-rate calculated on the basis of the assumption that an average household would produce 120 kg of waste per months. With the new decree, since 2005, the charge is calculated with a methodology allowing for a better approximation to the real value of waste produced per household: Rates are calculated following a formula factoring (1) the fixed costs for cleaning, waste collection and transport as well as the administrative costs; (2) the weight of the collected waste from one service area at the final disposal site, divided by the number of households that generated the waste; and (3) the distance to the next landfill site. The price defined by this methodology is the maximum price that service providers are allowed to charge, meaning that if they can manage to lower their prices, they can translate this efficiency to the users[14]. Rates are adjusted annually to cover the costs of waste collection and transport as well as cleaning of the preceding year. The methodology allows for an approximation to the real costs incurred by the households in a particular area. Nevertheless, it is not a service-based charge because the same amount is charged to every household in one service area independent of individual waste generation.

Within services areas, waste charges are differentiated according to user type and income. User types differentiate between industrial producers, commercial producers, and residential producers. Residential producers are additionally differentiated by household income or "socio-economic strata". Socio-economic strata are a category established in the Law of Public Services No. 142 of 1994 used by the Colombian government as a solidarity tool. Public services such as waste collection have to follow a solidarity scheme, where people with a lower income (strata 1, 2 and sometimes 3) have their public services subsidized by the local authorities. People with a higher income (strata 5 and 6), businesses and industrial companies, have included in their bills the contribution. Stratum 4, and official establishments neither pay a contribution nor receive a subsidy.

The theory behind the methodology to calculate the charge is that what is being charged for is the actual cost of providing the service. This cost is not homogeneous even in areas of the same municipality or city, as even at a local level, there are areas with a higher delivery costs than others, due to the condition of the roads or their degree of sloping. This means that in the midst of competition

[14] Ministerio de Ambiente, Vivienda y Desarrollo Territorial 2007: Guía Metodológica de Costos y Tarifas para el Servicio Público de Aseo.

in one or more service areas, two users of the same stratum may pay a different charge. This would be correct provided that the charge meets the real costs of provision within the maximum charge allowed by the law[15].

Municipal waste management in Colombia may be handled by private companies or the municipalities themselves. The Regulatory Commission for Water and Basic Sanitation Services (*Comisión de Regulación de Agua Potable y Saneamiento Básico* - CRA) is responsible for overseeing the municipal waste management nationally and for setting the rates. Waste collection, transport, treatment and disposal in the city of Medellin is organized by a private company, which also collects the charge directly from its users. The charge is collected together with other public services, normally with the water bill, and to a lesser degree with the electricity bill.

**Table 6: Calculation of the municipal waste charges in Colombia.**

| Calculation of the municipal waste charges in Colombia |
|---|
| **$AFRC = AC + CSC*(K/N) + CFC_F$**<br>AFRC: The maximum average fixed reference cost, to be used in the fee applied for the service area ($/user).<br>AC: The administrative costs per user ($/user).<br>CSC: The costs of sweeping and cleaning streets and public areas ($/km).<br>K: The addition of all the kilometers of kerbs swept by all the service providers that operate in the urban areas of the municipality for the reference year, during one month, according to the frequencies defined by the municipality (km).<br>N: The total number of users served by the providers, in the urban areas of the municipality for the reference year (user).<br>$CFC_F$: The fixed cost for fee collection charged to the user ($/user). |
| **$AVRC = CCT + CTE_A + CTD_A + CFC_V$**<br>AVRC: The maximum average variable reference cost, to be used in the fee applied for the service area ($/ton).<br>CCT: The cost of collection and transport ($/ton).<br>$CTE_A$: The cost of transport for the extra distance covered over the maximum 20km, adjusted by the tons of waste from a specific service area ($/ton).<br>$CTD_A$: The cost of treatment and final disposal of the waste, adjusted by the tons of waste from a specific service area ($/ton); when there is more than one final disposal site it is calculated as the average of these costs.<br>$CFC_V$: The variable cost for fee collection charged ($/ton). |

**France: City of Paris (User Charge Based on Property Value)**

The city of Paris, like most other large French cities, is recovering its waste management costs through the Household Waste Collection Tax (*Taxe d'enlèvement des ordures ménagères* – TEOM). As the revenue of this "tax" is actually earmarked for the provision of a specific service (i.e. waste collection and treatment) it can be considered a user charge, which is variable but does not create an environmental incentive. National legislation mandates that the amount of tax is de-

[15] Comisión de Regulación de Agua Potable y Saneamiento Básico 2006: Metodología de costos y tarifas para el servicio público de aseo.

termined on the same basis as property tax on buildings (i.e. value of the building). The value is reduced by half and multiplied with a coefficient determined by the municipalities to calculate the rate. The reduction of 50 per cent is made to account for management fees, insurance, depreciation and maintenance of the flat or the property which have to be taken care of by the owner. The coefficient in Paris in 2010 is 0.0621.

**Table 7: Calculation of the Household Waste Collection Tax in France**

| **Taxe d'enlèvement des ordures ménagères (TEOM) ("Household Waste Collection Tax")** |
|---|
| **(Value of the building x 0.5) x coefficient*** |
| *Coefficient for Paris (2010) is 0.0621 |

The "tax" is to be paid by all residents and businesses subject to the property tax as well as those temporarily exempt. Large industrial businesses and public institutions do not pay the TEOM. For them a *redevance speciale* (Special Tax) was introduced in 1992 in order to offset the financial burden caused by industrial and commercial waste. Generally, the charge is collected directly by the municipality, the responsible EPCI (*Établissement public de coopération intercommunale*) or the responsible concessionaire. In Paris the collection of waste is given by concession to four private companies (Régie, Véolia, Nicollin, Sita). The treatment of waste is done by the *Syndicat intercommunal de traitement des ordures ménagères* (SYTCOM).

In 2008 overall waste generation in Paris was at 535 kg/person, down from 566 kg/person in 2004. Given the absence of incentives for waste reduction created by the waste tax, however, this positive effect clearly has to be assigned to other factors. Overall revenue generated by the waste tax for the city of Paris was 366.3 Million Euro in 2008, overall costs for waste collection and treatment were 386.2 Million Euro. The TEOM does not usually cover all service costs and additional financing from the general budget is possible.

**Table 8: Waste generation, total revenues from charges, and cost of waste management in Paris, France**

| **Year** | **2004** | **2005** | **2006** | **2007** | **2008** |
|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | 1,014 | 998 | 988 | 981 | 947 |
| **Change in comparison to 2004 (in percent)** | 0% | -1.6% | -2.6% | -3.3% | -6.6% |
| **Waste generated per capita (in tons/capita)** | 0.566 | 0.564 | 0.558 | 0.556 | 0.535 |
| **Total revenues from charges (in million Euro)** | 330.6 | 340.0 | 349.0 | 357.9 | 366.3 |
| **Costs of waste management (in million Euro)** | 415.6 | 357.7 | 364.6 | 364.2 | 386.2 |

**Argentina: City of Buenos Aires (User Charge Based on Property Value)**

The city of Buenos Aires charges its citizens a general charge for municipal services. It comprises public lighting, public cleansing and waste collection and treatment (*alumbrado, barrido y limpieza* - ABL). It is one of the oldest taxes and was introduced in the 1950s. At the beginning it was designed to finance paving of the streets, lightening and cleansing. The charge is regulated by Act 23.514. The rate is based on real estate and calculated as a proportion of its value. It is paid every two months. For instance, a flat of 40m$^2$ in a medium class residential area pays AR$ 35 (approx. 7 Euro) every two months in 2010. Compared to the income level, the charge is not very high even though it was raised in 2008. All residents pay the charge without exceptions. Owners of apartment buildings pass the costs on to the tenants. The municipality sends bills per mail and recipients may pay it either at the bank, the city Council or other authorized places. The revenue goes to the general municipal budget.

**Table 9: Calculation of the municipal service charge in Buenos Aires, Argentina**

| **Alumbrado, barrido y limpieza (ABL)** | |
|---|---|
| Land value (VT)* + (Building value x Zone coefficient for year 2008**)<br><br>* land valuation from 2008<br>** determined geographically according to the cadastral area where the property is situated | Example: 40m² flat → 6.50 Euro (AR$ 35) |

Waste collection is done daily in plastic bags from the kerbside by a private service. There are also some street containers. In 2004 in the city of Buenos Aires 490 kg/person/year of wastes were produced. The Government of Buenos Aires was expecting to lower this quantity by 30 per cent by 2010 by applying an awareness program "zero waste". The ABL charge, however, does not play a role in the environmental program of the City of Buenos Aires.

**Brazil: City of Rio de Janeiro (User Charge Based on Property Value)**

In Rio de Janeiro the *Taxa de Coleta Domiciliar do Lixo* (*Taxa do lixo)* is collected with the property tax as a function of the value of the property, the amount of waste generated in the particular area in which the estate is situated and the amount of waste the property is likely to generate. The amount is arrived at by applying a formula for each estate in line with an "*anuario*" (annual report)[16]. Residents of the slums and properties owned by the municipality are apparently exempt. The tax covers collection, treatment and disposal of waste. The "*anuario"* is used to calculate the tax but figures for the actual coverage are not easily available as they are applied on a property by property basis[17]. In the case of Rio de Janeiro the tax collected in passed on to the *Companhia Municipal de Limpeza Urbana* (COMLURB), a semi-privatized state company that is responsible for overseeing waste collection and disposal. In Rio like in many other Brazilian cities there are daily collections. This should however be contrasted with areas which have infrequent or no collection at all, especially rural areas or slums. The costs for waste management are provided by COMLURB as R$103.45 (approx. 45 Euro) per capita and year.

[16] Anuário do IPTU e Taxa de Coleta Domiciliar do Lixo da Cidade do Rio de Janeiro, http://www2.rio.rj.gov.br/smf/pdfs/anuario1999.pdf

[17] Taxa De Coleta de Lixo. COMLURB. http://comlurb.rio.rj.gov.br/taxa_coleta_lixo.htm

"Large waste generators" are considered to be private or public establishments (commercial, industrial or services) that produce more than 120 liters or 60kgs of domestic type waste per day[18]. These large waste producers are obliged to contract a private service (recognized or licensed by COMLURB, although COMLURB also provides this service[19]) to dispose of their waste under the regulations proscribed[20] but are still obliged to pay the *taxa de lixo* on top of this.

Low income communities have been contracted by COMLURB to collect waste and clean streets and every effort is made to guarantee that local labor will be employed to carry out the waste collection and street cleaning services for the community. This creates local jobs and develops community awareness of public health and environmental issues. COMLURB funds the services of these low-income community cleaning associations and provides technical support and equipment. However, the associations hire and manage their own employees. This type of system is present in almost all of Rio de Janeiro's informal settlements and has worked well so far, although there are still individuals who independently scavenge for recyclables in urban areas. Such schemes offer employment for otherwise marginalized groups.

**Table 10: Waste generation, total revenues from charges, and cost of waste management Rio de Janeiro, Brazil**

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | n/a | 8,347 | n/a | 8,815 | n/a | n/a | n/a |
| **Change in comparison to 2003 (in percent)** | 0% | 0% | 0% | +5.6% | 0% | 0% | 0% |
| **Waste generated per capita (in tons/capita)** | n/a | 0.518 | n/a | 0.547 | n/a | n/a | 0.547 |
| **Total revenues from charges (in million Euro)** | 177.2 | n/a | 213.4 | n/a | 259.0 | n/a | n/a |
| **Costs of waste management (in million Euro)** | 242.6 | n/a | 246.5 | n/a | 263.7 | n/a | n/a |
| **Costs of waste management per capita (in Euro/capita)** | n/a | n/a | n/a | n/a | 44.5 | n/a | n/a |

### 3.2.4 Country Examples for User Charges Based on Household Water Consumption

In some cases, the rate of waste charges is also determined on the basis of water consumption of individual users. The City of Barcelona (Spain), for example, levies a waste treatment charge on households and businesses in this manner. Another peculiarity of this charge is that it is raised to fund improvements in waste treatment and is collected in addition to individual waste collection charges collected by the individual municipalities within the metropolitan area.

[18] Dúvidas mais freqüentes. COMLURB. http://comlurb.rio.rj.gov.br/informa_duvidas.htm#q12

[19] Tabela De Preços De Serviços Especiais. COMLURB. http://comlurb.rio.rj.gov.br/serv_precos.asp

[20] Remoção De Lixo Domiciliar Extraordinário. COMLURB. http://comlurb.rio.rj.gov.br/rem_lixo_domiciliar.htm

**Spain: City of Barcelona (User Charge Based on Water Consumption and Waste Generation)**

The City of Barcelona raises an extra Municipal Waste Treatment Charge (TMTR). The TMTR is a charge especially collected for the financing of municipal waste treatment. It must be differentiated from the municipal waste charge, that every municipality voluntarily charges to households and commercial businesses to fund waste collection. The TMTR is only for treatment and is used to pay for the Waste Metropolitan Program launched in 1997 (*Programa Metropolità de Gestió de Residus*, PMGRM). Revenue obtained by this charge goes to the Metropolitan Environmental Authority which is in charge of water and waste management in the Metropolitan Area of Barcelona. In the typology of environmental charges and taxes presented in the introduction, this instrument is therefore an earmarked charge.

The TMTR is charged with the water bill so that all citizens and businesses that have contracted water supply pay it. It classifies contributors in two categories: households and commercial businesses (retailers and industries). For households the charge is calculated on the basis of (1) the water consumption of the household and (2) the quantity of waste generated in the individual municipality where the household is located. Table 11 shows rates for households in the individual municipalities in 2010. D11 to D34 differentiate households according to water consumption (see annex 14 for details).

Families with more than 3 members can get a discount, as well as handicapped people or inhabitants having an income below an inter-professional minimum salary. Regarding environmental incentives, the charge also includes a discount for the use of the recycling centers: households using the recycling centers 15 times or more a year can get a discount of 14 per cent of the charged fee[21] (see annex 14 for more details).

[21] Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009

**Table 11: Annual Charges for Households in the Metropolitan Area of Barcelona for 2010 (in Euro)**

| | coef | D11 | D12 | D13 | D14 | D21 | D22 | D23 | D24 | D31 | D32 | D33 | D34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tarifa base | 100,0 | 26,50 | 49,25 | 83,91 | 126,00 | 55,37 | 89,91 | 134,94 | 146,44 | 58,85 | 95,63 | 179,20 | 186,39 |
| Badalona | 99,0 | 26,24 | 48,76 | 83,07 | 124,74 | 54,82 | 89,01 | 133,59 | 144,98 | 58,26 | 94,67 | 177,41 | 184,53 |
| Badia del Vallès | 97,3 | 25,78 | 47,92 | 81,64 | 122,60 | 53,88 | 87,48 | 131,30 | 142,49 | 57,26 | 93,05 | 174,36 | 181,36 |
| Barcelona | 100,9 | 26,74 | 49,69 | 84,67 | 127,13 | 55,87 | 90,72 | 136,15 | 147,76 | 59,38 | 96,49 | 180,81 | 188,07 |
| Begues | 102,6 | 27,19 | 50,53 | 86,09 | 129,28 | 56,81 | 92,25 | 138,45 | 150,25 | 60,38 | 98,12 | 183,86 | 191,24 |
| Castellbisbal | 94,8 | 25,12 | 46,69 | 79,55 | 119,45 | 52,49 | 85,23 | 127,92 | 138,83 | 55,79 | 90,66 | 169,88 | 176,70 |
| Castelldefels | 103,7 | 27,48 | 51,07 | 87,01 | 130,66 | 57,42 | 93,24 | 139,93 | 151,86 | 61,03 | 99,17 | 185,83 | 193,29 |
| Cerdanyola del Vallès | 101,3 | 26,84 | 49,89 | 85,00 | 127,64 | 56,09 | 91,08 | 136,69 | 148,34 | 59,62 | 96,87 | 181,53 | 188,81 |
| Cornellà de Llobregat | 97,3 | 25,78 | 47,92 | 81,64 | 122,60 | 53,88 | 87,48 | 131,30 | 142,49 | 57,26 | 93,05 | 174,36 | 181,36 |
| Esplugues de Llobregat | 97,2 | 25,76 | 47,87 | 81,56 | 122,47 | 53,82 | 87,39 | 131,16 | 142,34 | 57,20 | 92,95 | 174,18 | 181,17 |
| Gavà | 101,4 | 26,87 | 49,94 | 85,08 | 127,76 | 56,15 | 91,17 | 136,83 | 148,49 | 59,67 | 96,97 | 181,71 | 189,00 |
| Hospitalet de Llobregat, L' | 96,8 | 25,65 | 47,67 | 81,22 | 121,97 | 53,60 | 87,03 | 130,62 | 141,75 | 56,97 | 92,57 | 173,47 | 180,43 |
| Molins de Rei | 95,0 | 25,18 | 46,79 | 79,71 | 119,70 | 52,60 | 85,41 | 128,19 | 139,12 | 55,91 | 90,85 | 170,24 | 177,07 |
| Montcada i Reixac | 97,6 | 25,86 | 48,07 | 81,90 | 122,98 | 54,04 | 87,75 | 131,70 | 142,93 | 57,44 | 93,33 | 174,90 | 181,92 |
| Montgat | 98,3 | 26,05 | 48,41 | 82,48 | 123,86 | 54,43 | 88,38 | 132,65 | 143,95 | 57,85 | 94,00 | 176,15 | 183,22 |
| Pallejà | 96,8 | 25,65 | 47,67 | 81,22 | 121,97 | 53,60 | 87,03 | 130,62 | 141,75 | 56,97 | 92,57 | 173,47 | 180,43 |
| Papiol, El | 96,7 | 25,63 | 47,62 | 81,14 | 121,84 | 53,54 | 86,94 | 130,49 | 141,61 | 56,91 | 92,47 | 173,29 | 180,24 |
| Prat de Llobregat, El | 98,6 | 26,13 | 48,56 | 82,74 | 124,24 | 54,59 | 88,65 | 133,05 | 144,39 | 58,03 | 94,29 | 176,69 | 183,78 |
| Ripollet | 96,9 | 25,68 | 47,72 | 81,31 | 122,09 | 53,65 | 87,12 | 130,76 | 141,90 | 57,03 | 92,67 | 173,64 | 180,61 |
| Sant Adrià de Besòs | 100,3 | 26,58 | 49,40 | 84,16 | 126,38 | 55,54 | 90,18 | 135,34 | 146,88 | 59,03 | 95,92 | 179,74 | 186,95 |
| Sant Andreu de la Barca | 99,2 | 26,29 | 48,86 | 83,24 | 124,99 | 54,93 | 89,19 | 133,86 | 145,27 | 58,38 | 94,86 | 177,77 | 184,90 |
| Sant Boi de Llobregat | 100,2 | 26,55 | 49,35 | 84,08 | 126,25 | 55,48 | 90,09 | 135,21 | 146,73 | 58,97 | 95,82 | 179,56 | 186,76 |
| Sant Climent de Llobregat | 99,4 | 26,34 | 48,95 | 83,41 | 125,24 | 55,04 | 89,37 | 134,13 | 145,56 | 58,50 | 95,06 | 178,12 | 185,27 |
| Sant Cugat del Vallès | 106,9 | 28,33 | 52,65 | 89,70 | 134,69 | 59,19 | 96,11 | 144,25 | 156,54 | 62,91 | 102,23 | 191,56 | 199,25 |
| Sant Feliu de Llobregat | 96,4 | 25,55 | 47,48 | 80,89 | 121,46 | 53,38 | 86,67 | 130,08 | 141,17 | 56,73 | 92,19 | 172,75 | 179,68 |
| Sant Joan Despí | 96,7 | 25,63 | 47,62 | 81,14 | 121,84 | 53,54 | 86,94 | 130,49 | 141,61 | 56,91 | 92,47 | 173,29 | 180,24 |
| Sant Just Desvern | 95,9 | 25,41 | 47,23 | 80,47 | 120,83 | 53,10 | 86,22 | 129,41 | 140,44 | 56,44 | 91,71 | 171,85 | 178,75 |
| Sant Vicenç dels Horts | 100,5 | 26,63 | 49,50 | 84,33 | 126,63 | 55,65 | 90,36 | 135,61 | 147,17 | 59,14 | 96,11 | 180,10 | 187,32 |
| Santa Coloma de Cervelló | 101,0 | 26,77 | 49,74 | 84,75 | 127,26 | 55,92 | 90,81 | 136,29 | 147,90 | 59,44 | 96,59 | 180,99 | 188,25 |
| Santa Coloma de Gramenet | 99,8 | 26,45 | 49,15 | 83,74 | 125,75 | 55,26 | 89,73 | 134,67 | 146,15 | 58,73 | 95,44 | 178,84 | 186,02 |
| Tiana | 88,9 | 23,56 | 43,78 | 74,60 | 112,01 | 49,22 | 79,93 | 119,96 | 130,19 | 52,32 | 85,02 | 159,31 | 165,70 |
| Torrelles de Llobregat | 91,8 | 24,33 | 45,21 | 77,03 | 115,67 | 50,83 | 82,54 | 123,87 | 134,43 | 54,02 | 87,79 | 164,51 | 171,11 |
| Viladecans | 99,2 | 26,29 | 48,86 | 83,24 | 124,99 | 54,93 | 89,19 | 133,86 | 145,27 | 58,38 | 94,86 | 177,77 | 184,90 |

**Source: Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009**

For commercial businesses the charge is calculated considering the following classification.

**Table 12: Waste producers classification by type of waste**

| | |
|---|---|
| Group A. Refuse producers<br>All activities that are not included in groups B to F | Charge CA (coefficient 1) |
| Group B. Paper and refuse producers<br>Examples: Shops, pharmacies | Charge CB (coefficient 1.25) |
| Group C. Paper and cardboard producers<br>Examples: Financial agencies, real state agencies, banks, among others | Charge CC (coefficient 1.50) |
| Group D. Packaging/glass and refuse producers<br>Examples: cinemas, theatres, discotheques, bars, gyms, hotels | Charge CD (coefficient 1.75) |
| Group E. Organic waste, cardboard and refuse producers<br>Examples: food and flowers shops, supermarkets | Charge CE (coefficient 2.25) |
| Group F. organic, refuse, paper and cardboard, packaging and glass<br>Examples: hotels, restaurants, cafeterias, schools, hospitals. | Charge CF (coefficient 3.50) |

**Source: Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009**

**Table 13: Charges for treatment of municipal waste produced by commercial activities in the Metropolitan Area of Barcelona.**

| Coeficient fracció residus | coef municipi | CA 1,00 | CB 1,25 | CC 1,50 | CD 1,75 | CE 2,25 | CF 3,50 |
|---|---|---|---|---|---|---|---|
| Tarifa base | 100,0 | 131,29 | 164,11 | 196,94 | 229,76 | 295,40 | 459,52 |
| Badalona | 99,0 | 129,98 | 162,47 | 194,97 | 227,46 | 292,45 | 454,92 |
| Badia del Vallès | 97,3 | 127,75 | 159,68 | 191,62 | 223,56 | 287,42 | 447,11 |
| Barcelona | 100,9 | 132,47 | 165,59 | 198,71 | 231,83 | 298,06 | 463,66 |
| Begues | 102,6 | 134,70 | 168,38 | 202,06 | 235,73 | 303,08 | 471,47 |
| Castellbisbal | 94,8 | 124,46 | 155,58 | 186,70 | 217,81 | 280,04 | 435,62 |
| Castelldefels | 103,7 | 136,15 | 170,18 | 204,23 | 238,26 | 306,33 | 476,52 |
| Cerdanyola del Vallès | 101,3 | 133,00 | 166,24 | 199,50 | 232,75 | 299,24 | 465,49 |
| Cornellà de Llobregat | 97,3 | 127,75 | 159,68 | 191,62 | 223,56 | 287,42 | 447,11 |
| Esplugues de Llobregat | 97,2 | 127,61 | 159,51 | 191,43 | 223,33 | 287,13 | 446,65 |
| Gavà | 101,4 | 133,13 | 166,41 | 199,70 | 232,98 | 299,54 | 465,95 |
| Hospitalet de Llobregat, L' | 96,8 | 127,09 | 158,86 | 190,64 | 222,41 | 285,95 | 444,82 |
| Molins de Rei | 95,0 | 124,73 | 155,90 | 187,09 | 218,27 | 280,63 | 436,54 |
| Montcada i Reixac | 97,6 | 128,14 | 160,17 | 192,21 | 224,25 | 288,31 | 448,49 |
| Montgat | 98,3 | 129,06 | 161,32 | 193,59 | 225,85 | 290,38 | 451,71 |
| Pallejà | 96,8 | 127,09 | 158,86 | 190,64 | 222,41 | 285,95 | 444,82 |
| Papiol, El | 96,7 | 126,96 | 158,69 | 190,44 | 222,18 | 285,65 | 444,36 |
| Prat de Llobregat, El | 98,6 | 129,45 | 161,81 | 194,18 | 226,54 | 291,26 | 453,09 |
| Ripollet | 96,9 | 127,22 | 159,02 | 190,83 | 222,64 | 286,24 | 445,27 |
| Sant Adrià de Besòs | 100,3 | 131,68 | 164,60 | 197,53 | 230,45 | 296,29 | 460,90 |
| Sant Andreu de la Barca | 99,2 | 130,24 | 162,80 | 195,36 | 227,92 | 293,04 | 455,84 |
| Sant Boi de Llobregat | 100,2 | 131,55 | 164,44 | 197,33 | 230,22 | 295,99 | 460,44 |
| Sant Climent de Llobregat | 99,4 | 130,50 | 163,13 | 195,76 | 228,38 | 293,63 | 456,76 |
| Sant Cugat del Vallès | 106,9 | 140,35 | 175,43 | 210,53 | 245,61 | 315,78 | 491,23 |
| Sant Feliu de Llobregat | 96,4 | 126,56 | 158,20 | 189,85 | 221,49 | 284,77 | 442,98 |
| Sant Joan Despí | 96,7 | 126,96 | 158,69 | 190,44 | 222,18 | 285,65 | 444,36 |
| Sant Just Desvern | 95,9 | 125,91 | 157,38 | 188,87 | 220,34 | 283,29 | 440,68 |
| Sant Vicenç dels Horts | 100,5 | 131,95 | 164,93 | 197,92 | 230,91 | 296,88 | 461,82 |
| Santa Coloma de Cervelló | 101,0 | 132,60 | 165,75 | 198,91 | 232,06 | 298,35 | 464,12 |
| Santa Coloma de Gramenet | 99,8 | 131,03 | 163,78 | 196,55 | 229,30 | 294,81 | 458,60 |
| Tiana | 88,9 | 116,72 | 145,89 | 175,08 | 204,26 | 262,61 | 408,51 |
| Torrelles de Llobregat | 91,8 | 120,52 | 150,65 | 180,79 | 210,92 | 271,18 | 421,84 |
| Viladecans | 99,2 | 130,24 | 162,80 | 195,36 | 227,92 | 293,04 | 455,84 |

**Source: Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009**

### 3.2.5 Country Examples for Unit-pricing Models Based on Volume

In unit-pricing models of waste charges, rates are usually based on either the size of the container or determined by the number of bags put outside for collection. Also, in unit-pricing models, rates can depend only on the volume or take the form of hybrid systems, where the variable component is paid on top of a flat basic charge. As examples for unit-pricing models, where the rate depends on the size of containers, regulations in the cities of San Francisco (USA) and Berlin (Germany) are described below. The City of Frankfurt (Germany) implements a hybrid model, where a charge depending on the size of containers is paid on top of a basic charge. As an example for a "per-bag" charging system, regulations in the City of Argentona (Spain) are explained, where a fee per bag of waste is charged on top of a basic charge.

**USA: City of San Francisco (Unit-pricing Model Depending on Container Size)**

Residential waste in San Francisco is collected in three different containers. One is used for residual waste, one for metals (e.g. aluminum cans), plastic (e.g. bottles, packaging material, etc.), paper and glass and a third one for biodegradable waste. US$27.55 is charged a month for the residual waste container (32 gallons/ca. 120 l). The containers for recycling and biodegradable waste are picked up without charge. If residents can reduce waste, they can get a 20-gallon (ca. 75 l) bin for residual waste for a charge of US$21.21 a month.

**Table 14: Municipal waste charges in San Francisco, United States**

| Bin for | Height of charge |
|---|---|
| • residual waste (32-gallons/ca. 120 l)<br>• recycling (bottles, cans and paper)<br>• biodegradable waste | • US$27.55 (~20 €)<br>• free of charge<br>• free of charge |
| **If user wants to reduce waste:** | |
| • residual waste (20-gallons) | • US$21.21 (~16 €) |

**Germany: City of Berlin (Unit-pricing Model Depending on Container Size)**

In the city of Berlin, the municipal waste management is financed by a charge based on the volume of the waste container. Households can choose between the volumes 60, 120, 240, 660 and 1,100 liters. The costs for a weekly collection of solid waste for the different can sizes add up to 63.50, 75.30, 98.60, 220.80 and 303.80 Euro, respectively. This charge has to be paid quarterly. However, if house owners decide to extent their waste collection frequency to a bi-weekly time interval the charges for the waste containers are lowered by half. The sizes for containers for biodegradable waste vary between 60l, 120l and 240l. Charges for a bi-weekly collection are added to the charges for residual waste. The additional cost are 15.25 Euro, 15.70 Euro and 17.70 Euro, respectively. In Berlin, the *Berliner Stadtreinigungsbetriebe* (BSR), a statutory body owned by the city of Berlin, are in charge of the organization and implementation of waste management. Since 2001, solid waste generation in Berlin shows in a negative direction

**Table 15: Municipal waste charges in Berlin, Germany**

| Containers | Quarterly rates, weekly collection (in Euro) |
|---|---|
| **Residual waste** | |
| 60 l<br>120 l<br>240 l<br>1,100 l | 63.50<br>98.60<br>220.80<br>303.80 |
| **Biodegradable waste** | |
| 60 l<br>120 l<br>240 l | 30.50<br>31.40<br>35.40 |
| If collection interval is extended to a bi-weekly collection the charges are lowered by 50 per cent. | |

**Table 16: Waste generation, revenues from charges, and costs of waste management in Berlin, Germany**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | 905 | 906 | 899 | 887 | 861 | 875 |
| **Change compared to 2004** | 0% | +0.1% | -0.6% | -2.0% | -4.9% | -3.3% |
| **Total revenues from charges (in million Euro)** | 242.1 | 276.5 | 267.4 | 265.0 | 260.8 | 267.7 |
| **Costs of waste management (in million Euro)** | 507.9 | 533.4 | 557.2 | 526.9 | 428.1 | 516.2 |

**Germany: City of Frankfurt (Main) (Hybrid Unit-pricing Model Depending on Container Size)**

The city of Frankfurt collects a variable user charge composed of a flat-rate user charge of 42 Euro per year to cover for basic service provision and a variable charge, depending on the amount of waste collected. The first component is charged on every housing unit or any other form of utilization of a separate facility (e.g. a store or a small business) with a size up to 200 m². For every additional used space of 200 m² the flat-rate is doubled. Among different services the flat-rate covers also the collection of biodegradable waste in an extra container and the collection of paper waste. A deduction from the flat-rate and a removal of the container for biodegradable waste can be requested if proper composting on the own property can be verified. The second component is collected based on the volume of the chosen waste container and the frequency of waste collection. The offered sizes differ in volume, ranging from the minimum size of 80 liters up to 36,000 liters for commercial users. For a weekly collection of a 80 (120, 240, or 770) liter container for residual waste users would pay a monthly charge of 15.40 (23.09, 46.19 or 148.18 Euro) respectively additional to the flat-rate. In Frankfurt no exceptions are made with regards to waste charges for special social environments (e.g. low-income households) or for businesses. The user charges for the waste collection are determined politically through the Waste Charge Ordinance (*Abfallgebührensatzung*), which was last amended in 2005. Any future amendment to the ordinance and corresponding to the rate of waste charges will depend on political majorities.

**Table 17: Municipal waste charges in Frankfurt (Main), Germany**

| Type of charge | Volume of waste bin | Rate (in Euro/month) |
|---|---|---|
| **Basic charge** | | 42.00 |
| **Volume- and frequency-based charge** | 80 l<br>120 l<br>240 l<br>770 l | 15.40<br>23.09<br>46.19<br>148.18 |

Waste management in Frankfurt is run by a semi-public company, the *Frankfurter Entsorgungs- und Service GmbH*, which is owned by the City of Frankfurt and a private shareholder. The charge is collected by the city which covers the costs of waste management. The total amount of solid waste generated in Frankfurt decreased continuously from 2001 (193,414 t) to 2008 (161,484 t). However, in 2009 this trend broke when the total amount of solid waste rose again to 164.334 t. The per capita waste generation showed a similar development. It fell from 300.29 kg/per capita (2001) to 243.44 kg/per capita (2008), while showing an opposite development in 2007.

**Table 18: Waste generation and revenues from charges in Frankfurt (Main), Germany**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | 172 | 169 | 165 | 164 | 161 | 164 |
| **Change compared to 2004** | 0% | -1.7% | -4.1% | -4.7% | -6.4% | -4.7% |
| **Waste generated per capita (in tons/capita)** | 0.263 | 0.260 | 0.249 | 0.251 | 0.243 | n/a |
| **Total revenues from charges (in million Euro)** | n/a | n/a | n/a | 100.8 | 101.5 | 101.9 |

**Spain: City of Argentona (Hybrid Unit-pricing Model Depending on Number of Bags)**

In the beginning of 2010, a volume based variable charge system was launched in Argentona in the Catalonia province, a municipality of about 12,000 inhabitants. Before 2010 a flat-rate user charge of 151 Euro per year was charged per household. Since February 2010 residents pay a variable charge that is made up of two components: a general charge of 95 Euro per year for residents and for commercial activities depending on the businesses category, which is collected by billing; and a variable part charged in the price of the standardized waste bags of obligatory use, both for homes and commercial businesses. Waste is only collected in these standardized bags which carry the logo of the council. Prices are listed below. It is applied for two types of waste with differentiated rates: packaging waste and residual waste. With the new unit-pricing scheme, a household producing an average amount of waste per week (one bag of refuse and one of packaging waste) is expected to pay 147 Euro per year.

**Table 19:Municipal waste charges in Argentona, Spain**

| Type of charge | Bag volume (in liter) | Rate (in Euro) |
|---|---|---|
| **flat user charge (yearly)** | - | 95.00 |
| **standardized waste bags for:** | | |
| - ***Domestic refuse*** | 17 | 0.65 |
| - ***Domestic packaging*** | 35 | 0.35 |
| - ***Commercial refuse*** | 65 | 2.50 |
| - ***Commercial packaging*** | 100 | 1.00 |

Revenues from charges in 2009, when the flat-rate charge was still applied were 912,200 Euro per year. Data for 2010, after the introduction of the unit-pricing system is not yet available. The total costs of waste management services in Argentona in 2009 were 1,367,828 Euro. With the expected reduction of household waste (both residual waste and packaging waste) the City of Argentona is expecting a reduction of treatment costs by approximately 3 per cent. As for waste generation, it decreased by 7 per cent during a three months trial period, ahead of the beginning of implementation. During the implementation period (February-April 2010) waste was reduced 6 per cent. During the trial period standardized bags were given for free by the Council. Since February 2010 a number of shops, who signed a treaty with the Council, sell bags at the rates above.

In 2009, 7,000 tons of wastes were produced in Argentona (over 600 kg/person/year) of which 2,500 tons were incinerated. Few residents and shops made efforts to recycle and reduce waste without receiving any incentive. For this reason the Council decided to promote the adoption of a payment system for waste generation.

**Table 20: Waste generation, revenues from charges, cost of waste management in Argentona, Spain**

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **Total waste generated (in 1,000 tons)** | 6.7 | 6.4 | 6.8 | 6.9 | 6.7 | 7.0 |
| **Change compared to 2004** | 0% | -4.5% | +1.5% | +3.0% | ±0% | +4.5% |
| **Waste generated per capita (in tons/capita)** | 0.600 | 0.583 | 0.610 | 0.606 | 0.583 | 0.600 |
| **Total revenues from charges (in million Euro)** | n/a | n/a | n/a | n/a | n/a | 0.91 |
| **Costs of waste management (in million Euro)** | n/a | n/a | n/a | n/a | n/a | 1.37 |

### 3.2.6 Unit-pricing Models Based on Weight

Weight-based unit-pricing models exist in some German, Swedish, French and US municipalities. For example in Sweden 26 out of 290 municipalities use weight-based models. Systems in operation usually work with scales integrated either in the collection vehicles, which weigh the waste bins before loading the content into the trucks, or in the waste collection containers of apartment buildings, where users have to identify themselves with chip cards or passwords. These systems need advanced digitalized accounting systems as the weight of waste collected needs to be accounted per household and the bills processed accordingly.

## 3.3 Evaluation

### 3.3.1 Environmental Effects

In principle, municipal waste charge schemes that include a variable rate depending on the quantity or weight of the collected waste can set incentives for the minimization of overall waste production or better separation of recyclable materials and biodegradable waste from general household waste. As the examples above show, unit-pricing models are in use in a variety of forms in the countries surveyed for this study. These models have been categorized above in charges on the basis of the size of the collection container, charges based on the volume actually collected or the weight actually collected and as hybrid models of all these types where a flat-charge is collected to cover for basic service costs.

From an economic point of view, the potential of unit-pricing models to reduce the amount of household waste and to increase separated collection depends on the **price elasticity of waste reduction**. Price elasticity is a measure for the magnitude of the behavioral responses to taxes and charges. If after the introduction of an environmentally related tax or charge the price for a certain good or service increases by 10 per cent and, as a result of the higher price, the consumption of the

good or the usage of the service falls by 2 per cent, the price elasticity in this case is -0.2. A study by Fullerton[22] provides an overview over a number of empirical estimates of the price elasticity of household waste generation towards the effects of unit-pricing models of waste charges. The overview is reproduced in table 21. It shows that a change in household waste generation as a result of a price increase is observable where unit-pricing systems have been introduced, albeit at a modest level. Values for price elasticities are given both for overall waste generation and for recycling. The overview shows that positive impacts of unit-pricing schemes were observable in most studies, however to very different extents.

**Table 21: Empirical estimates of the effect of unit-pricing for waste collection adapted from Fullerton (2005)**

| Study | Data | Change in Waste Generation | Change in Recycling |
|---|---|---|---|
| Wertz (1976) | Compares subscription program vs. flat fee | ε = -0.15 | - |
| Jenkins (1993) | Panel of 14 cities (10 with user fee), 1980-88 | ε = -0.12 | - |
| Hong, Adams and Love (1993) | 1990 survey of 4,306 homes in Portland, OR | no significant impact | Positive relationship |
| Reschovsky and Stone (1994) | 1992 mail survey of 1,442 households in and around Ithaca, NY | - | No significant impact |
| Miranda et al. (1994) | Panel of 21 cities over 18 months starting in 1990 | decrease in individual cities between 17 and 74 per cent | Increase of 128 per cent |
| Callan and Thomas (1997) | 1994 cross-section of 324 towns in Massachusetts 55 with unit-pricing programs | - | 6.6-12.1 per cent increase |
| Fullerton and Kinnaman (1996) | Two-period panel of 75 households in 1992 in Charlottesville, VA | ε = -0.076 (weight), or -0.23 (cans) | Cross-price elasticity is 0.073 |
| Van Houtven and Morris (1999) | Monthly panel for 400 households in Marietta, GA, in 1994 | -36 per cent for bags, -14 per cent for cans | No significant impacts |
| Podolsky and Spiegel (1998) | 1992 cross-section of 159 municipalities in New Jersey, 12 with unit-pricing | ε = -0.39 | - |
| Kinnaman and Fullerton (2000) | 1991 cross-section of 959 towns across the US, 114 with unit-pricing | ε = -0.19<br>ε = -0.28 | ε = 0.23<br>ε = 0.22 |
| ε = price elasticity of demand | | | |

[22] Fullerton, Don 2005: An Excise Tax on Municipal Waste? In: Sijbren Cnossen (ed.) 2005: Theory and Practice of Excise Taxation, Oxford, United Kingdom.

Dijkgraaf[23], analyzing various waste collection payment systems in the Netherlands and comparing price elasticities of different systems of unit-price charging found that effects are actually significant. Introducing bag-based collection charges for both unsorted and compostable waste was found to have almost the same impact on total waste amounts as a weight-based system – a reduction of 36 per cent. If compostable waste is collected for free, Dijkgraaf found that the reduction in total waste amount would be much smaller – only 14 per cent. In his model he also integrated a variable correcting the effect that municipalities introducing unit-pricing models are generally characterized by a comparably high degree of environmental activism. Even after this correction elasticities turned out to be significant. His results are reproduced in table 21. His model was refined and the results confirmed in consequent research[24].

**Table 22: Price elasticity of different variable waste collection systems in the Netherlands**

| System | Average price | Total waste | Unsorted waste | Recycled waste |
|---|---|---|---|---|
| Payments according to weight | 4.39 | -0.40 | -0.53 | 0.12 |
| Payments per bag for unsorted waste | 2.15 | -0.07 | -0.58 | 0.09 |
| Payments according to waste volume | 1.94 | -0.00 | 0.01 | -0.03 |

**Source: adapted from Dijkgraaf (2004).**

In a more qualitatively oriented study conducted by Eunomia Research and Consulting analyzing unit-pricing models in continental Europe a significant effect of unit-pricing is also confirmed. The overall quantity of total and unsorted waste is found to decline. But different from the findings of Dijkgraaf, this effect is found to be strongest with weight-based systems, where reductions of 30 per cent and more are reported. In bag-based systems, more moderate reductions of the order five per cent are found to be the norm[25].

Among the municipalities examined for this study, the City of Argentona (Spain) was able to reduce the generation of unsorted waste by 6 per cent over the first months of the implementation of a unit-pricing model based on a flat basic charge in combination with a variable charge paid per bag. Implementation of a weighing system in the city of Detmold (Germany) resulted in a reduction of residual waste by 50 per cent from 1996 to 2004[26]. In Sweden, the changes of some municipalities to a weight-based system led to an average reduction of amounts of unsorted waste of 20 per cent within three to five years[27].

[23] Dijkgraaf, Elbert 2004: Regulating the Dutch Waste Market, PhD Thesis, Research Centre for Economic Policy, Erasmus University of Rotterdam.

[24] Dijkgraaf, Elbert 2008: Environmental Activism and the dynamics of unit-based pricing systems. ftp://zappa.ubvu.vu.nl/20080011.pdf

[25] Eunomia Research and Consulting 2003: Waste Collection: To Charge or not to Charge?

[26] Slavik, Jan 2006: Kommunale Gebühren – deutsche Erfahrungen in der tschechischen Praxis, Köln/Prag; www.ieep.cz/editor/assets/projekty/komunalni_poplatky/bericht.pdf

[27] Dahlén/Lagerkvist 2010: Pay as you throw. Strengths and weaknesses of weight-based billing in household waste collection systems in Sweden.

Price elasticity of specific models of user charges is finally influenced also by a number of practical aspects. **Models where the rate varies according to the size of the container** have the benefit of relatively lower administrative costs. Looking at environmental incentives however, the effects of these systems a comparatively low effect on waste minimization. On the one hand, rates are not directly proportional but rather increase or decrease in relatively large steps, when a decision is taken to get a different size container. Therefore there is no direct link between the amount of waste generated and the actual costs for the household or business. Furthermore the incentive for waste reduction are also comparably low as due to the relatively fixed costs for the waste management service the costs for different sizes of containers do not vary as much as the different sizes do. So it is not that much of a difference whether ordering a small, medium or large container. The dilemma for the municipality is that, apparently, only a high share of fixed fees would ensure that the costs of the system are fully recovered. Additionally, these systems create incentives to get smaller containers to minimize costs and to try to fit as much waste in this container as possible by squeezing it, and thus reducing the volume but not the amount of waste and additionally causing technical problems for the waste collection services as containers with squeezed content are sometimes difficult to empty. In Germany for example, this turned out to be a problem in almost half of the municipalities which introduced a variable charge based on the volume of the container. Some municipalities found a solution to this problem by amending the respective decree and mandating waste management services to exchange the container for a larger one, if the volume did obviously not suffice for the duration of a number of collection intervals (Slavik 2006). Similarly, **systems in which the charge is paid per number of bags** collected have the advantage of being very simple to put in place and to charge. The opportunity to forego the incentive for waste minimization by squeezing the waste does also exist, although to a lesser extent because squeezing is much easier in a hard-plastic container then in a plastic bag. **Weight-based models** have the benefit that they optimally satisfy the "polluter-pays" principle. Additionally, these systems make the relation of waste generation to fee level more transparent and thus set the strongest incentive for waste minimization. At the same time, the accounting for quantities of waste collected is complicated and the necessary equipment for measuring and accounting is costly. Also, with these truly proportional models, revenue volatility is higher and thus revenue prediction more insecure (see below). To a certain degree there is therefore a trade-off between revenue stability and environmental incentives for waste charges.

Another issue that is usually debated in relation with unit-pricing models of waste charges is the problem of "midnight-dumping" or "fly-tipping". Both are terms for **illegal dumping** of waste outside of licensed deposit sites or waste collection systems. It is assumed, that a calculation of waste charges according to the amount of waste put out for official collection creates opportunities for households and businesses to avoid additional costs by disposing of the waste otherwise. However, given its nature, it is hard to find reliable data for this phenomenon. From a statistical point of view, the amounts of waste burned in back-yards and dumped in woods appear in the statistics as successfully reduced overall amounts of waste collected. Some available evidence indicates that problems with midnight dumping have been reported in almost all countries, where unit-pricing schemes have been introduced. However, there is no strong evidence suggesting that this has turned into a significant problem. In the US this was found to be a problem in about 20 per cent of the communities which introduced unit-pricing systems. The problem reportedly disappeared in most cases after a few months given appropriate information and enforcement[28]. This situation was also experienced in Argentona (Spain) where waste was brought to public waste containers after the introduction of

[28] Skumatz, L. 2006: Pay-as-you throw (PAYT) in the US: 2006 Update and analyses

the per-bag payment system. This practice disappeared, however, after an information campaign had been implemented informing citizens that this was illegal. This shows that, from a governance perspective, illegal dumping is strongly related to the capacity and effectiveness of monitoring and enforcement systems, that ensure that the avoiding of waste charges through illegal dumping is detected and fined. From a sociological point of view, the tendency to avoid waste charges by illegal dumping is partly determined by the robustness of norms of environmental protection and cleanliness. Whereas in Japan, there are charging schemes in place, where consumers are asked to pay a recycling-fee upon return of certain products without doubting that they will return it, in other countries in Europe, North or Latin America such schemes would certainly not work for cultural reasons and general attitudes of people.

### 3.3.2 Revenue Generation

Before any environmental concerns, the most important thing a municipality is looking for in waste charges is the generation of revenue to cover the costs of waste management services. From the perspective of the municipality the cost recovery represents a key budgetary aim. In Germany, for example, it is obligatory to recover the costs for waste management by fees (but not more either).

One issue affecting the effectiveness of waste charges to be cost-covering is **revenue volatility**. Different systems of charging citizens for waste management guarantee cost recovery and revenue stability to different degrees. As a general rule it can be said that service-unrelated charges based on relatively stable variables like property, income or members of the household guarantee a low level of revenue volatility. Unit-pricing systems, on the other hand, have a comparatively higher degree of revenue volatility. Establishing an incentive implies a (potentially dynamic) response on the part of householders. However, with unit-price charging systems, the volatility of revenue is linked to the nature of the fee variation. Broadly speaking, it increases with the accuracy of the unit-pricing mechanisms. While it is comparably low for systems where different rates are charged on a subscription basis for different sized containers (because revenue only changes, when a household gets a new container) it is comparably higher for systems where the exact volume or weight is charged, because the revenue may vary with every collection-round. Additionally, revenue stability can be linked to the nature of payment mechanism. For example, pre-paid bags systems were reported to result in unsteady revenue streams for the municipality because customers may purchase large numbers of bags at one time.

This means that the proportion of the overall cost of service provision which is to be met through **fixed and variable elements** has to be given serious consideration in setting the charge rates. The fixed costs for municipal waste management institutions should at least to a major extent be paid proportionately by all citizens and industry through a flat-rate basic charge, like in the city of Argentona (Spain) or Franfurt/Main (Germany) as described above. Such a basic fee serves several purposes. On the one hand, an obligatory minimum fee is likely to discourage illegal dumping of waste or misuse of cost-free recycling facilities for waste streams not suitable for recycling. In short, a minimum fee discourages escapism from the municipal waste management system. On the other hand, the second important purpose of a minimum fee is the coverage of waste management costs (fix costs). A good mix of fixed and variable parts of waste management fees is essential to provide communities and waste management services with the needed revenues to finance the waste management infrastructure. However, as already mentioned above, here lies a certain trade-off with environmental targets as the best incentives would be achieved by complete proportional charging according to the actual waste generation.

A second issue with influence on the effectiveness of waste charges in recovering costs is **inflation**, which tends to be high in some Latin American countries. The challenge is for waste charges to adequately keep pace with inflation rates to cover costs. A strategy to cope with this is implemented for example in the city of Santiago (Chile) where the waste charges (like other fees and levies) is determined in a special accounting unit, the *Unidad de Fomento* (UF)[29], which is updated regularly to inflation. This way the revenues of the city are able to keep up with inflation.

A third challenge in relation to the cost-recovery of waste charges is the **inclusiveness** of waste charges. Especially in Latin American cities with extensive informal sectors, it is difficult to collect the waste charge from all service users. Beyond informality, inclusiveness of waste charges is challenged by evasiveness and exemptions. In the city of Santiago (Chile) for example, where a flat-rate waste charge is collected that is readjusted each year and adapted to inflation the level of cost-recovery is still just about around 50 per cent[30]. One reason for this large shortfall is the fact that the charge is collected only from those households which are formally registered to pay taxes (which in Santiago are less than 30 per cent of users). A second factor are the exemptions to poor households leading to a situation where around 90,000 households are exempted from the charge. And finally, the fact that no penalties are charged, when the waste charge is not paid, leads to a large incidence of charge evasion. A rare exception among Latin American Megacities seems to be Rio de Janeiro where COMLURB, a semi-autonomous waste management operator seems to operate on a self-sufficient basis. The *taxa de lixo* raised R$ 2986 millions and only covers 36 per cent of the operating costs of the company but COMLURB has the autonomy to oversee and charge private contractors[31] as well as large waste producers for collection and disposal.

### 3.3.3 Social Effects

Waste charges, except for those based on household income or property value, tend to be regressive, meaning that the proportion of income that households have to pay becomes smaller with increasing income. This is obviously true for flat-rate user charges, but also for unit-pricing models of waste charges. On the one hand, the amount of waste generated, broadly speaking, is a function of household income. The more income, the higher the consumption and accordingly the amount of waste generated and the waste charge due. On the other hand, poorer households spend a larger proportion of their income on consumption compared to households with higher income. Consequently, the consumption of households (and hence their waste generation) does not increase at the same rate as their income does. Additionally, unit-pricing systems, which try to approximate the rates of the charges to the actual costs depending on the service area (e.g. the Colombian case) may lead to a situation, where poorer households pay a greater proportion of their income, than households with higher income, because the actual costs of waste collection in poorer parts of town tend to be more expensive. Costs vary with settlement patterns, road conditions and traffic levels. Poor households have smaller quantities of waste in containers that are more difficult to gather and load than those found in wealthy neighborhoods. Hence, if waste charges are determined as an approximation of actual costs for waste management in specific service areas, the regressive effect may be enforced, or – seen differently – be justified to some more extent. Accordingly, there is some trade off between

[29] For current values see: http://valoruf.cl.

[30] CONAMA 2005: Política de gestión integral de residuos urbanos.

[31] Leite/Monteiro 2003: Rio De Janeiro's Improvement Of Its Urban Trash And Garbage Services.

the fairness of the polluter-pays principle, which is implemented with unit-pricing waste charge models on the one hand and social fairness on the other.

In this vein, in France for example (where the REOM is based on the amount of waste produced, while the TEOM is linked to the rental value) a transition from TEOM to REOM may be accompanied by a substantial transfer of tax burden among households. Certain households will pay more under the REOM even if they already sorted their waste under the TEOM. For these users the difference in the contribution before and after the incentive pricing is mainly due to the low rental values of the homes. This is particularly the case when taking into consideration social housing and old buildings downtown. Other households will pay less under the REOM than under the TEOM. This will be the case for households that decrease their waste substantially or households that live in homes with a high rental value.

Hence, there are two options for cushioning the regressive effect of flat-rate or unit-pricing models of waste charges. One is the inclusion of a "solidarity element" also in those schemes which are not based on income or property value, like for example in the Colombian case. In Colombia, the calculation of the charge takes into account the economical differences of households and uses subsidies and contributions to redistribute the cost of the waste collection services. A distinction is made between six socio-economic groups as well as commercial, industrial and institutional (official) users. This system is not only applied for waste charges but in various areas of the Colombian tax and public services system (see above). Such solutions are supported in a report by Eunomia (2003): "The aim should not be to address problems of income distribution through the unit-pricing system itself, but through existing tools and mechanisms designed specifically to address income distribution". Nevertheless, a second best option is to include reduced rates and exemption in the unit-pricing scheme.

### 3.3.4 Administrative Costs

Different models of charges for municipal waste management are connected with different levels of administrative and technical burdens for the municipalities in relation to collection, accounting and billing. Generally speaking, flat-rate charges are associated with the lowest administrative costs (e.g. tax and data collection, monitoring, etc.). Usually, no identification of individual users is necessary and charges are raised together with other levies such as the water bill or the income or property tax. The same is true for most models of service-unrelated variable user-charges. The number of persons living in a household, income and value or size of properties are monitored and recorded for other purposes and, hence, the billing for waste charges does not constitute significant additional administrative processes. Higher administrative burdens are associated with unit-pricing models of waste charges, as individual charges have to be determined per household. This implies that records have to be kept for individual households and these have to be billed individually. Among unit-pricing models, those based on a subscription are less complex to handle, while those based on different systems for truly proportional unit-pricing are more complex. Where households subscribe to a specific size of container and have the opportunity to change container size or collection frequency, when they realize potentials for reduction, changes in the subscription are rare. When the amount of waste collected needs to be measured and recorded every time the waste is collected this implies a more administrative effort, even if certainly these systems are implemented with the help of advanced IT systems, which ensure for the process of measuring, accounting and billing to be very little labor-intensive. Additionally, these systems are more costly than subscription systems. Among the systems guaranteeing for proportional unit-pricing, pre-paid bag systems

are relatively easy to administer, simple for users to understand and still provide a strong incentive for customers to reduce waste.

For reasons of administrative effort, complex models which allow for proportional unit-pricing in the US, in Europe and in Japan are usually implemented in medium-size municipalities in the range from 10,000 to 100,000 inhabitants. Smaller municipalities usually do not have the resources to invest in the necessary technology for proportional unit-pricing. For larger municipalities, due to greater population density and according settlement structure, these systems are again more difficult and costly to implement. Exceptions are, once again, pre-paid bag systems, which are implemented also in larger cities, like for example in the city of Kyoto (Japan).

### 3.3.5 Political Acceptance

Waste charges of all types have a potentially high political acceptance among the citizens because waste management services are widely considered a public good. Nevertheless, all types may by confronted with different levels of acceptance and opposition depending on their design, the level of rates and their communication.

Flat-rate user charges or service-unrelated variable charges for waste management have usually been implemented for a longer time, are raised together with other taxes or charges like the income or property tax or the water bill. If their level is not perceived as too high and there are no changes to the charge they are usually hardly noticed. However in these cases, especially in Latin American cities, they do not effectively contribute to cost recovery. Steeply increasing charges (or improving coverage by decreasing exemptions or enforcing payment) is usually associated with high political costs. For example, in the city of Santiago (Chile), authorities are afraid to enforce collection and raise fees. In Brazil there has also been opposition to the introduction of a separate waste charge. Various attempts to levy charges on citizens to raise revenues for waste collection have at times been met with opposition as do all tax impositions. In the case of Brazil the complex legal situation and tax code have been used to make it difficult to impose taxes for generalized services in relation to waste management and at various times the courts have ruled such taxes unconstitutional, although many have now agreed that waste collection can be funded in this way as a definable service.

The introduction of cost covering unit-pricing models, on the other hand, is usually also associated with rising costs for households. Unit-pricing models have a high potential for high political acceptance in comparison to flat-rate charges. In Sweden for example, high acceptance was found among citizens of municipalities, which had introduced weight-based charges in 25 out of 26 municipalities[32]. In the US more than 90 percent of customers are pleased with unit-pricing systems[33]. The reason is that they are generally perceived as a fair and just way to raise revenue for a public good. However, as experience shows, in order to reach such high level of acceptance, the transparency of the system must be considerable and some effort must be made to inform people ahead of the introduction and during the first months of implementation (see Argentona above and findings by Eunomia 2003).

[32] Dahlén, Lisa and Anders Lagerkvist 2010: Pay as you throw. Strengths and weaknesses of weight-based billing in household waste collection systems in Sweden

[33] Menell, P. 2004: An Economic Assessment of Market-Based Approaches to Regulating the Municipal Solid Waste Stream

### 3.3.6 Summary

**Table 23: Short evaluation of municipal waste charges**

| | Flat-rate Charges | Service-unrelated Variable Charges | Unit-pricing Models | | |
|---|---|---|---|---|---|
| | | | Variable Size Container Subscription | Pre-paid bag systems | Proportional Weighing or Measuring Systems |
| **Environmental Effects** | 0 | 0 | + | ++ | ++ |
| **Revenue (Stability)** | + | ++ | -* | -* | --* |
| **Market effects** | | | | | |
| **Social Effects** | - | ++* | - | - | - |
| **Administrative Costs** | ++ | + | + | - | - |
| **Political Acceptance** | + | + | ++ | ++ | ++ |

* Revenue volatility of unit-pricing models may be significantly reduced by implementing hybrid forms of charging, where a fixed basic fee and a variable service fee are combined.
**Very positive social effects IF charges are varying on the basis on income or a proxy thereof.

# 4 LANDFILL TAXES

## 4.1 General Remarks

Landfill is usually the cheapest mode of waste disposal (this is, as long as eventual post-operative treatment or rehabilitation costs are not included) and still the most common one in most OECD countries and by far the most common one in Latin American countries[34]. At the same time, the landfilling of untreated waste is generally the worst option as it is associated with a number of negative environmental and social impacts: emission of greenhouse gases; the danger of leakage of hazardous substances; negative amenity effects for neighboring communities, and negative environmental effects arising from transport:

- Landfills emit two greenhouse gases – carbon dioxide and methane – during the natural decomposition of the solid waste. Davies and Doble estimate that the external marginal cost attributable to greenhouse emissions is $3.27 per compacted ton of waste disposed in landfills without energy recovery (through the use of landfill gas for energy generation) and $2.22 per compacted ton for landfills with energy recovery[35]. In the UK, where landfilling is by far the most common method of waste disposal, landfill sites all over the country produce over 1.5 million tons of methane gas every year, which makes up around a quarter of UK emissions.
- Landfill sites may produce a considerable quantity of leachate fluids that can potentially permeate through the underlying and surrounding geological strata and pollute groundwater.
- Perhaps the main external costs are generated through the nuisance caused by noise, odor, unsightliness and vehicle movements as well as the perceived and actual contamination and pollution arising from such sites. For the UK, a study commissioned by the Department for Environment, Food and Rural Affairs (DEFRA) illustrated the amenity costly to communities living near landfills[36]. As an example it was found that the properties sited within half a mile of a landfill site suffer statistically significant disadvantages: the value of houses situated less than a quarter of a mile away from a landfill site was on average of £5,500 lower than the value of a similar house not situated near a landfill site. For the houses between a quarter of a mile and half a mile from the site, this difference was on average of £1,600. Using assumptions about the number of homes located within close proximity to the landfill, the value of those homes, the quantity of waste deposited per year at the landfill, and the discount rate, DEFRA (2004) estimates the amenity costs to range between $3.05 and $4.39 per compacted ton (virtually all waste entering landfills is compacted by collection trucks) disposed over the lifetime of the landfill.
- Another negative external effect of disposing waste in landfills is created through transportation. Transportation of waste could cause congestion, air pollution and the increased probability of road accidents. Again for the UK, Davies and Doble (2004) estimate these costs to be $0.51 per compacted ton for urban landfills and $1.69 per compacted ton for rural landfills.

[34] OECD Environmental Data 2006-2008. http://www.oecd.org/dataoecd/22/58/41878186.pdf

[35] Davies/Doble 2004: The development and implemention of a landfill tax in the UK

[36] A study to estimate the disamenity costs of landfill in Great Britain. Final Report. DEFRA. http://www.defra.gov.uk/environment/waste/strategy/legislation/landfill/documents/landfill_disamenity.pdf

- Finally, the amount of material deposited also represents an opportunity cost in many ways as the recyclable proportion represents a resource that could be used as industrial raw materials rather than being buried and locked away.

The large amounts of waste being landfilled are a result of a market failure caused by the lack of internalization of these external costs. Environmental and social costs are borne by the general public and the neighboring communities, but not by those actors making decisions about waste disposal like municipalities, waste management services and industrial waste producers. A landfill tax – a levy on the disposal of waste in landfill sites – is a possible strategy to internalize these external effects in the prices for waste disposal. Therefore landfill taxes are generally implemented with the objective to internalize external costs and to create incentives for waste producers and waste management operators to use more environmentally friendly methods of waste disposal, to recover more value from waste, for example through recycling or composting and, ultimately, to reduce waste generation. By imposing taxes on waste disposal, waste recovery (through reuse, recycling or incineration) becomes relatively cheaper. Landfill taxes, accordingly, are environmental incentive taxes, in the typology established in the introduction above, with the objective to change the behavior of producers and/or consumers.

On top of the introduction of a landfill tax, some countries have set different levels of taxation for different waste treatment techniques (mostly landfilling and incineration) according to their environmental soundness. Among the countries surveyed for this report, the United Kingdom, France, Sweden and two Regions in Spain (the *Comunidad de Madrid* and Catalonia) have a landfill tax. Also, a landfill tax is implemented in over 20 states in the United States. In Sweden, France and Catalonia, a tax is additionally levied on incineration with a separate tax rate. An overview is given below in table 23. Experiences with landfill (and incineration taxes) are described are described in the section below.

**Table 24: Disposal type, type of waste, and the appropriation of the revenues in the investigated countries**

| Country/ Region | Disposal Tax on … | Waste Types | Appropriation of Revenues |
|---|---|---|---|
| **France** | Landfill + Incineration | ▪ Household Waste<br>▪ Industrial Waste | Revenue is earmarked for fund to promote the modernization of waste management |
| **Sweden** | Landfill | ▪ Household Waste<br>▪ Industrial Waste<br>▪ Hazardous Waste | General Budget |
| **United Kingdom** | Landfill | All non-hazardous waste types from business and households | General Budget |
| **Catalonia** | Landfill + Incineration | Municipal Solid Waste | Revenue is channeled back to municipalities through fund for improved waste management |
| **Madrid** | Landfill | Only waste that is NOT collected by municipalities | General Budget |

## 4.2 Experiences with Landfill Taxes

### 4.2.1 United Kingdom

In the UK, a landfill tax was introduced in 1999. The tax is collected by landfill operators who operate registered landfill sites and who must also register with the Revenue and Customs Department (Her Majesty's Revenue and Customs – HMRS) . Unless it is specifically exempt, landfill tax applies to all material disposed of as waste, by way of landfill, and at a landfill site that is required to have a license or permit under specific environmental legislation[37]. No tax is due on waste which is subject to processing or sorting in the area of a landfill site prior to the waste being subject to recovery but records must to kept as evidence to show that this has happened. Any material which is deposited at a site which is not subject to a waste management license or permit under environmental law is not liable to tax. Some materials and/or sites are not taxed (e.g. some mining and quarry waste, pet cemeteries etc.) or at lower rates (e.g. certain quarry infill sites).

The purpose of the UK landfill tax as formally stated is firstly "to ensure that landfill waste disposal is properly priced so as to reflect its environmental cost" and secondly "to promote a more sustainable approach to waste management in which less waste is produced and more waste is either reused or has value recovered from it" (HM Customs and Excise 1998).

Rates for 2010/11 are as following: active waste: £48/ton (+VAT); inactive waste: £2.50/ton (+VAT). Broadly speaking, inactive waste is waste that will not degrade further when put into landfill (e.g. rubble), that is it will not dissolve, burn, react chemically, biodegrade or produce any form of pollution or leachate[38]. For the purposes of the tax all other waste is active waste. The tax is collected by HMRC. In order to more rapidly promote the benefits it was looking for and to meet the EU Landfill Directive, the government implemented a landfill escalator: a mechanism whereby the cost of landfilling waste is being steadily increased for active waste but not for inactive waste. The government announced in the Budget 2010 that the rate for active waste will continue to escalate by £8 per year until at least 2014/15, when it will reach £80 per ton. It is intended that this escalator will:

- make investments in alternative non-landfill treatments such as recycling and anaerobic digestion more economically viable
- give waste producers a greater incentive to avoid the burden of increased tax on landfilling through diverting waste from landfill and by using separated waste collection services involving waste auditing and separation of waste at source. These will become relatively cheaper, leaving only residual mixed wastes requiring disposal.

[37] As a general guide to landfill tax see: HMRC Reference Notice LFT1 (July 2010). http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&propertyType=document&id=HMCE_CL_000509

[38] Guidance for waste destined for disposal in landfills. Environment Agency. http://www.environment-agency.gov.uk/static/documents/Business/wacv2_1006008.pdf

**Table 25: Landfill tax rates in the United Kingdom (1996-2015)**

| Year | Tax rate (in Euro/ton) | |
|---|---|---|
| | Active waste (+VAT) | Inactive waste (+VAT) |
| **1996-1998** | 8 | 2 |
| **1999** | 12 | 2 |
| **2000** | 13 | 2 |
| **2001** | 14 | 2 |
| **2002** | 15 | 2 |
| **2003** | 16 | 2 |
| **2004** | 17 | 2 |
| **2005** | 21 | 2 |
| **2006** | 24 | 2 |
| **2007** | 28 | 2 |
| **2008** | 37 | 3 |
| **2009** | 46 | 3 |
| **2010** | 56 | 3 |
| **2011** | 56 | 3 |
| **2012** | 65 | 3 |
| **2013** | 74 | 3 |
| **2014** | 84 | 3 |
| **2015** | 93 | 3 |

The weight will usually be calculated by the use of a weighbridge although if no weighbridge is available then the Customs and Excise may agree an alternative method of calculating the weight of the waste, e.g. the maximum weight that the lorry can carry or estimated volumes of waste converted to weight. The landfill operator will have to account for the tax collected quarterly and keep, records of tax due, any credits of tax or adjustments (where permitted), the tonnage of waste accepted and the rate of tax attributable to that tonnage. Records must be kept for 6 years as with all tax records.

Many of the landfill sites accept household waste and many of these companies are also contracted by councils to run collection and disposal schemes for household waste. Many of these companies are also contracted by businesses to deal with their waste. In this sense landfill operators are also waste management companies dealing with the whole waste management chain from source to final disposal. Some are also involved with recycling. They have arisen to respond to political demand for regulation of waste and its disposal in an ecologically safe manner as possible within the usual economic restraints. They are also able to accommodate the complex regulatory and economic (tax) framework in their *modus operandi*.

If they choose, landfill operators can claim a credit against their Landfill Tax payment if they make a voluntary contribution to an approved Environmental Body under the regulations for the Landfill Communities Fund. The fund specified that they can contribute up to 5.5 per cent of their landfill tax liability to Environmental Bodies, and claim 90 per cent of this contribution as a tax credit in

any financial year. They may bear the remaining 10 per cent themselves, or else an independent third party can make up this 10 per cent difference to the operator. ENTRUST regulates the Landfill Communities Fund (LCF) on behalf of HM Revenue & Customs[39]. The principle of the Landfill Communities Fund is that it offsets some of the negative impacts of living very close to a landfill site. This is done by allowing the operators to pay a proportion of their landfill tax liability to non-profit organizations that deliver benefits to the general public, biodiversity or the environment. The projects funded come under the objectives set out for the fund including: (1) land remediation or restoration; (2) pollution prevention, mitigation or remediation; (3) provision, maintenance or improvement of public parks or amenities, conservation of specific species or habitats, repair, maintenance or restoration of public buildings, provision services between bodies enrolled with ENTRUST.

### 4.2.2 France

In France, a landfill tax is levied on waste disposal since 1993. In 1999 the landfill tax was integrated in the general French pollution tax, the *Taxe Générale sur les Activités Polluantes* (TGAP). In 2009 a parallel tax on incineration was introduced. The landfill tax was introduced with the objective of accomplishing the polluter-pays principle regarding waste production and treatment. Further objectives for the establishment of the landfill tax were, among others, to increase material recycling, to reduce the number of landfill sites and to abolish the 6000 illegal dump sites (in 2002), to improve the environmental standards of landfill sites, and to find new sources of funding to finance waste policy[40].

All persons or legal entities operating a landfill site (whether they have been granted authorization or not) are liable to pay the tax, unless the site is exclusively used for waste generated by their own firm. The operator is the person to whom the prefectural order to operate has been issued. In the case of illegal dump sites, the last person or legal entity to pay any cost relating to the land is considered the operator. But the owner of the land may be taxed if the economic operators cannot be identified. It is then up to the owner to take action against the operator.

The tax is applied to all waste entering landfill sites with prefectural authorization to take such waste. An inventory of illegal sites allows the *Agence de l'Environnement et de la Maîtrise de l'Energie* (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 authorization. All persons or legal entities liable to pay the tax send a notification to ADEME of tonnage delivered along with the tax payment due before the first day of the second month following, i.e. at the end of each quarter or each calendar year. Lastly, ADEME is in charge of checking the declaration and collecting the tax. Should doubt arise as to the accuracy of a declaration or if the need arises for a probative check, ADEME is entitled to readjust the tax.

When the tax was introduced in 1993 rates where 18,29 Euro/t for waste deposited on a not registered landfill site, 9,15 Euro/t for waste deposited on a registered landfill site, and 7,5Euro/t for waste deposited on landfill sites which meet certain environmental standards[41]. In 2009 a rate escalator was introduced: beginning that year 15 Euro/t must be paid for disposal in non-registered land-

[39] ENTRUST http://www.entrust.org.uk/

[40] Gale/Barg/Grillies 1995: Green Budget Reform.

[41] sites with EMAS or ISO 14000 certification.

fill sites, 13 Euro/t for disposal in registered landfill sites and 10 Euro/t for disposal in those sites which meet environmental standards. The rates are foreseen to be raised continuously until 2015. Also in 2009 a new tax on incineration of 7 Euro/t was introduced. This rate will be raised to 14 Euro/t in 2013. The incineration tax was introduced to accomplish the polluter-pays principle for all disposal types and to correct incentives given by a tax only on landfills to increase incineration instead of separation and recycling. The rates are reduced by half (adjusted rate) for facilities with good energy performance (based on the recovery of biogas).

**Table 26: Landfill tax rates in France (1993-2015)**

| Year | TGAP landfill and incineration (in Euro/ton) | | | |
|---|---|---|---|---|
| | Type of waste treatment station | | | |
| | ***Landfill (non-registered)*** | ***Landfill (registered)*** | ***Landfill (registered + environmental standards)*** | ***Incineration**** |
| **1993-2008** | 18.29 | 9.15 | 7.5 | - |
| **2009** | 15 | 13 | 10 | 2-7 |
| **2010** | 20 | 17 | 11 | 2-7 |
| **2011** | 20 | 17 | 11 | 3.2-11.2 |
| **2012** | 30 | 24 | 15 | 3.2-11.2 |
| **2013** | 30 | 24 | 15 | 7-14 |
| **2014** | 30 | 24 | 20 | 7-14 |
| **2015** | 40 | 32 | 20 | 7-14 |
| *minimum/maximum value for highest/lowest environmental standards in waste treatment process. | | | | |

The revenues generated by the landfill and incineration tax are earmarked for the Modernization Fund for Waste Management (MFWM) created within ADEME. The money is used to promote innovative means of waste treatment, to finance the upgrading of landfills, and to restore contaminated sites. The fund is managed by the Chair of the agency's board of directors and supported by a representative of each of the Ministries concerned (Environment, Economy, Finance, Research, Industry, Health, Territorial Authorities), eight representatives of the territorial authorities (at regional, *département* and *commune* levels) and seven qualified experts including two from environmental protection organizations.

The "*Grenelle Environement*" 2007 (an open multi-party debate bringing together representatives of national and local goverment, industry, civil society, etc.) decided to establish an 5 year action plan on waste administration. The objectives are:

- To reduce the production of household and assimilated waste by 7 per cent per capita
- To increase the recycling rate of organic and solid household waste to 35 per cent in 2012 and to 45 per cent in 2015. For industrial waste and household packaging waste, the recycling rate is supposed to be at 75 per cent in 2012.
- Decrease the quantities of waste being incinerated or stored by 15 per cent

The actions of the plan require extensive funding. The amount needed was estimated at approximately 7 Billion Euro in the period of 2009-2015. In this context, the progressive increase of the TGAP which was voted for in the budget law in 2009, was intended to provide additional funding.

### 4.2.3 Sweden

In Sweden, a landfill tax is raised since January 2000. As in France and the UK landfill site operators are responsible for transferring the tax to the authorities. Municipalities or disposal contractors pay the tax to operators upon delivery at the landfill site. The standard rate in 2000 was SEK 250 (approx. 27 Euro) per ton. In 2002, the rate was increased to SEK 288 and simultaneously requirements concerning the separation of combustible waste and a ban on dumping separated combustible waste entered into force. In 2003, the tax rate was further increased to SEK 370 (approx. 40 Euro) per ton. The aim is to halve the amount of waste landfilled by 2005 from 1994 levels.

**Table 27: Landfill tax rates in Sweden (2000-2006)**

| Year | Tax rate (in Euro/ton) |
|---|---|
| **2000-2001** | 27 |
| **2002** | 32 |
| **2003-2005** | 40 |
| **2006** | 48 |

### 4.2.4 Spain – Catalonia

Since January 2004, the *Comunidad Autónoma Catalunya* raises a tax both on landfill depositing and on incineration. The tax is charged for landfilling and incineration of all municipal waste. The respective legislative decree 1/2009 defines as municipal waste all waste generated in private households, shops, offices and services, also, all waste proceeding from cleaning activities in public areas, streets, green zones and beaches, dead animals, furniture, and construction wastes from minor reparations. The tax is calculated as follows: For landfills: 10 Euro/t. In municipalities where separate waste collection of biowaste does not take place a tax rate of 20 Euro/t applies. For incineration: 5 Euro/t. In municipalities where separate waste collection of biowaste does not take place a tax rate of 15 Euro/t applies. It is paid quarterly.

**Table 28: Landfill and incineration taxes in Catalonia, Spain**

| Type of tax | Separate Biowaste collection | Tax rate (in Euro/ton) |
|---|---|---|
| Landfill tax | yes | 10 |
| | no | 20 |
| Incineration tax | yes | 5 |
| | no | 15 |

The taxpayer is the entity in charge of municipal solid waste. When industries generate waste similar in nature to municipal solid waste, they are also subject to the tax. The taxpayer's substitute is

the operator of the landfill. He submits and signs a tax declaration including all taxable transactions effectuated in the period, including exempted transactions, as well as the necessary data for determining the tax amount accordingly. The substitute of the taxpayer deposits the tax in a fund (*Fons de Gestió de Residus*) managed by the Waste Agency of Catalonia (*Agència de Residus de Catalunya*). According to the law, resources obtained by this tax are destined to the following activities:

- At least 50 per cent to organic waste separate collection
- Waste recovery of other type of materials that reduce waste production
- Treatments to reduce the quantity and improve the quality of landfill refuse
- Environmental education campaigns

Most of these resources are channeled back to the municipalities according to their recycling levels. In 2010, measures that municipalities can instrumented to get money back are the following:

**Table 29: Measures for municipalities to gain back funds in Catalonia, Spain**

| Measure | Unitary value (in Euro/ton) |
|---|---|
| 1.Organic fraction treatment and collection | 33.50 |
| 2.Reduction treatment of the quantity or improvement of quality of refuse destined to controlled landfill | 2.50 |
| 3.Reduction treatment of the quantity or improvement of quality of refuse destined to energetic valorization | 1.25 |
| 4.Selected collection of organic waste[42] | 8.50* |
| 5.Selected collection of paper and cardboard | 3.80 |
| 6.Selected collection in recycling centers | 500 (special waste in small quantities)** |
| * A coefficient is applied to the unitary value according to the size of municipality and the percentage of impurities.<br>** up to a max of 0.38kg/inhabitant | |

**Source: Catalonia Waste Agency, 2009**

### 4.2.5 Spain – Madrid

In Spain, the *Comunidad de Madrid* also charges a landfill tax on solid hazardous and non-hazardous waste including construction and demolition waste. However, different from all other instruments described above, explicitly not on municipal solid waste. Act 6/2003, introducing a tax on waste deposit in public and private landfill as well as its abandonment in non-authorized places, came into force in April 2003. This tax was introduced with a clearly stated environmental objective as quantities of waste sent to landfill were rising steeply. Thus, this tax intends to create incentives for recovery and recycling of materials. The object of taxation is the deposit of waste on public or private land or the abandonment of waste in unauthorized areas of the territory of the *Comunidad de Madrid* (art. 4 of the Act). Waste incineration and the temporary storage of waste are not included.

[42] In case of points 4 and 5, a correction coefficient is applied: 1 for urban municipalities, 1.28 for semi-urban municipalities, 1.50 for rural municipalities.

Additionally, the law provides some exemptions: apart from urban waste managed by the public authorities, also discharges from waste energy recovery such as ashes and slag from waste incineration. The following rates are applied:

**Table 30: Landfill tax rates in Madrid, Spain**

| Type of waste | Tax rate (in Euro/ton) |
|---|---|
| **hazardous** | 10 |
| **non-hazardous** | 7 |
| **from construction and demolition** | 3 |

The taxpayer is the natural or legal person who (1) deposits waste in public or private landfills or (2) abandons waste in non-authorized places. In the first case, the taxpayer's substitute is the owner of the landfill. The landfill operator submits and signs a tax declaration including all taxable transactions effectuated in the period, including exempted transactions, as well as the necessary data for determining the tax amount accordingly. The owner of the landfill is the final responsible for the payment. The operator of the landfill passes on the cost of the tax to the waste producer, either every time the producer leaves its waste in the landfill or in a monthly invoice. Revenues are not earmarked for a particular purpose but directed towards the general budget.

## 4.3 Evaluation

### 4.3.1 Environmental Effects

Landfill taxes are environmental incentive taxes with the objective to change the behavior of producers and/or consumers. The intended environmental effect is to influence individual choices through the price mechanism. By increasing the price for landfill disposal relatively to other methods of waste treatment and disposal, municipalities and waste management operators are incentivezed to opt for increased recycling and reuse. As municipalities and private operators can be expected to pass the additional costs on to the consumer, these are also incentivized to increase waste separation and decrease overall waste generation (if unit-prizing schemes are in place). Accordingly, the environmental effectiveness of landfill taxes is determined by the degree to which they prove to be capable to divert waste streams away from landfill (and incineration) and towards increased recycling. The expected functional chain is that, through the increase in prices for landfill depositing, the relative prices of incineration and especially separated collection and recycling decrease so that the separate collection and recycling of recyclable waste becomes cost efficient for municipalities. Table 30 below provides data for the shares of household waste being landfilled, incinerated and recycled in the UK, Sweden and France.

**Table 31: Municipal solid waste (MSW) treatment (in 1,000 tons) and landfill tax rates (in Euro/ton) 1995-2008**

| Country | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **France** | | | | | | | | | | | | | | |
| ***MSW landfilled*** | 12,668 | 13,408 | 13,588 | 13,786 | 13,462 | 13,320 | 13,117 | 12,651 | 11,944 | 11,767 | 11,465 | 12,318 | 12,372 | 12,346 |
| ***Change compared to 1995*** | 0% | +5.8% | +7.3% | +8.8% | +6.3% | +5.1% | +3.5% | -0.1% | -5.7% | -7.1% | -9.5% | -2.8% | -2.3% | -2.5% |
| ***MSW in-cinerated*** | 10,573 | 10,137 | 10,155 | 10,036 | 10,148 | 10,246 | 10,677 | 11,110 | 10,662 | 11,284 | 12,004 | 11,283 | 11,202 | 11,033 |
| ***Change compared to 1995*** | 0% | -4.1% | -4.0% | -5.1% | -4.0% | -3.1% | +1.0% | +5.1% | +0.8% | +6.7% | +13.5% | +6.7% | +5.9% | +4.4% |
| ***MSW re-cycled*** | 2,481 | 2,653 | 3,048 | 3,523 | 3,822 | 4,045 | 4,410 | 4,715 | 4,725 | 4,970 | 5,365 | 5,661 | 5,964 | 6,095 |
| ***Change compared to 1995*** | 0% | +6.9% | +22.9% | +42.0% | +54.1% | +63.0% | +77.8% | +90.0% | +90.0% | +100.3% | +116.2% | +128.2% | +140.4% | +145.7% |
| ***Landfill tax rate*** | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 | 9.15 |
| **Spain** | | | | | | | | | | | | | | |
| ***MSW landfilled*** | 12,134 | 11,758 | 12,606 | 12,577 | 13,157 | 13,559 | 14,726 | 14,723 | 15,174 | 13,068 | 12,584 | 15,657 | 14,921 | 14,798 |
| ***Change compared to 1995*** | 0% | -3.1% | +3.9% | +3.7% | +8.4% | +11.7% | +21.4% | +21.3% | +25.1% | +7.7% | +3.7% | +29.0% | +23.0% | 22.0% |
| ***MSW in-cinerated*** | 955 | 972 | 1,390 | 1,506 | 1,431 | 1,462 | 1,488 | 1,567 | 1,765 | 1,343 | 1,915 | 2,383 | 2,258 | 2,392 |
| ***Change compared to 1995*** | 0% | +1.8% | +45.5% | +57.7% | +49.8% | +53.1% | +55.8% | +64.1% | +84.8% | +40.6% | +100.5% | +149.5% | +136.4% | +150.5% |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***MSW re-cycled*** | 1,415 | 1,640 | 1,860 | 2,067 | 1,920 | 1,778 | 2,956 | 3,811 | 3,770 | 3,730 | 3,685 | 3,646 | 3,904 | 3,728 |
| ***Change compared*** | 0% | +15.9% | +31.4% | +46.1% | +35.7% | +25.7% | +108.9% | +169.3% | +166.4% | +163.6% | +160.4% | +157.7% | +175.9% | +163.5% |
| **Sweden** | | | | | | | | | | | | | | |
| ***MSW landfilled*** | 1,200 | 1,110 | 1,150 | 1,070 | 960 | 865 | 880 | 825[a)] | 575 | 380 | 210 | 226 | 189 | 140 |
| ***Change compared to 1995*** | 0% | -7.5% | -4.2% | -10.8% | -20.0% | -27.9% | -26.7% | -31.3% | -52.1% | -68.3% | -82.5% | -81.2% | -84.3% | -88.3% |
| ***MSW in-cinerated*** | 1,310 | 1,298 | 1,330 | 1,464 | 1,440 | 1,457 | 1,504 | 1,675 | 1,893 | 1,944 | 2,182 | 2,108 | 2,191 | 2,293 |
| ***Change compared to 1995*** | 0% | -0.9% | +1.5% | +11.8% | +9.9% | +11.2% | +14.8% | +27.9% | +44.5% | +48.4% | +66.6% | +60.9% | +67.3% | +75.0% |
| ***MSW re-cycled*** | 680 | 770 | 855 | 1,011 | 1,050 | 1,090 | 1,130 | 1,295 | 1,350 | 1,460 | 1,570 | 1,680 | 1,738 | 1,658 |
| ***Change compared to 1995*** | 0% | +13.2% | +25.7% | +48.7% | +54.4% | +60.3% | +66.2% | +90.4% | +98.5% | +114.7% | +130.9% | +147.0% | +155.6% | +143.8% |
| ***Landfill tax rate*** | n/a | n/a | n/a | n/a | n/a | 27 | 27 | 32 | 40 | 40 | 40 | 48 | n/a | n/a |

| **United Kingdom** | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***MSW landfilled*** | 23,990 | 25,574 | 26,848 | 26,607 | 27,482 | 27,563 | 27,948 | 27,546 | 26,144 | 25,006 | 22,569 | 21,335 | 19,685 | 18,850 |
| ***Change compared to 1995*** | 0% | +6.6% | +11.9% | +10.9% | +14.6% | +14.9% | +16.5% | +14.8% | +9.0% | +4.2% | -5.9% | -11.1% | -17.9% | -21.4% |
| ***MSW incinerated*** | 2,610 | 2,100[b)] | 1,730 | 2,174 | 2,369 | 2,456 | 2,535 | 2,681 | 2,678 | 2,901 | 2,942 | 3,302 | 3,245 | 3,376 |
| ***Change compared to 1995*** | 0% | -19.5% | -33.7% | -2.8% | -9.2% | -5.9% | -2.8% | +2.7% | +2.6% | +11.1% | +12.7% | +26.5% | +24.3% | +29.3% |
| ***MSW recycled*** | 2,020[c)] | 1,922 | 2,265 | 2,763 | 3,421 | 2,836 | 3,181 | 3,733 | 4,698 | 5,657 | 6,362 | 7,107 | 7,680 | 7,850 |
| ***Change compared to 1995*** | 0% | -4.9% | +12.1% | +36.8% | +69.4% | +40.4% | +57.5% | +84.8% | +132.6% | +180.0% | +215.0% | +251.8% | +280.2% | +288.6% |
| ***Landfill tax rate*** | - | 8 | 8 | 8 | 12 | 13 | 14 | 15 | 16 | 17 | 21 | 24 | 28 | 37 |

a) Landfilling of sorted combustible waste is prohibited since 1 January 2002 and landfill of organic waste since 2005 (Source: The Swedish Association of Waste Management (RVF), 2003: Swedish Waste Management 2003).
b) The drop in 1996 is due to the closure of incinerators without energy recovery (because of legislation banning them).
c) Data 1995 to 1999 include composted amounts

**Source: eurostat 2010: http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/introduction.**

In the UK, even though the amount of waste being landfilled remains high, the overall amount has dropped during the time that the landfill tax has been in force. According to Martin and Scott (2003), the landfill tax has had a relatively low impact on the generation and disposal of waste in the UK in its first years. Municipal waste continued to grow at rates exceeding economic growth. Landfill was still relatively cheap in the UK. The main reason for the ineffectiveness has been the incorporation of the landfill tax with other municipal taxes into a flat fee. In terms of encouraging other waste management options, the tax has been too small. Since then, the amount of waste landfilled has further decreased, with 19,685,000t deposited in 2007 and 18,850,000t in 2008, down from 27,482,000t deposited in 1999 when landfill tax had been recently introduced. The recycling rate has also steadily increased during this timeframe from around 6 per cent in 1997 to around 27 per cent in 2007[43]. In France, the amount of waste deposited in landfills has decreased steadily after a peak in 1999, although the reduction has been very slow. Nevertheless, the increase of the recycling rate has been much steeper, which explains why the increase in overall waste generation has at least not led to an increase in landfilling. The tax rate is comparably low in comparison with the UK. In Sweden the amount of waste being landfilled has also decreased significantly, although the most significant decrease can be observed in 2002, when a ban on the landfill disposal of combustible waste was introduced. Nevertheless, it can be observed that waste amounts deposited in landfills has decreased already before 2002, indicating that the landfill tax did have an effect even before. Also in Madrid and in Catalonia, where no consistent data on state specific waste generation and disposal modes was available, there are indications that landfilling is decreasing slightly. However officials believe that in both cases, the tax rates are too low to have a significant effect and would argue for it to be raised in order to create significant incentives.

Overall, a decline of overall amounts of waste being landfilled can be detected in all countries surveyed, which have implemented a landfill tax. Landfill taxes do provide a continued economic incentive for local authorities and large industrial companies to reduce the amount of waste going to landfills. Addressees of the various types of waste taxes are first and foremost municipalities, who decide how the municipal waste will be treated. The municipalities design the waste treatment policy and can set quality standards in their call for tenders by way of public procurement. The citizens then, as waste producers, have influence over waste policy of the respective commune as constituents. Therefore, citizens can exert pressure on their communal representatives. In this context, it is important that rates are predictable and their increase is known for a long time in advance (as is the case with the long-term escalator models which are implemented in the UK and France). This allows municipalities and businesses to make strategic choices that might improve their overall cost of waste management. It also gives them enough time to build up the necessary infrastructure in order to process waste not as landfill or incineration.

But also short-term effects are possible. In Catalonia it could be observed that some municipalities, which had until then not set up public containers for the collection of recyclable materials, did so in a direct reaction to the introduction of the landfill and incineration tax. However, except for specific examples like these it is complicated to differentiate the specific effect of the landfill tax from the effects of other policy instruments implemented in parallel in the different countries. All countries that have introduced high landfill taxes also apply bans or other restrictions on landfilling, which makes isolation of landfill taxes as a factor behind the decrease in landfilling problematic. However, turning it the other way round, embedding a landfill tax in a mix of policy instruments that promote

[43] UK waste & recycling statistics at recycle-more.co.uk (quoting DEFRA). http://www.recycle-more.co.uk/nav/page2128.aspx

prevention and recycling seems to be important effective element of a policy mix addressing the increasing amounts of waste being landfilled.

### 4.3.2 Revenue Generation

Revenues generated by the landfill tax are not huge compared to other environmental incentive taxes like for example energy levies. The highest revenue was generated in the UK, where the largest part of waste is landfilled and the tax rate is comparably high. Between 2005 and 2008, the landfill tax in the UK raised more than 1 billion Euros (see table 33 below). The proportion of landfill tax revenue in the countries surveyed ranged between 0.03 per cent in Sweden and 0.22 per cent in the UK (see table 32 below).

**Table 32: Revenue generated from the landfill taxes and its percentage of the overall national tax income in 2008**

| Country | Landfill tax revenue (in 1,000 Euro) | Total national tax revenue (in billion Euro) | Percentage of landfill tax of the national tax revenues |
|---|---|---|---|
| | 2008 | | |
| France | n/a | 524.0 | n/a |
| Sweden | 34,930 | 117.7 | 0.03 |
| United Kingdom | 1,216,313 | 555.0 | 0.22 |
| Catalonia | 33,101 | n/a | n/a |
| Madrid | 9,000 | 16.6 | 0.05 |

**Table 33: Revenues from landfill taxes (in 1,000 Euro)**

| Country | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|
| France | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Sweden | 99,003 | 97,735 | 79,929 | 79,315 | 69,490 | 65,911 | 34,929 | 21,608 |
| United Kingdom | 863,860 | 883,991 | 992,892 | 1,068,876 | 1,177,274 | 1,286,096 | 1,216,313 | 937,426 |
| Catalonia | n/a | n/a | n/a | n/a | 32,953 | 31,530 | 33,101 | n/a |
| Madrid | n/a | n/a | n/a | n/a | 5,000 | 12,000 | 9,000 | 9,000 |

The revenue from landfill taxes is appropriated differently in the countries surveyed. In the UK, government has a tendency to regard the landfill as a revenue generation tool independent of the objective of reducing waste. Even though there has been a significant reduction of the taxable amount of waste being landfilled over the last years, this has been at least partially balanced by the landfill tax escalator[44]. Also, in Sweden and Catalonia, revenues from the landfill tax are not earmarked but go to the general budget. In France, revenues generated by the landfill and incineration tax are earmarked for a "Modernization Fund for Waste Management" (MFWM). The objective of this fund is to promote innovative means of waste treatment, to finance the upgrading of landfills, and to restore contaminated sites. Similarly, in Catalonia revenue is appropriated to a Waste Management Fund (*Fons de Gestió de Residus*) managed by the Waste Agency of Catalonia (*Agència de Residus de*

[44] Hogg/Baddeley/Montag 2008: Impact Assessment of the Landfill Tax Escalator.

*Catalunya*). This fund channels the largest part of revenues back to the municipalities as an incentive to increase separation and recycling efforts. Municipalities receive a pre-determined sum per amount of organic waste collected separately and treated, of waste separated for energetic combustion, etc. (see above for details). This way 99.6 per cent (2008) of the revenue from the landfill and incineration tax are channeled back to the municipalities and the provincial government retains only the remaining 0.4 per cent.

### 4.3.3 Market effects

Landfill tax costs are generally assumed to be passed on to the consumer either through the municipal waste charges or through increased prices as businesses pass on costs associated with waste disposal to consumers. This has a certain logic as the tax is intended to encourage the reduction in the amount of waste sent to landfill. However, for this mechanism to have the (desired) effect on households and commercial businesses to create an incentive for waste reduction, a unit-pricing system needs to be in place in the community. Alternatively or additionally, councils could make explicit to householders the amount of money they pay to landfill household waste.

In some of the countries observed, mainly in the UK and in France, the introduction of the landfill taxes has been accompanied by increasing market concentration in the landfill sector. Most landfill sites in the UK are now operated by large companies which also operate internationally[45]. Similarly in France. However, it seems this has more to do with the increasing complexity of regulations and standards applied to landfill sites and their operation, which have been implemented alongside the landfill taxes, rather than with the implementation of the tax itself.

### 4.3.4 Social Effects

As already explained above, landfill tax costs are passed on to the consumer either through the municipal waste charges or through increased prices as businesses pass on costs associated with waste disposal to consumers. This means, that landfill taxes slightly increase the costs of consumer products. However, due to their comparably low rate, this effect is not significant.

Nevertheless, in the UK (which has introduced the highest rates on landfilling in Europe) the introduction of the landfill tax was accompanied by a wider move in the direction of a holistic Environmental Fiscal Reform (EFR). At the time that landfill tax was introduced employers' National Insurance contributions were reduced to offset the cost to them and with the aim of making the overall tax burden similar but shifting the focus from labor to waste disposal.

Also in the UK, a Landfill Communities Fund was created, which has a direct social objective. Landfill operators can deduce money that they transfer to the Landfill Communities Fund partly from their tax burden from the landfill tax. This fund promotes projects in communities affected, or reasonably seen to be affected, by landfill operations. Many funded projects have the direct effect of promoting social objectives in these communities[46].

[45] List of Registered Landfill Site Operators. HMRC: http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&id=HMCE_PROD_009941&propertyType=document

[46] Statistics on Landfill Community Fund. Entrust. http://www.entrust.org.uk/home/facts-and-figures

### 4.3.5 Administrative Costs

Like most environmental levies, the administrative costs associated with the implementation of landfill taxes are low – especially compared to the potential costs of enforcing regulation that could pursue the same objective. This is due to the fact that tax or customs departments need to control only the limited number of landfill operators to monitor the correct payment of charges, and not the innumerable amount of waste producers. This is, of course, slightly more problematic in the case of illegal dumpsites. However, France for example has facilitated the taxation of illegal dumpsites somewhat, by holding the owner of the land ultimately responsible in the case the economic operators cannot be identified. It is then up to the owner to take action against the operator.

Perhaps the largest administrative problem with collection of landfill taxes are the mixed nature of much waste coming onto landfills. However this has been solved in most countries with the provision of a number of acceptable proxy measures for weights of waste brought onto landfill sites including (for example) methods of converting volumes of household waste into tons.

### 4.3.6 Political Acceptance

In those countries where the landfill tax is implemented, the tax is widely accepted. Plans to raise the rates over the coming years are not questioned either. This acceptance was and is facilitated by the fact that in all countries where is has been implemented, public awareness that the extensive landfilling of waste was reaching problematic dimensions. Also, with the landfill tax, the government faces few interlocutors, since the tax is paid by the landfill operators and not directly by municipalities or the industry.

Illegal dumping of waste, of course, cannot be impeded by this tax scheme. However, the landfill tax does not necessarily encourage illegal dumping (at least not more than the regular costs for landfill depositing) because the landfill tax can be passed on to consumers through the general waste fees.

### 4.3.7 Summary

**Table 34: Short evaluation of the effects of landfill taxes**

| | Landfill Taxes |
|---|---|
| **Environmental Effects** | + |
| **Revenue** | + |
| **Market Effects** | **0** |
| **Social Effects** | **0*** |
| **Administrative Costs** | ++ |
| **Political Acceptance** | ++ |

***** The neutrality of the social effects is only achieved if the landfill tax is included in a wider scheme of Environmental Fiscal Reform, like for example in the UK, where insurance contributions were lowered at the time of introduction. Otherwise the social effects will be slightly negative as the tax will slightly increase consumer prices.

# 5 LANDFILL ALLOWANCES TRADING SCHEME

## 5.1 General Remarks

As described in chapter 4, landfill disposal is generally the least preferable mode of waste disposal, because of the problematic effects of emissions, potential leakage, amenity costs for neighboring communities and transport, as well as the fact that the resources deposited in landfills are lost to the material cycle. While the landfill tax addresses these problems by internalizing the negative external effect and by creating incentives to divert waste streams to other modes of treatment and recycling, another possibility is to address this problem through a trading scheme. Trading schemes establish a maximum level for a certain polluting behavior (most commonly emissions of specific pollutants) and distribute "pollution rights" in the form of certificates among market participants, which entitle the holder to a defined amount of pollution. Certificates may then be traded among market participants so that a market price will be established for "pollution rights" and pollution reducing effort will then be made at the economically most efficient places. This mechanism can also be applied to waste disposal in landfills, by establishing a maximum amount of (a specific type of) waste that may be deposited in landfills and distributing certificates among market participants that entitles them to dispose a certain amount of waste in landfills. The UK has introduced a certificate trading mechanism for biodegradable municipal waste (BMW) in order to reduce negative environmental effects associated with landfill disposal of BMW and allow for flexibility. This model is uniquely implemented in the UK to date.

## 5.2 Experience with the Landfill Allowances Scheme

The Landfill Allowances and Trading Scheme (LATS) sets a limit on the amount of biodegradable municipal waste (BMW)[47] that each waste disposal authority in England can send to landfill. The aim of the scheme is to reduce the amount of biodegradable waste material sent to landfill.

The scheme allocates tradable landfill allowances to each Waste Disposal Authority (WDA) (normally county councils or unitary authorities[48]) in England. Landfill allowances have been allocated to the authorities at a level that will allow England to meet its contribution to the UK targets under the Landfill Directive of the European Commission. Each year, authorities are able to landfill BMW up to the level of allowances held. Allocations for allowances are made according to each WDA's percentage contribution to the total waste in the base year 2001/2002. The actual allocation is calculated using this percentage applied to the maximum amount of BMW that can be sent to landfills from England in the target years (2009/10, 2012/13 and 2019/20)[49]. The scheme only operates in England and the devolved authorities in Wales, Scotland and Northern Ireland have made other ar-

[47] Guidance on the Landfill Allowance Schemes: Municipal Waste. revised June 2006. DEFRA. http://www.defra.gov.uk/environment/waste/localauth/lats/documents/lats-municipalwasteguidance.pdf

[48] Waste Disposal Authority Register. LATS Public Register held by DEFRA. http://lats.defra.gov.uk/Default.aspx?Menu=register&Module=publicRegister/wdaRegister

[49] The Landfill Allowance Trading Scheme (Lats). Allocation Of Allowances. DEFRA. http://www.defra.gov.uk/environment/waste/localauth/lats/documents/latsfaq-03.pdf

rangements to reduce BMW going into landfill. For example the Landfill Allowance Scheme in Wales sets targets for reduction of BMW going to landfill but does not operate a trading scheme.

WDAs need to ensure that they hold sufficient allowances to cover the actual amount of BMW they intend to landfill over a given period. Should an authority not need or expect not to need all of its allowances in one or more scheme years, because of actual or planned diversion of biowaste away from landfill, the authority can sell them, or bank (save) them into the following year. An authority which does not hold enough allowances to cover the amount of BMW it intends to landfill would need either to increase its rate of diversion, purchase additional allowances or borrow forward up to 5 per cent of its following year's allocation. Local authorities do not have to trade allowances provided they do not exceed their limit on the amount of BMW they may send to landfill. Authorities can choose to meet their targets through diversion alone. Similarly, authorities may wish to co-operate to meet their targets. Unlimited banking is allowed between target years but allowances cannot be banked out of a target year or the year preceding a target year (e.g. 2009/10 is the first target year and councils will not be allowed to carry over accumulated allowances into the 2010 – 2013 period). Authorities are able to borrow up to 5 per cent of the next year's allowance, although allowances cannot be borrowed into the target year or the year preceding a target year as this may cause England as a whole to breach its target. The effect of banking in non-target years is to increase the surplus of allowances available until they are removed from the scheme in the year before a target year.

To work out how much biodegradable waste each WDA has landfilled, the Environment Agency calculates the biodegradable component of the municipal solid waste each WDA has sent to landfill. This involves calculating the proportion of biodegradable waste that has been diverted from landfill, based on the information provided by the WDA and assumptions on the proportion of biodegradable waste in different waste types. Waste is categorized according to proportion biodegradability (e.g. these proportions range from card, paper and green waste at 100 per cent, through footwear, furniture and textiles at 50 per cent, to glass, plastic and metal waste at 0 per cent). The amount of BMW the WDA has diverted from landfill is deducted from the total amount of BMW collected. The total BMW is deemed to be 68 per cent of municipal waste collected (and not the total municipal solid waste collected).

BMW can be diverted in various ways. The main methods available are recycling, composting, anaerobic digestion, incineration and gasification/pyrolysis. Some "treatments", e.g. de-watering, do not count as diversion of BMW, as only methods of treatment that actually reduce the impact of emissions from waste contribute towards an authority's diversion. Home composting is also not currently accepted as a method of diverting BMW from landfill as the method of calculating the Mass Balance Calculation can not accommodate this method of diversion.

## 5.3 Evaluation

### 5.3.1 Environmental Effects

Generally speaking, certificate trading schemes are intended to have the environmental effect of establishing a maximum level of the polluting behavior concerned. In the case of the LATS in the UK the intended effect is to establish a cap for the disposal of BMW in landfills. Experience in the UK was, that during the first year of the scheme (2005/6), the total tonnage of biodegradable waste that could be landfilled in England was 15,196,000 tons and the calculated amount that was landfilled

was given as 12,386,666 tons, or 18.5 per cent less BMW than was allocated to waste disposal authorities[50]. 2008/09 was the fourth year of the scheme and the latest year for which detailed statistics are available. In 2008/09 waste disposal and local authorities in England landfilled 9,326,167 tons of BMW which was a reduction of over 1.2 million tons from the previous year (2007/08)[51]. England now landfills 40 per cent less BMW than it did in 2001/02 and DEFRA considers that since the beginning of the scheme in 2005/06, LATS has helped to divert over three million tons of biodegradable waste away from landfill.

The landfill tax escalator (as explained above) could render the LATS increasingly irrelevant as the cost of landfill is rising rapidly providing a clear incentive to divert waste from landfill even in the absence of LATS (the landfill tax rate for active waste will rise by £8 a ton on April 1 each year from 1998 up to £72/ton in 2013). This is reflected in the low prices currently being obtained for traded allowances (considerably below £1 per ton). Many councils would argue that it is best to concentrate resources on diversion rather than the complex procedures required for trading and saving allowances but others argue that it is a necessary compliment to the landfill tax and will be seen as valuable in the medium to long term.

The scheme would appear to be successful because no authority has been fined to date and all have met their allowances. However the low price and demand for tradable allowances would indicate that authorities are finding other ways to divert BMW from landfill. It is unclear if this is related to the Landfill escalator or to LATS or to a combination of the two instruments.

### 5.3.2 Revenue Generation

Certificate trading schemes in general can have a revenue effect if permits are auctioned and market participants have to pay a price for receiving the "pollution right". If certificates are auctioned, the state may use the revenue either for the general budget or earmark revenues for specific (environmental) purposes. If certificates are distributed for free, they are still traded among market participants so that a market price for the specific "pollution right" will be established. However, in these cases trading schemes have no revenue effect. As in the UK permits are distributed to WDAs for free and not sold or auctioned, there is no revenue generated by the LATS.

### 5.3.3 Market Effects

The costs of the scheme are borne by the WDAs but it is assumed that they will pass these costs onto their clients/customers (mainly householders through the council tax). Banking and trading of allowances is taking place. Allowances are being traded between authorities but allowance prices are kept confidential. In order to promote development of the market, nominated WDA users of the LATS Register are able to view a list of anonymous historic trades displaying the year the trade relates to, the number of allowances sold and the value of the trade. The market demand and price for allowances therefore seems to be low at the moment and many WDAs are facing writing them off. Future demand is uncertain as the scheme is experiencing the first target year (2009/2010) when allowances will be effectively removed from the scheme and the inability to bank or borrow around the target year will put a very different complexion on the situation.

---

[50] Report on the Landfill Allowances and Trading Scheme (LATS) 2005/6. Version 3. Environment Agency. November 2006. http://publications.environment-agency.gov.uk/pdf/GEHO1106BLQM-e-e.pdf

[51] Landfill Allowances and Trading Scheme results. 2008/09. (2007/08, 2006/07, 2005/06 also available on same website). Environment Agency. http://www.environment-agency.gov.uk/business/topics/waste/38989.aspx

LATS has some loopholes in so far private contractors are concerned who are not necessarily registered for the scheme. For instance, many waste collection authorities have reviewed their charging scheme for collecting food waste from restaurants, public houses and other food establishments. In those cases where the costs of local authority collection have increased, businesses may have opted to rely on private contractors instead. In these circumstances, the waste would continue to be sent to landfill, but would no longer appear on the local waste collection authority's figures. Any financial incentive to divert food waste from municipal collection to private contractors instead will depend on the scale of the landfill tax escalator (see above). This anomaly in the rules of the Landfill Allowance Trading Scheme could distort reported figures on the tonnage of municipal biodegradable waste sent to landfill and lead to inconsistencies across the country.

### 5.3.4 Social Effects

The costs of the scheme are borne by the WDAs but it is assumed that they pass these costs onto their clients/customer. As in the UK, there are usually no user charges for waste management services but costs are covered from the general municipal tax revenue, the costs will have to be borne by the citizens through their council taxes. This means that in principle, the LATS has a regressive effect. However, given the low administrative costs (see below), this effect can be considered negligible.

### 5.3.5 Administrative Costs

Under the scheme the landfill operators need to record the amount of municipal waste they accept and which waste disposal authority it has come from. The government considers this to be a "minor administrative task" on top of existing reporting requirements adding around 5 pence per ton adding up to a total of around £150,000 additional administrative costs each year across the whole of the UK[52].

### 5.3.6 Political Acceptance

The LATS seems to be widely accepted by municipalities and the general public, although there is some doubt as to whether the scheme will be necessary in the future as an additional instrument next to the landfill tax given the rising landfill tax rate and its increasing pressure on diversion.

### 5.3.7 Summary

**Table 35: Short evaluation of the effects of Landfill-Allowances-Trading-Schemes**

| | Landfill Allowances Trading Scheme |
|---|---|
| **Environmental Effects** | **+** |
| **Revenue** | **0** |
| **Market Effects** | **0** |
| **Social Effects** | **-** |
| **Administrative Costs** | **++** |
| **Political Acceptance** | **+** |

[52] Landfill Allowances. Letsrecycle.com. http://www.letsrecycle.com/legislation/landfill/allowances.html

# 6 ECONOMIC INSTRUMENTS SUPPORTING EXTENDED PRODUCER RESPONSIBILITY (EPR) POLICIES

Extended Producer Responsibility (EPR) aims to reduce the economic and environmental costs of waste management by extending the responsibility of producers for their products (including its packaging) to include the full social and environmental costs of waste management after the end of their useful life. OECD defines EPR as "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle"[53]. Overall goal of the EPR concept is to force a shift in focus from end-of-pipe approaches to preventive measures, an enhancement of life-cycle thinking, and – more specifically – the attempt to set incentives for producers to incorporate environmental considerations in the design of their products ("Design for Environment" or "DfE"). EPR principles first prominently featured in Germany's "Duales System Deutschland" launched by the packaging industry in reaction to the German Packaging Ordinance of 1991. Since that beginning, EPR policies have been applied to a wide variety of municipal solid wastes, hazardous wastes and special waste streams (especially electronics, batteries and tires) from both the residential and the industrial sector

Extended Producer Responsibility by itself is a command and control approach of policy-making. Through regulation the state holds private companies responsible for its products and orders take-back obligations or minimum recycling quotas, which they must meet. As command and control policy tools, take-back obligations and recycling quotas are not treated in this report. However, in some of the countries surveyed, there are a number of economic instruments in place supporting take-back obligations and recycling quotas, either by creating incentives for a product to be returned or by levying a charge on consumers or producers in order to provide funding for the implementation of collection and recycling. Most prominently these are **Deposit-Refund Systems**, which are implemented for a range of products, but chiefly for beverage, containers in a number of OECD countries. Second, there are so-called **Advanced Recycling Fees** (ARF) levied on consumers upon purchasing certain products and thus charging a contribution to collection and recycling costs after the end of their useful-life.

## 6.1 Deposit-Refund Systems

### 6.1.1 General Remarks

Deposit-refund systems are in place in a number of countries to create incentives for returning products after the end of their useful-lives. These systems can be implemented, where the product or its packaging does keep its integrity throughout its life-cycle and/or where there is a significant risk of illegal dumping even if households face no direct charge for waste collection and disposal, or where the costs of illegal dumping are high (as in the case of toxic products). Most commonly, deposit-refund systems are implemented for bottles, but sometimes also for hazardous products like batteries. The incentive is created by asking customers to pay a deposit when buying the product concerned and refunding them the same amount upon return of the product. The immediate objective of deposit-refund systems is to make sure that valuable materials are not disposed of but incorporated in a recycling or re-use scheme. Apart from encouraging reuse or recycling, an often cited

[53] OECD 2003: Extended Producer Responsibility: A Guidance Manual for Governments

aim in the case of beverage deposits is the reduction of litter and the promotion of recyclable products (glass bottles or rechargeable batteries) as well as providing incentives for consumers to sort and return the recyclables.

Within the logic of this study, which is analyzing economic instruments that can be used as policy tools addressing the waste management sector, for deposit-refund systems similarly to the Advanced Recycling Fees below, a differentiation has to be made between voluntary and stately mandated deposit-refund systems. Voluntary systems, as for example in Chile for beverage containers, are set up by industries as a means of self governance in order to facilitate the meeting of recycling goals established by the state. Stately mandated systems are in place for example in Germany and Sweden for beverage containers and in Germany for car-start batteries. In these systems the state mandates that a deposit-refund system must be implemented and determines the rates and relevant mechanisms.

### 6.1.2 Experiences with Deposit-Refund Systems

**Germany: Deposit-Refund System for Beverage Containers**

In Germany, a deposit-refund system on reusable beverage containers has been in place for a long time. The deposit is passed on from the beverage companies to wholesale and retailers. The retailer sells the beverage including deposit, the consumer then receives a refund upon return of the container. Finally, container and refund are passed down the chain in the other direction. For reusable beverage containers the deposit depends on the size of the bottle and is between 0.08 and 0.15 Euro per item.

An additional deposit refund-system on one-way beverage containers was introduced in 2003. For one-way beverage containers, distributors have to raise a deposit of 0.25 Euros for each container of volumes ranging from 0,1 to 3 liters and take back the bottle from end users in exchange for a refund of the same amount. Containers for fruit-juices, milk and spirits (other than beer) are exempt from this regulation. For collection and recycling, retailers have to make individual contracts with recycling companies. The background of the introduction of this second deposit-refund system for one-way beverage containers was that the German packaging decree (*Verpackungsverordnung*) of 1991 foresees a mandatory deposit to be introduced when the percentage of reusable beverage containers of overall sales drops below 72 per cent. This was the case in 1997 for the first time and did not change in the following year. Consequently, the German government finally introduced the deposit-refund system on one-way beverage containers in 2003. The original mandatory deposit comprised several critical exceptions. Taken into consideration some of the former problems, an amendment came into force in 2006 mandating a deposit of 0.25 Euro on all one-way drinks packaging subject to the mandatory deposit and containing between 0.1 and 3 litres. The objective is, to make one-way bottles less attractive in comparison to reusable bottles as the latter are considered to have a significantly less severe environmental impact.

**Sweden: Deposit-Refund System for Beverage Containers**

In Sweden, a deposit-refund system has been in place for reusable and one-way PET-bottles since 1994. The mechanism of the deposit-refund system is as follows: The bottle-industry mandatorily has to participate in system for reuse and recycling. Producers handle the reuse or recycling of bottles individually. For the management of the deposit-refund scheme, two administrative systems were set up: one for one-way bottles (managed by Retourpack-PET AB), and one for reusable bot-

tles (managed by the Swedish Breweries association). The beverage producers pay a deposit plus a handling fee for each bottle they put on the market to the Retourpack-PET AB or the Swedish Breweries Association, respectively. The retailer buys and sells the bottles including the deposit and collects empty bottles in return for the deposit. The retailer then passes on the collected bottles to the beverage producers in return for the refund, the beverage producer then receives its deposit back from either of the two administrative organizations. Reusable bottles are reused about 20 times on average, with an average turn-over of 3.3 times a year. Single-use PET bottles are recycled and the material reused in the production of new bottles or incinerated[54]. The level of the deposit depends on weight and material. It is 1-2 SEK (0.09-0.18 Euro) for one-way bottles, 4 SEK (0.37 Euro) for reusable bottles. The handling-fee that producers pay to the mandated management organizations are 0.27 SEK (0.02 Euro) for one-way bottles smaller than 1 liter and 0.77 SEK (0.07Euro) for one-way bottles larger than 1 liter, 0.60 SEK (0.06 Euro) for reusable bottles and for colored bottles there is an extra sorting fee of 0.15 SEK (0.01 Euro).

**Germany: Deposit-Refund System for Car-Start Batteries**

In Germany, since 1998, a deposit-refund system is also in place for car-start batteries to support the take-back obligation for producers for these products. The consumer has to pay deposit of 7.50 Euro when buying car battery. Retailers (usually gas stations or car repair services) are obliged to take back the car-start batteries and return the deposit to the consumer. They then pass the used batteries to the disposal-contractors of battery-producers who recycles and/or disposes of the battery.

### 6.1.3 Evaluation

#### 6.1.3.1 Environmental Effects

The objective of deposit-refund systems is to create incentives for consumers to separate and return recyclable products. This way deposit-refund systems aim at supporting the increase of recycling quotas and – as a side-effect – also at reducing the amount of littering. In Germany, in addition to these objectives, an additional objective was the promotion of ecologically advantageous drinks packaging. Concerning the first objective, the German deposit-refund system for singe-use recyclable beverage containers was quite successful. Collection rates are estimated at 93 to 97 per cent[55]. This also contributed to the overall increase of the recycling rate (for all materials) from 47.1 per cent in 1991 to 81 per cent in 2003[56]. However, concerning the second objective, the environmental steering effect has turned out to be inefficient. The mandated introduction of a deposit on single-use recyclable bottles (at a higher rate than that on reusable bottles) was supposed to make reusable packaging alternatives more attractive in comparison with single-use solutions. However, despite the introduction of the deposit the rate of reusable packaging continued to decrease and stood at 44,1 per cent in 2008 (in comparison with slightly below 72 per cent in 1997/1998 which triggered the introduction of the mandatory deposit)[57]. In Sweden, the introduction of the deposit-refund system in 1994 led to increase of the recycling-rate of PET-bottles from 51 per cent in 1994 to almost

[54] Amano 2004: PET-Bottle Systems in Sweden and Japan: an Integrated Analysis from a Life-Cycle Perspective

[55] Umweltbundesamt, 2010: Bewertung der Verpackungsverordnung. Evaluierung der Pfandpflicht. http://www.uMWeltdaten.de/publikationen/fpdf-l/3931.pdf

[56] BMU 2006: Abfallwirtschaft in Deutschland. Motor für Jobs und Innovationen.

[57] Gesellschaft für Verpackungsmarktforschung 2010: Mehrweg-Quoten 2008. http://www.gvm-wiesbaden.de/pdf/infocus/2010-05_EWMW2008_de.pdf

80 per cent in 1995. For bottles holding more than one liter, the recycling rate is 90 per cent, for small bottles this rate is estimated to be lower[58]. For car-start batteries, the collection and recycling rate in Germany is at 95 per cent (in contrast to all other batteries, which are not charged with a deposit, and for which the collection rate is only 30 per cent).

Generally, deposit-refund systems can have a significant impact on collection and recycling rates, if the products or materials concerned are charged with a sufficiently high deposit. For bottles, of course, this does not have to be very high, as long as a certain level of convenience is provided for consumers to return the products.

#### 6.1.3.2 Revenue Generation

Deposit-refund systems are non-revenue instruments. Accordingly, there is no revenue effect for the state.

#### 6.1.3.3 Market effects

In neither Germany nor Sweden, disadvantages for domestic industries are reported. In both countries, imported products are also subject to the obligatory deposit, while no deposit has to be charged on exports. However, in both countries the introduction of the deposit-refund systems have contributed to an acceleration of market-concentration in the beverage retail industry as due to the fact that administrative and handling costs of the deposit-refund systems (which are small but not insignificant) are to be borne by the beverage retailers, large discounters profit from smaller per unit costs (Umweltbundesamt 2010, Amano 2004).

For larger, more expensive products, which are exchanged in greater intervals like car-start batteries, deposit-refund systems have even less effect on competitiveness, because the administrative burdens are proportionally smaller.

#### 6.1.3.4 Social Effects

Since deposit-refund systems are cost neutral for consumers, and the administrative costs for retailers are too small to have significant effects on product prices if passed on to consumers, (negative) social effects of deposit-refund systems are not significant. Anecdotally, it can be mentioned that the introduction of the mandatory deposit on single-use beverage containers in Germany (which makes a relatively high deposit of 0.25 Euro mandatory) has opened up small-scale additional income opportunities for poor people: The presence of people collecting inappropriately discarded bottles in parks and on the streets (comparable almost to the *catadores* in Brazilian cities) has become ubiquous in some larger German cities in the past years (Umweltbundesamt 2010).

#### 6.1.3.5 Administrative Costs

For the public administration, administrative effort are very small and limited to sporadic controls in the retail industry if the mandatory deposit regulations are correctly implemented. The administrative and handling costs of the deposit-refund system itself are borne by the retail industry. In Germany these are estimated to be around 800-980 Million Euro per year for the entire beverage industry (Umweltbundesamt 2010).

[58] Amano 2004: PET-Bottle Systems in Sweden and Japan: an Integrated Analysis from a Life-Cycle Perspective.

#### 6.1.3.6 Political Acceptance

Since deposit-refund systems target specific products, there is the risk of strong lobbying on behalf of the respective waste producer groups. In both Germany and Sweden, the introduction of the mandatory deposit-refund systems for beverage containers has been met by heavy opposition from the retail industry. Especially in Germany, the retail industry launched a public campaign against the "deposit-dictate" and threatened with a collective boycott. After introduction in 2003 in Germany, also the public was very skeptic, because handling was very inconvenient (beverage containers at first could only be returned to those shops where they had been purchased). Public opposition, however, significantly decreased after the ordinance had been amended in 2006 making collection much more convenient for consumers. Today the system is widely accepted in the public. In Sweden, there was initially strong opposition from small beverage companies against plastic-bottles-deposit when only reusable bottles were permitted to market. Companies expected economic advantages for large breweries, due to the high costs of refilling technology. As a reaction one-way plastic-bottles where allowed and integrated into the deposit-refund system. In contrast, the German deposit system for car batteries has never been questioned, since its usefulness has been accepted by the public and the system does not cause any great inconvenience.

#### 6.1.3.7 Summary

**Table 36: Short evaluation of the effects of Advanced Recycling Fees**

| | Deposit-refund Schemes |
|---|---|
| **Environmental Effects** | ++ |
| **Revenue** | **0** |
| **Market effects** | - |
| **Social Effects** | **0** |
| **Administrative Costs** | - |
| **Political Acceptance** | - |

## 6.2 Advanced Recycling Fees

### 6.2.1 General Remarks

As described above Extended Producer Responsibility (EPR) legislation mandates that producers are responsible for products after the end of their useful lives. If mandatory recycling targets are established for the products concerned, this means that producers have to bear the costs for recycling of their products. There are different systems for the organization of the handling of recycling and the distribution of costs for handling and recycling among responsible companies. In most cases this is left to self-regulation among the private sector companies, who may decide to take care of collection and recycling of their own products on their own or who may establish Producer Responsibility Organizations (PRO), which organize collection and recycling for groups of companies and are financed through company contributions. While these solutions do not fall in the ambit of economic instruments because they are a matter of self-regulation and cost distribution among private actors, another different solution is the establishment of so called Advanced Recycling Fees (ARF). ARFs (also sometimes referred to as Advanced Disposal Fees) are fees paid by the consumer on product

sales and used to cover the cost of recycling. ARFs are often assessed per unit of the product sold but can also be assessed on a weight basis. In order to qualify as an economic instrument, their rate must be determined by and the revenue collected by a public authority or a publicly mandated body. The objective of ARFs is to internalize the costs of the recycling of products after the end of their useful lives already in the purchasing price and thus to guarantee that prices better reflect products' life cycle costs. Among the countries surveyed for this report, ARFs can be found in Japan and California. In Japan, ARFs are collected for computers and automobiles. California imposes a uniform advanced disposal fee on all covered electronic products.

### 6.2.2 Experiences with Advanced Recycling Fees

**Japan: Advanced Recycling Fee for End-of-Life Vehicles**

In Japan the "Law for the Recycling of End-of-Life Vehicles" has passed in July 2002 and came into effect in January 2005. The law covers passenger cars and commercial vehicles and requires manufacturers to collect and recycle shredder residue – the residual material remaining after all recycling of metals and other materials – and collect and properly dispose of fluorocarbons and air bags. Materials in vehicles are highly recycled, with overall recycling rates in most countries around 75-80 per cent. However the 20-25 per cent of remaining material – auto shredder residue – is difficult to deal with, sometimes hazardous, and has few secondary uses. EPR regulation on automobiles in Japan and elsewhere is attempting to force manufacturers to deal with this problem. Shredder residue must meet a recycling rate of 30 per cent by 2005, 50 per cent by 2010, and 70 per cent by 2015. To help fund the system, a mandatory ARF is collected from vehicle owners upon purchase of new vehicles or at inspection of already registered vehicles. Fees are determined by manufacturers. They depend on the type of vehicle and should reflect the actual costs of recycling. the government can intervene if fees are considered inappropriate. The "Japan Automobile Recycling Promotion Center", a third party organization, is a mandated body assigned to collect and manage ARFs. Currently the costs for processing fluorocarbons, airbags and shredder residue, and those for fund management and information handling, amounting to 6,000 to 18,000 yen (about U.S.$51-153)[59].

**USA/California: Electronic Waste Recycling Fee**

In California, an ARF on the purchase of video display devices was established with the "Electronic Waste Recycling Act" which came into force in 2005. It has two main objectives: (1) to limit the amount of toxic substances in certain electronic products and (2) to establish a funding system for the collection and recycling of discarded electronic devices. From January 2005, retailers were required to collect a fee of 6, 8 or 10 US$ from consumers upon purchase of video display devices. From January 2009, these fees where raised to 8, 16, and 25 US$. Fees are based on screen size measured diagonally, $8 for screens greater than 4 inches and less than 15 inches, $16 for screens equal to or greater than 15 inches and less than 35 inches, and $25 for 35 inches. The law allows the state to reassess the level of the fee every two years to ensure it pays for the collection and recycling costs of all covered waste electronics products. Retailers transfer the collected fees to the Board of Equalization (BOE), which in turn deposits the money into an account managed by the California

[59] METI (2004): Handbook on Resource Recycling Legislation and Trends in 3R. http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/handbook2004_e.pdf

Integrated Waste Management Board (CIWMB). CIWMB distributes the funds from this account in two ways: (1) as a legally set fixed rate ($0.28/lb for recycling and $0.20/lb for collection), given to approved recyclers, or (2) as a payment equal in value to the ARF paid for the device, given to registered manufacturers that are collecting and recycling. If these recovery or recycling payments do not fully cover costs, collectors and recyclers may charge fees; however, the collector must offer a cost-free collection method even if they charge the consumer for recovery under another method. To be eligible for recovery, recycling, or manufacturer payments, covered electronics must be discarded from households in California. Recyclers must have source documentation to show that covered electronics originated from California. Because covered electronics can come from within the state, outside the state, residential sources, and nonresidential sources or be source-anonymous, collectors are subject to source documentation requirements. Covered electronics intended for reuse are not eligible for recycling payments. To eliminate the possibility of double payment, payment for recycling electronics is possible only with the cancellation methods described in the final regulations. CIWMB can audit approved collectors and recyclers to determine compliance, and they must maintain records on revenues (e.g., fees charged, revenues from commodity sales) and specific costs related to their business. CIWMB will use these reports to adjust future recovery and recycling payment rates. Recyclers must operate in accordance with all federal, state, and local laws.

**Table 37: Revised Electronic Waste Recycling Fee Amount**

| Viewable Screen Size (measured diagonally) | Electronic Waste Recycling Fee | |
|---|---|---|
| > 4 inches and < 15 inches | US$8 | (~6 Euro) |
| ≥ 15 inches and < 35 inches | US$16 | (~12 Euro) |
| ≥ 35 inches | US$25 | (~18 Euro) |

**Source: adapted from California Department of Resources Recycling and Recovery (CalRecycle): 2010, http://www.calrecycle.ca.gov/electronics/act2003/Retailer/Fee.**

### 6.2.3 Evaluation

#### 6.2.3.1 Environmental Effects

As described above, one objective of ARFs is to internalize the costs of the recycling of products after the end of their useful lives and this way to contribute to an increase in recycling and a decrease in landfilling of valuable or hazardous substances. In California for example, electronic waste accounts for about 70 per cent of heavy metals found in municipal landfills[60]. Since its introduction, the California e-waste program seems to have been rather successful in increasing the ratio of recovered and recycled waste: In 2005, the year California's program began, only 64.8 million lbs, or 1.8 lbs capita of e-waste was collected. In 2007, that number had increased to 5 lbs/ capita and currently is thought to be higher[61]. Until now, the California program has helped keep 840 million pounds of monitors and TVs out of landfills.

In Japan, in 2000, before the introduction of EPR legislation, 5 Million vehicles were de-registered every year of which 1 Million were exported and 4 Million were disposed of in Japan. 83 per cent

[60] http://blog.riskmetrics.com/esg/2010/08/e-waste-trade.html

[61] http://www.djc.com/news/en/12021308.html

of end-of-life vehicles where recycled (by weight). With the introduction of EPR legislation and the the recycling of the shredder residue which was facilitated through the introduction of the ARF for vehicles, this rate increased to 94 per cent in 2008. At the same time, however, export of end-of-life vehicles increased from 1 Million in 2000 to 1.5 Million in 2006, while disposal in Japan decreased from 4 Million to 3.5 Million vehicles[62]. The mandatory recycling rate for shredder residue, which was set at 30 per cent in 2005, 50 per cent in 2010 and 70 per cent in 2015, was outperformed by the automobile industry: Toyota and Honda both achieved a recycling rate of 60 per cent already by 2005[63]. This can be interpreted as a good example for the potential of economic instruments to create incentives to go further than just meeting environmental minimal standards.

Another positive effect of the introduction of an ARF on vehicles in Japan was that due to the payment prior to the use of the vehicle, the overall number of illegally dumped vehicles decreased from about 126,000 in 2001 to just 35,000 in 2007[64].

The impact of the ARF on product design was found small in Japan: Because there are only three materials included in the program (ASR, fluorocarbons and airbags), developing more environmentally friendly designs does not make the obligatory part of recycling for manufacturers significantly cheaper. Therefore there is only a very small incentive to improve the product design towards greater recyclability[65]. For California information on the issue of "Design for Environment" was unfortunately not available.

#### 6.2.3.2 Revenue Generation

Since ARFs are raised only to cover for the costs of recycling after the end of a products useful life, the desired outcome is that ARF programs turn out to be revenue-neutral for the state. California's experience with its ARF for electronic waste highlights both the need as well as the difficulty to accurately project costs. During the first 18 months of the program, $109 million were collected, and processors claimed $57.5 million. An estimated $15.7 million went to administration in that period, generating an estimated program surplus of $35.8 million. However, the law specifies that the reserve cannot exceed 5 per cent the total amount in the account. Eventually, the surplus was reduced by continual growth in processor claims until a situation was reached in 2007, when the reserves the state had been collecting through ARFs were depleted, forcing the state to significantly raise the advanced recovery fee. This allows for the conclusion that a reassessment interval and adjustment of the ARF rates should eventually be possible more often than just every two years, as is the case in California, in order to allow for continuous cost recovery.

#### 6.2.3.3 Market effects

Negative competitiveness impacts did not arise in either of the two cases examined for this report where ARFs had been implemented since the fee in both cases is levied on all products sold in the respective markets including imports. Exported goods are exempted.

---

[62] Ministry of Economics of Japan 2009: Establishing a sound material-cycle society - Creating economic development through the establishment of a sound material-cycle society. http://www.env.go.jp/en/wpaper/index.html

[63] http://www.japanfs.org/en/mailmagazine/newsletter/pages/027816.html

[64] Togawa, K. 2007: Japan´s Automotive Recycling System: Evaluation Three Years after Implementation

[65] Togawa, K. 2007: Japan´s Automotive Recycling System: Evaluation Three Years after Implementation

In the Californian case it has been documented that a significant market was created for recycling services, that had not existed to this extent before. In fact, many companies offering recycling services opened up businesses in California after the introduction of the ARF scheme, because conditions were very favorable[66].

#### 6.2.3.4 Social Effects

Through the introduction of ARFs, the cost of recycling is borne by consumers. However, since products which are charged with ARFs in both cases – electronic devices and vehicles – are high-end consumer products, the costs for recycling are borne to the largest extent by the middle class, which makes the social effect of these fees comparably small.

#### 6.2.3.5 Administrative Costs

Management costs of ARF schemes tend to be rather high. In California, revenues generated by the ARFs are divided among BOE, CIWMB, and the Department of Toxics Substances Control (DTSC) to cover management costs. Retailers retain 3 percent of the ARF to cover their costs associated with collecting it. Over the first 18 months of the implementation of the scheme $15.7 million of the $109 million collected had to be paid for management costs. Management costs decreased to $10.5 million in 2006.

#### 6.2.3.6 Political Acceptance

In both cases analyzed for this report the political acceptance for the ARF schemes was unproblematic.

#### 6.2.3.7 Summary

**Table 38: Short evaluation of the effects of Advanced Recycling Fees**

| | Advanced Recycling Fees |
|---|---|
| **Environmental Effects** | + |
| **Revenue** | + |
| **Market Effects** | + |
| **Social Effects** | - |
| **Administrative Costs** | -- |
| **Political Acceptance** | + |

[66] http://www.fresnobee.com/2010/07/18/2010112_p2/californias-pioneering-e-waste.html

# 7 SUMMARY AND RECOMMENDATIONS

The table below recapitulates the short evaluations given to the individual instruments in the evaluations above.

**Table 39: Short Evaluation Summary of Economic Instruments**

| | | Environ. Effect | Revenue Generation | Market effects | Social Effects | Administrative Costs | Political Acceptance |
|---|---|---|---|---|---|---|---|
| Municipal Waste Charges | Flat-rate Charges | 0 | + | 0 | - | ++ | + |
| | Service-unrelated User Charges | 0 | ++ | 0 | ++** | + | + |
| | Container Subscription | + | -* | 0 | - | + | ++ |
| | Pre-paid Bag Systems | ++ | -* | 0 | - | + | ++ |
| | Proportional Weighing or Measuring Systems | ++ | --* | 0 | - | - | ++ |
| | Landfill Taxes | + | + | 0 | - | ++ | ++ |
| | LATS | + | 0 | 0 | - | ++ | + |
| | Deposit-refund Systems | ++ | 0 | - | 0 | - | - |
| | Advanced Recycling Fees | + | + | + | - | -- | + |

* Revenue volatility of unit-pricing models may be significantly reduced by implementing hybrid forms of charging, where a fixed basic fee and a variable service fee are combined.
**Very positive social effects IF charges are varying on the basis on income or a proxy thereof.

## 7.1 Municipal Waste Charges

### 7.1.1 Summary

- As user charges, municipal waste charges are an important contribution to realizing the polluter pays principal and strengthening municipal waste management services.
- Municipal waste charges have the potential to create incentives for waste minimization and better separation if they are implemented as unit-pricing models, where the rate varies with the amount of waste collected by individual household. Generally speaking, the strength of the incentive increases (1) with the rate of the charge, and (2) with the accuracy with which the charge is adapted to the volume collected.
- The most significant impact on waste generation and separated collection is coming from weight-based systems of user charges. However, collection and billing systems needed for weight based charging are comparably complicated and costly.
- Container subscription systems, where households can choose from different size containers create a modest incentive for waste minimization and better separation but are comparably easy to manage.

- A promising model that creates significant incentives for waste reduction and better separation and is comparably easy to manage at the same time is a pre-paid garbage bag model. Pre-paid garbage bag models allow for rather accurate charging by volume and are easy to manage because they do not require elaborated measuring and accounting technologies. Pre-paid bags programs have been successfully implemented in large cities (e.g. Kyoto).
- Midnight-dumping as a form of evasive behavior is expected when introducing unit-pricing models. There is no consistent data of this phenomenon (because it is taking place clandestinely) but there are indications that in most cases where unit-pricing models are introduced it is a temporary phenomenon and can be contained through information campaigns and enforcement. It is also a phenomenon that depends a lot on sociological factors like environmental awareness and the value of tidiness.
- There is a potential trade-off between strong environmental incentive effects of waste charges and the stability of revenues derived from them. The more accurately the charge adapts to the actual amount of waste collected, the more room there is for temporary revenue volatility. This trade-off can partly be overcome by introducing hybrid systems of waste charges, where one component is a flat-rate charge which covers part the structural costs of waste management services and the other a variable part depending on the amount of waste collected. In order to maintain environmental incentives however, the flat-rate charge should not be too high.
- In countries with considerable inflation, waste charges (like other service charges) should be adapted to inflation on a regular basis. A possible model is the *Unidad de Fomento* in Chile. Its value is daily adapted to inflation and rates for the waste charge are specified in this unit.
- Waste charges are regressive in nature as long as they are not based on income or property value. If they are calculated on the basis of actual collection costs for individual neighborhoods like for example in Colombia this may actually lead to situations where the poor pay more for waste collection than the wealthy because waste collection may be more time-consuming and costly in poorer neighborhoods.
- Political acceptance of waste charges is generally high as waste management is widely considered a public good. Nevertheless, there is frequent opposition when charges are raised. Unit-pricing systems have the merit that they offer considerable transparency and are perceived as fair. This points to the fact that, in case charges need to be raised significantly, the introduction of at least some element of unit-pricing promises greater acceptance of the raise.

### 7.1.2 Recommendations

- If there is political will to raise municipal waste management charges in order to strengthen cost-recovery, the introduction of unit-pricing models is favoured as those models not only best realize the polluter-pays principle but also generally enjoy a higher acceptance in comparison with flat- or unrelated variable charges.
- Pre-paid bag models of unit-pricing are comparatively easy to administer and create significant incentives for waste reduction and better separation.
- In order to minimize the risks associated with the potential revenue volatility of unit-pricing models, hybrid systems should be introduced, where a basic charge covers the structural costs of waste management services and an additional variable charge covers the operational service costs.

- In countries with considerable inflation, waste charges (like other service charges) should be adapted to inflation on a regular basis. A possible model is the *Unidad de Fomento* in Chile. Its value is daily adapted to inflation and rates for the waste charge are specified in this unit.
- Waste charges should be complemented by some element to cushion the regressive effects of the charges. In hybrid models, the basic charge can be adjusted to household income or property value. Another option are exemptions for poorer households.

## 7.2 Landfill Tax

### 7.2.1 Summary

- Landfill taxes are an effective instrument to correct market failures and help internalize external costs, which are caused by the dumping of waste through methane emissions, potential leakage of fluids, amenity costs to neighboring communities and increased transport. Through the price signal, landfill taxes can contribute to diverting waste streams away from landfills to recycling.
- The effectiveness of the environmental incentive of landfill taxes depends on the tax rate. Rates are very different in those countries surveyed for this report. Most of these countries introduced landfill taxes together with command and control instruments like landfill bans for certain substances or more ambitious landfill standards. Hence, it is difficult to separate diversion effects by the landfill tax proper. However, there was evidence that the introduction of landfill taxes in Catalonia had the immediate effect that municipalities which had not set up separate recyclable material collection until then did so quickly after the introduction.
- Like with most environmental taxes the administrative costs for landfill taxes are comparably low.
- Revenues from landfill taxes can be used to fund activities improving waste management and recycling activities.

### 7.2.2 Recommendations

- Landfill taxes can be implemented as a revenue generating tool creating additional incentives to support command-and-control regulation concerning landfilling, like for example mandatory landfilling and recycling quotas. In these cases landfill taxes create incentives to potentially outperform the quotas mandated by law.
- Tax rates should be significantly high in order for the tax to create meaningful incentives.
- The introduction of landfill taxes should be integrated in a holistic EFR approach, where the introduction of this tax is coupled with a parallel reduction in social security contributions.
- Confronted with the problem of unregistered dumpsites, a regulation making the owner of the land responsible for paying the tax in the case no operator can be identified seems to be practicable.

## 7.3 Landfill Allowances Trading Scheme

### 7.3.1 Summary

- The Landfill Allowances Trading Scheme is an additional economic instrument complementing the landfill tax in the UK. It has been proven successful in allowing municipalities a performance corridor during which they were limiting their disposal of biodegradable waste in landfills in order to reach the target of the respective EU Directive in a cost-efficient manner.
- However, the rising rate of the landfill tax in the UK is increasingly rendering the trading scheme less relevant because the disincentive to deposit waste on landfills is becoming increasingly strong.

### 7.3.2 Recommendations

- The implementation of a permit trading system is a potentially effective tool to reduce the landfilling of specific waste streams. However, in the presence of landfill taxes at a significant rate, its implementation seems to be redundand.

## 7.4 Deposit-refund Systems

### 7.4.1 Summary

- Deposit-refund systems have proven very successful in increasing collection and recycling rates for the products which they are covering.
- In Germany, however, the mandatory deposit on single-use beverage containers, which was implemented with the additional objective to make single-use containers less attractive and therefore increase the ratio of reusable containers, proved not to have a significant effect on the use of single-use containers. From this may be concluded that deposit-refund systems have great potential to increase collection rates but not to influence the market in a way of diverting demand in the direction of products which are environmentally more favourable. For demand-side effects product taxes which influence the price of products seem to be more efficient.
- Deposit-refund systems usually address specific products and usually burden the administrative costs on the industry. This increases the probability of significant lobbying and resistance from the affected industry.

### 7.4.2 Recommendations

- Deposit-refund systems are effective instruments to increase the recycling rate for specific products. They should be increasingly introduced not just for packaging waste but also for other products where the risk for and/or costs of illegal dumping are significant (e.g. batteries).

## 7.5 Advanced Recycling Fees

### 7.5.1 Summary

- Advanced Recycling Fees have proven successful in Japan and California to provide funding for the recycling of certain products like electronic goods or end-of-life vehicles. While they do not create an incentive for increased recycling (this is done through mandatory recycling quotas) they generate revenues for the recycling process.
- From a social perspective ARFs burden the costs of recycling on the consumer.
- In California, ARFs have contributed to the creation of a strong recycling market in the course of only a few years.
- In both cases surveyed for this report administration costs were comparably high and revenue and cost projection turned out to be difficult.

### 7.5.2 Recommendations

- Advanced Recycling Fees have proven successful in creating recycling markets for waste streams where recycling would otherwise not be economically efficient.
- Their implementation should increasingly be considered for electronic products
- For efficient implementation, more experiences will have to be evaluated in order to improve administration and cost projections
- A potential combination with deposit-refund systems should be evaluated in order to increase return-rates.

# 8 BIBLIOGRAPHY


- Amano, M. 2004: PET-Bottle Systems in Sweden and Japan: an Integrated Analysis from a Life-Cycle Perspective, http://www.lumes.lu.se/database/alumni/03.04/theses/amano_michiko.pdf (Last accessed: November 01, 2010).
- Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit (BMU) 2006: Abfallwirtschaft in Deutschland. Motor für Jobs und Innovationen, http://www.cleaner-production.de/fileadmin/assets/bilder/_73_broschuere_abw_deutschland.pdf (Last access: November 01, 2010).
- Callan, S.J. and J.M. Thomas 1997: The Impact of State and Local Policies on the Recycling Effort. In: Eastern Economic Journal, 23(4), 411-423.
- Cointreau, S., P. Gopalan and A. Coad 2000: Private Sector Participation in Urban Solid Waste Management, http://rru.worldbank.org/Documents/Toolkits/waste_fulltoolkit.pdf (Last access: November 01, 2010).
- Comisión de Regulación de Agua Potable y Saneamiento Básico (CRA) 2006: Metodología de costos y tarifas para el servicio público de aseo, http://cra.gov.co/apc-aa-files/32383933383036613231636236623336/Revista11.pdf (Last access: November 01, 2010).
- Comisión Nacional del Medio Ambiente (CONAMA) 2005: Política de gestión integral de residuos urbanos. Comisión Nacional del Medio Ambiente, Gobierno de Chile.
- Dahlén, L. and A. Lagerkvist 2010: Pay as you throw. Strengths and weaknesses of weight-based billing in household waste collection systems in Sweden. In: Waste Management, 30(1), 23–31.
- Davies B. and M. Doble 2004: The development and implementation of a landfill tax in the UK. In: OECD (ed.): Addressing the Economics of Waste. Paris: OECD Publishing, 63-78. (Available online: http://books.google.co.uk/books?hl=en&lr=&id=1Cqs0J6tB9YC&oi=fnd&pg=PA63&dq=An+Economic+Analysis+of+the+UK+Landfill+Permits+Scheme&ots=MTBxN9z4QT&sig=aTcOPNqsWaC7mpeL_EhFWuIpF_Q#v=onepage&q&f=false, Last access: November 01, 2010).
- Deutscher Bundestag 2002: Drucksache 14/9993, http://dip21.bundestag.de/dip21/btd/14/099/1409993.pdf (Last access: November 01, 2010).
- Dijkgraaf, E. 2008: Environmental Activism and the dynamics of unit-based pricing systems, ftp://zappa.ubvu.vu.nl/20080011.pdf (Last access: November 01, 2010).
- Dijkgraaf, E. 2004: Regulating the Dutch Waste Market, PhD Thesis, Research Centre for Economic Policy, http://129.3.20.41/eps/io/papers/0502/0502005.pdf (Last access: November 01, 2010).
- Eunomia Research and Consulting 2002: Waste Collection: To Charge or not to Charge? Northampton: Chartered Institution of Wastes Management (CIWM).

- European Environmental Agency (EEA) 1996: Environmental Taxes. Implementation and Environmental Effectiveness, http://www.eea.europa.eu/publications/92-9167-000-6/at_download/file (Last access: November 01, 2010).
- Fullerton, D. 2005: An Excise Tax on Municipal Waste? In: Cnossen, S. (ed.) 2005: Theory and Practice of Excise Taxation. Oxford: Oxford Scholarship Online.
- Fullerton, D. and T.C. Kinnaman 1996: Household responses to pricing garbage by the bag. In: American Economic Review, 86(4), 971-984.
- Gale, R., S. Barg and A. Grillies 1995: Green Budget Reform. London: Earthscan Publications Limited (Available online: http://books.google.de/books?id=_rqDi8MAkEC&printsec=frontcover&dq=Green+Budget+Reform&source=bl&ots=E575VT0jdI&sig=GH2mjN2Xo_-I2zl8sP_c0mOGBL8&hl=de&ei=gdHOTNaQO4Xusgaft8jCA&sa=X&oi=book_result&ct=result&resnum=3&ved=0CCYQ6AEwAg#v=onepage&q&f=false, Last access: November 01, 2010).
- Gesellschaft für Verpackungsmarktforschung mbh 2010: blickpunkt. Mehrweg-Quoten 2008. http://www.gvm-wiesbaden.de/pdf/infocus/2010-05_EWMW2008_de.pdf (Last access: November 01, 2010).
- HM Customs and Excise 1998: Review of the Landfill Tax: Report. Newcastle: HM Customs and Excise.
- Hogg D.; A. Baddeley and H. Montag 2008: Impact Assessment of the Landfill Tax Escalator. http://www.eunomia.co.uk/shopimages/Eunomia%20-%20LfT%20Impact%20Assessment%20Final.pdf (Last access: November 01, 2010).
- Hong, S., R. M. Adams and H. A. Love (1993): An Economic Analysis of Household Recycling of Solid Wastes: The Case of Portland, Oregon. In: Journal of Environmental Economics and Management, 25(2), 136–146.
- Japan for Sustainability (JFS) 2006: Newsletter No.50. The Recycling of End-of-Life Vehicles in Japan. http://www.japanfs.org/en/mailmagazine/newsletter/pages/027816.html (Last access: November 01, 2010).
- Jenkins, R. R. (1993): The Economics of Solid Waste Reduction. The Impact of User Fees. Edward Elgar Publishing Ltd.
- Kinnaman, T.C. and D. Fullerton 2000: Garbage and recycling with endogenous local policy. In: Journal of Urban Economics, 48(3), 419-442.
- Leite L.E.C and J.E.P. Monteiro 2003: Rio De Janeiro's Improvement Of Its Urban Trash And Garbage Services, Brazil. In: Inter-American Development Bank (ed.): Environment Network, Economic Instruments for Solid Waste Management: Global Review and Applications for Latin America and the Caribbean Synthesis of Case Studies. Washington: Inter-American Development Bank (Available online: http://www.bvsde.paho.org/bvsacd/cd51/economic-waste/part2.pdf, Last access: November 01, 2010).
- Menell, P.S. 2004: An Economic Assessment of Market-Based Approaches to Regulating the Municipal Solid Waste Stream. http://escholarship.org/uc/item/97p725dj#page-36 (Last access: November 01, 2010).

- Ministry of Economy, Trade and Industry (METI) 2004: Handbook on Resource Recycling Legislation and Trends in 3R. http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/handbook2004_e.pdf (Last access: November 01, 2010).
- Ministry of Economics 2009: Establishing a sound material-cycle society. Creating economic development through the establishment of a sound material-cycle society. http://www.env.go.jp/en/recycle/smcs/a-rep/2009gs_full.pdf (Last access: November 01, 2010).
- Ministerio de Ambiente, Vivienda y Desarrollo Territorial (MAVDT) 2007: Guía Metodológica de Costos y Tarifas para el Servicio Público de Aseo. http://cra.gov.co/apc-aa-files/32383933383036613231636236623336/guia1.pdf (Last access: November 01, 2010).
- Miranda, M.L., J.W. Everett, D. Blume, and B.A.Roy 1994: Market-based incentives and residential municipal solid waste. In: Journal of Policy Analysis and Management, 13(4), 681-698.
- OECD 2001: Environmentally Related Taxes in OECD Countries: Issues and Strategies. Paris: OECD Publishing (Available online: http://books.google.de/books?id=JnlFf4X6C4AC&printsec=frontcover&dq=Environmentally+Related+Taxes+in+OECD+Countries:+Issues+and+Strategies&source=bl&ots=k4q2SgcqY-&sig=3-siD8OjZls8eJ-G0EDukbjgG68&hl=de&ei=MN3OTJ-rBMaEOvL4hMUB&sa=X&oi=book_result&ct=result&resnum=5&ved=0CC8Q6AEwBA#v=onepage&q&f=false, Last access: November 01, 2010).
- OECD 2003: Extended Producer Responsibility: A Guidance Manual for Governments. Paris: OECD Publishing. http://books.google.de/books?id=DNM4brpcKO4C&printsec=frontcover&dq=Extended+Producer+Responsibility:+A+Guidance+Manual+for+Governments&source=bl&ots=y2YtINL7L5&sig=DOiRljXCoSLDPByeMmTnEYV--bs&hl=de&ei=qt3OTM-kOom-ZOsC3tcUB&sa=X&oi=book_result&ct=result&resnum=7&ved=0CEIQ6AEwBg#v=onepage&q&f=false, Last access: November 01, 2010).
- OECD 2006: The Political Economy of Environmentally Relates Taxes. Paris: OECD Publishing. (Available online: http://books.google.de/books?id=KDNoSDqTBWMC&printsec=frontcover&dq=The+Political+Economy+of+Environmentally+Related+Taxes&source=bl&ots=VMkU89eO4I&sig=6r3MZuxjI-kw-TOv8uGAzNxPoqA&hl=de&ei=ctrOTO-yLI-HOswbvkI2XCA&sa=X&oi=book_result&ct=result&resnum=3&ved=0CCsQ6AEwAg#v=onepage&q&f=false, Last access: November 01, 2010).
- OECD 2007: Instrument Mixes Addressing Household Waste. http://www.ingentaconnect.com/content/oecd/16091914/2007/00000007/00000008/0207081ec001 (Last access: November 01, 2010).
- Podolsky M.J. and M. Spiegel 1998: Municipal waste disposal: Unit-pricing and recycling opportunities. In: Public Works Management and Policy, 3(1), 27-39.

- Reschovsky, J.D. and S.E. Stone 1994: Market incentives to encourage household waste recycling: Paying for what you throw away. In: Journal of Policy Analysis and Management, 13(1), 120-139.
- Slavik, J. 2006: Kommunale Gebühren – deutsche Erfahrungen in der tschechischen Praxis. www.ieep.cz/editor/assets/projekty/komunalni_poplatky/bericht.pdf (Last access: November 01, 2010).
- Skumatz, L. 2006: Pay-as-you throw (PAYT) in the US: 2006 Update and analyses. Final Report. http://www.epa.gov/wastes/conserve/tools/payt/pdf/sera06.pdf (Last access: November 01, 2010).
- Togawa, K. 2007: Japan´s Automotive Recycling System: Evaluation Three Years after Implementation. http://www.ide.go.jp/English/Publish/Download/Spot/pdf/30/006.pdf (Last access: November 01, 2010).
- Umweltbundesamt (UBA) 2010: Bewertung der Verpackungsverordnung. Evaluierung der Pfandpflicht. http://www.umweltdaten.de/publikationen/fpdf-l/3931.pdf (Last access: November 01, 2010).
- Van Houtven, G.L. and G.E. Morris 1999: Household behavior under alternative pay-as-you-throw systems for solid waste disposal. In: Land Economics, 75(4), 515-537.
- Walls, M., M. Macauley and S. Anderson 2005: Private Markets, Contracts and Government Provision: What Explains the Organization of Local Waste and Recycling Markets? In: Urban Affairs Review, 40(5), 590-613.
- Walls, M. 2006: Extended Producer Responsibility and Product Design. Economic Theory and Selected Case Studies, Discussion paper, Ressources for the Future, Washington D.C. (Available online: http://www.rff.org/Documents/RFF-DP-06-08-REV.pdf, Last access: November 01, 2010).
- Wertz, K.L. 1976: Economic-factors influencing Households Production of Refuse. In: Jounal of Environmental Economics and Management, 2(4), 263-272.

**ANNEX 1: Analytical Categories applied to individual instruments**

| | |
|---|---|
| **1.** | **Country:** |
| | |
| **2.** | **Instrument:** |
| *Name and short description* | |
| **3.** | **Type of Instrument** |
| *tax, charge, fee, subsidy, license, deposit-refund scheme* | |
| **4.** | **Level of Application:** |
| *e.g. federal, state, communal* | |
| **5.** | **Category of Waste:** |
| *e.g. hazardous waste, packaging waste, biodegradable waste, etc.* | |
| **6.** | **Type of Recovery:** |
| *e.g. waste deposit, incineration, recycling, composting, etc.* | |
| **7.** | **Assessment Base:** |
| *e.g. volume, weight, person, household, etc.* | |
| **8.** | **Addressee:** |
| *Payer or recipient, e.g. public institutions, companies, consumers , etc.* | |
| **9.** | **Detailed Description of Instrument:** |
| *Mechanism, functionality, tax rate, aspects of waste management addressed (e.g. economic, social, ecological, technical, political), implementing authorities, administrative processes, etc.* | |
| **10.** | **Relevant Laws and Regulations** |
| *Identification of relevant legal texts* | |
| **11.** | **Direct and Indirect Ecological Impact of Application of Instrument:** |
| *Environmental steering effect, e.g. volume of waste generation, recycling rate, pollution, etc.* | |
| **12.** | **Direct and Indirect Economic Impact of Application of Instrument:** |
| *e.g. costs (for consumer, producer, government), revenue generation, administrative costs, industry competitiveness, etc.* | |

| |
|---|
| **13. Direct and Indirect Social Impact of Application of Instrument:** |
| *e.g. price-increase for consumer products, welfare effects, job losses, etc.* |
| **14. Social or Political Opposition or Resistance:** |
| *e.g. opposition of environmental groups, industry or other interest groups, etc.* |
| **15. Technical or Legal Obstacles (and Solutions):** |
| *e.g. administrative problems with collection of fees and taxes, collision with other legal provisions, etc.* |
| **16. Decision-Making Process Leading to Introduction of Instrument:** |
| *How/why/by whom was the instrument brought on the agenda, negotiations over introduction, alternatives considered, etc.* |
| **17. Necessary Amendments of Previously Existing Legal Provisions:** |
| |
| **18. General Success and Acceptance:** |
| *Is the instrument generally seen as successful or are there strong needs for reform or improvements?* |
| **19. References and Sources:** |
| *Please also indicate above where cited* |

## ANNEX 2: Argentina – Waste Charge for Municipal Solid Waste

| |
|---|
| **1. Country:** |
| Argentina |
| **2. Instrument:** |
| Waste charge for municipal solid waste (MSW) |
| **3. Type of Instrument** |
| Charge |
| **4. Level of Application:** |
| Municipality |
| **5. Category of Waste:** |
| According to the law (Act 25.916), Municipal Solid Waste comprises residential, urban, commercial, medical and public care, industrial and institutional waste. |
| **6. Type of Recovery:** |
| Landfill |
| **7. Assessment Base:** |
| The charge is calculated according to a complicated mechanism based on the value of the respective real estate. |
| **8. Addressee:** |
| Households and commercial businesses |
| **9. Detailed Description of Instrument:** |
| The Waste charge covers collection and treatment of waste, public cleansing and lighting. The level is set by a municipal decree. Bills are sent via E-Mail, citizens pay at the city council or other authorized places.<br><br>Waste is collected from the sidewalks (bags or bins). The collection is carried out by private disposal contractors. There is no formal system for waste separation. Before the truck performs the collection, the so called *cartoneros* collect valuable waste fractions (aluminium cans, plastics, paper, cardboard) from the bags and street containers.<br><br>As for Buenos Aires city, this charge was introduced in the 50's. At the beginning it was designed to finance paving of the streets, lightening and cleansing. It is paid by all residents every two month (ca. 7 € for middle class households in 2010)<br><br>Assessment base: at first land and real estate value are estimated according to the geographical location (multiplication with special zone coefficient). The result is used to calculate different parts of the charge according to special ratios (in the case of waste disposal the ratio is 5.62 for every thousand ARG$ of the total value of the real estate) |
| **10. Relevant Laws and Regulations** |
| Federal level:<br><br>Environmental General Act (Ley General del Ambiente). Act 25.675 |

http://www2.medioambiente.gov.ar/mlegal/marco/ley25675.htm

Act on Minimum Budgets for Municipal Waste (Ley sobre Presupuestos Mínimos para la Gestión Integral de los Residuos Domiciliarios). Act 25.916

http://www.fipma.org.ar/admin/Ley_25916_Ley_de_Gestion_de_Residuos_Domiciliarios.pdf

Buenos Aires City: Act 23.514; Act 2568

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The Government of Buenos Aires City set the goal of 30 % waste quantities reduction from 2004 (1,497,656 t) to 2010; however information concerning the success is missing

As the charge is not designed to have any environmental effect (level is independent of waste quantities or separation) nothing in this respect is reported

**12. Direct and Indirect Economic Impact of Application of Instrument:**

Revenues:

| Year | ABL charge revenue ARG$ | Total tributes revenue ARG$ |
|---|---|---|
| 2004 | 621,888,540 | 4,144,861,914 |
| 2005 | 636,533,923 | 4,995,446,487 |
| 2006 | 626,427,257 | 6,117,832,928 |
| 2007 | 656,103,036 | 7,756,290,699 |
| 2008 | 1,286,073,965 | 10,581,194,930 |
| 2009 | 1,308,341,906 | 12,559,896,012 |

Source: Buenos Aires Statistical Yearbook 2009.

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

There are some individual web protests against the charge's rise in 2009; however systematic opposition has not been reported

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

-

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

Due to its longstanding existence and low level the charge is generally accepted

**19. References and Sources:**

Interview by mail with Mr. Pablo Schamber, from the National Observatory for Urban Solid Waste Management **(**Observatorio Nacional para la Gestión de Residuos Sólidos Urbanos). Buenos Aires, 10 August 2010. pschamber@ambiente.gob.ar

Municipality of Buenos Aires City website: www.buenosaires.gov.ar [Accessed August 28th 2010]

## ANNEX 3: Chile – Waste Charge for Municipal Solid Waste

| |
|---|
| **1. Country:** |
| Chile |
| **2. Instrument:** |
| Waste charge for municipal solid waste (Derecho de aseo) |
| **3. Type of Instrument** |
| Charge |
| **4. Level of Application:** |
| Municipality |
| **5. Category of Waste:** |
| Municipal solid waste |
| **6. Type of Recovery:** |
| Most municipal solid waste goes to landfill. Recycling of paper, glass and cardboard occurs spontaneously. |
| **7. Assessment Base:** |
| Periodical flat charge independent of volume, weight and type of waste |
| **8. Addressee:** |
| Households and commercial businesses |
| **9. Detailed Description of Instrument:** |
| Municipalities are responsible for MSW management. The collection (from sidewalks) and transport of waste is usually carried out by private contractors.<br><br>The waste charge is designed to cover the costs of the whole MSW management including recyclables, the level is set according to last years costs. The charge has to be paid quarterly. It is not cost covering, in Santiago the coverage ratio is only 55%. The low ratio is caused by the exemption of low income households from the charge and the absence of penalties in case of refusal to pay. Only 30 % of all households pay the charge.<br><br>There are no environmental goals included in the charge's design. There is also no formal recycling-system, recycling is only conducted by individuals collecting and selling recyclables on their own account. |
| **10. Relevant Laws and Regulations** |
| Local Treasuries Act of 1995 (Ley de Rentas Municipales de 1995);<br>http://www.sii.cl/pagina/jurisprudencia/dl3063.htm |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| The charge's design neither contains incentives for waste reduction or recycling. Accordingly the amount of waste generated has increased with an annual growth rate of 5 % during the last decade reflecting changing consumption patterns. From 1996 to 2000 waste amounts increased by 28.6 %. The total waste amount in Santiago in 2010 is 379,000 t/month. |

The solely informal recycling system, consisting of individuals selling recyclables on their own account, reaches an estimated recycling rate of 14 % in Santiago.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

The cost coverage ratio is ca. 50 %.

Revenues:

Municipality of Santiago

| Year | Total revenue ($10^3$ CLP) | Waste charge ($10^3$ CLP) |
|---|---|---|
| 2010 | 93,770,799 | 4,644,151 |
| 2009 | 88,474,197 | 4,180,690 |
| 2005 | 74,104,797 | 3,358,411 |

Source: Municipality of Santiago website:
http://intranet.munistgo.cl/integridad/web2/articles.php?lng=es&pg=134

Costs of waste collection and treatment: ca. 15,000 – 20,000 CLP/t

**13. Direct and Indirect Social Impact of Application of Instrument:**

Except for the exemption of low income households the charge's design as flat charge is regressive from a social point of view

**14. Social or Political Opposition or Resistance:**

Plans by authorities to make the charge compulsory for all households are not realized due to expected political resistance by the affected population. As low income households do not pay taxes the implementation of the charge would also lead to significant additional administrative costs.

**15. Technical or Legal Obstacles (and Solutions):**

Main problems regarding waste management in Chile arise from the scattered legal competences on federal level. Doubling and contradicting competences involve the Ministry of Health, the Ministry of Housing and Urban Development and the National Commission for the Environment (CONAMA).

Besides legal conflicts, problems arise from a lack of IT-systems allowing for controlling and monitoring urban waste management, a lack of planning in the medium and long term and a low level of social awareness.

**16. Decision-Making Process Leading to Introduction of Instrument:**

-

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

From the point of view of cost recovery the charge is not successful as the revenue obtained only covers half of the waste management costs. This results from only 30% of all households paying the charge, which itself is a consequence of a lack of enforcement. Municipalities are also missing chances for reducing costs by forming disposal-alliances. Even official publications are very critical in all these aspects.

## 19. References and Sources:

Huber, R.; Ruitenbeek, J.; Serôa da Motta, R. (1998): Market based instruments for environmental policy making in Latin America and the Caribbean. Lessons from eleven countries; World Bank discussion paper No. 381, World Bank, Washington, D.C

BID (Interamerican Bank for Development) (2004): Instrumentos económicos para la gestión de los residuos sólidos: revisión global y aplicaciones en América Latina y el Caribe. Departamento de integración y programas regionales; Departamento de Desarrollo Sostenible.

CONAMA (National Commission for the Environment) (2005): Política de gestión integral de residuos urbanos; Comisión Nacional del Medio Ambiente, Gobierno de Chile.

Municipality of Santiago website: http://www.municipalidaddesantiago.cl (Accessed 03.12.2010)

## ANNEX 4: France – Waste Charge for Municipal Solid Waste

| |
|---|
| **1. Country:** |
| France (City of Besançon) |
| **2. Instrument:** |
| REOM - La Redevance Générale d'Enlèvement des Ordures Ménagères (General charge for garbage collection of household and assimilated waste) |
| **3. Type of Instrument** |
| Charge |
| **4. Level of Application:** |
| Municipality |
| **5. Category of Waste:** |
| Municipal solid waste |
| **6. Type of Recovery:** |
| Landfill, incineration, recycling |
| **7. Assessment Base:** |
| Volume of Containers as well as number of persons living in a household |
| **8. Adressee:** |
| The charge applies to all users of the waste collection service |
| **9. Detailed Description of Instrument:** |
| **General:**<br>There are two forms of REOM that can be established:<br>REOM *classique* or *général*: the charge is linked to the average quantity of waste produced in the municipality and does therefore not reflect the quantity actually produced by the single households (in this case the amount of the charge is determined by persons living in a household). Hence, the REOM *classique* does not give any incentives in terms of waste reduction (prevention, separation, composting)<br>REOM *incitative*: the charge is linked to the amount of waste produced by households; hence, incentives for waste reduction are given<br>Hence, the REOM charges are linked to the service provided and waste produced. In most cases, the charge is based on:<br>• Number of persons living in a household<br>• The volume of bags<br>• The weight of waste produced<br>The REOM follows an economic logic: users pay according to their use of the waste management system. The REOM is fairer and more transparent than the TEOM or the general budget. However, the implementation of the REOM contains certain constraints for the local tax collecting centres, since it burdens them with extra tasks without providing any extra funding for the collection process itself. The municipalities have to create files for each person that the tax applies to, keep it updated, issue bills and ensure their payment. The administrational efforts |

are comparable to those related to the *Redevance spéciale* with the difference that the REOM applies to all users (households and non-households).

The amount collected from the charge plus any additional revenue must cover the full cost of the service provided.

The charge is collected directly by the municipality or the responsible EPCI (*Établissement public de coopération intercommunale,* which in this case is Le Grand Besançon) or the responsible concessionaire.

**Le Grand Besançon:**

The REOM has been in place since 1st January 2006 in the area of Grand Besançon. The REOM keeps the balance between costs and revenues.

Collection and treatment are in the hands of private companies: NICOLLIN SAS, STEHLY NICOLAS, SITA Centre Est, ISS Environnement, COVED, SOLOVER, ANCO and SYBERT (treatment)

**Grand Besançon uses the REOM in order to reach the following six goals:**

Transparency: The revenue generated by the REOM is supposed to cover the cost of the elimination of waste. The tax amount is calculated on the basis of a known tariff and a clearly defined assessment base.

Universality: all the users of the service that fall into the category of household or assimilated waste, are billed with the charge.

To provide incentives to reduce waste at the source: For the households in Besançon and the producers of assimilated waste in Grand Besançon, the amount of the charge is supposed to give incentives to reduce the quantity of waste at the source. Hence, the charge is related to the volume of waste produced.

To provide incentives to separate waste: For the households in Besançon and the users of DNMA in Grand Besançon, the charge is also supposed to provide incentives for waste separation since the charge only includes grey bins. The yellow bins are not used to calculate the charge.

Equity: the amount of the service is calculated according to the service provided.

In the case of Besançon, this is being determined by the number and the volume of the containers made available as well as the time of their availability (prorata temporis).

For communes located in suburbs, the amount of the REOM is calculated according to the basis of a fixed part and a variable part which is calculated according to the number of persons living in a household and the length of the service (prorate temporis)

How the REOM is calculated in Grand Besançon:

Calculation of the REOM in the sector of Besançon:

The charge is based on the volume of the container designed to receive residual waste in place at the users “grey bag”. The “yellow container” designed to receive recyclable waste is not used as a base for the calculation of the REOM.

The tariff is composed of:

- A fixed part intended to cover structural costs, which is attached to the containers (big

trash containers located at buildings) regardless of their size

- A part intended to cover the costs of waste collection in the area
- A variable part which allows to cover costs of treating the waste billed by SYBERT. This varies in proportion to the theoretical volume of waste that will have to be treated relative to the size of the containers.

Calculation of the REOM in sectors other than Besançon:

The tariff is composed of:

- The charge determined for household in sectors other than Besançon comprehend a fixed part applied to every household and a variable part according to the number of inhabitants in the household.
- The fixed part is designed to cover the structural costs and the waste collection costs associated to each sector. These costs are object to an allocation on the basis of number of households in the considered sectors.
- The variable part is intended to cover the costs of waste treatment charged by SYBERT relevant to each sector. The costs are object to an allocation on the basis of the real population in the sector.

In the interest of fairness, a unique tariff is set for non-household waste producers of the CAGB (Communauté d'Agglomération du Grand Besançon) no matter in which sector. This unique tariff is based on the volume of the container made available.

All tariffs mentioned above, integrate a part called „provision" of the container. This "provision" represents the amortization of the recipients, the charges of maintenance (besides cleaning), the reconditioning and the delivery of the containers.

**Facts and Numbers:**

Over the last year, waste collected in the territory of Besançon was reduced by 0.2 percent.

175 295 people live in Grand Besançon (between 1999 and 2006, the population of Besançon grew by 2.7 percent)

56 728 tonnes of waste were collected

324 kg/year/inhabitant were collected by Grand Besançon (in 2005, the national average was 396 kg/year/inhabitant)

162 kg/year/inhabitant was brought to collection stations (in 2005, the national average was 151 kg/year/inhabitant)

30 percent of waste collected is recyclable

85 percent of recyclable waste (excluding glass) is being recycled

67 percent of the waste is collected directly

the elimination of household waste represents 65,9 euros without tax per capita

the elimination of non household waste represents 1262 €/m3

**10. Relevant Laws and Regulations**

Articles L 2333-76 du Code général des collectivités territoriales

Loi du 30 décembre 1974 portant loi de finances pour 1975, article 14

Code général des collectivités territoriales, articles L 2333-76 et L 2333-79

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

-

**12. Direct and Indirect Economic Impact of Application of Instrument:**

In 2004, the revenues of the REOM were € 408 millions (in France).

The implementation of the REOM contains certain constraints for the local tax collecting centres because it burdens them with extra tasks without providing any funding for the collection and administrative process itself. The municipalities have to create files for each persons that the tax applies to, keep it updated, issue bills and ensure their payment. The administrational efforts are comparable to those related to the *Redevance spéciale* with the difference that the REOM applies to all users (households and non-households).

**13. Direct and Indirect Social Impact of Application of Instrument:**

Due to the Grennelle Agreement, municipalities that are currently financing their waste management through the TEOM, will have to replace it with the REOM. While the REOM is already based on the amount of waste produced, the TEOM is linked to the rental value. Hence, the transition from TEOM to REOM may be accompanied by a substantial transfer of tax burden among households. Thus, certain households will pay more under the REOM even if they already sorted their waste under the TEOM. For these users the difference in the contribution before and after the incentive pricing is mainly due to the low rental values of the homes. This is particular the case when taking into consideration social housing and old buildings downtown. Other households will pay less under the REOM than under the TEOM. This will be the case for households that decrease their waste substantially or households that live in homes with a high rental value.

Hence, the time of transition from TEOM to REOM has to be accompanied by pedagogical efforts in forms of campaigns that explicitly communicate the challenges and aims of the reform, the concrete consequences for the user as well as its implementation schedule.

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

Due to the difficulties that its application and administration poses, the REOM is only applied in a minority of communities and only in one single city, Besançon. Especially the obligation of having to install an extra budget is a big obstacle. In 2004, the revenues of the REOM were € 408 millions.

The REOM is supposed to be linked to the actual amount of waste being produced; however, it is very difficult to measure how much waste exactly has been produced. The weighing of collected waste is too complex to install, to measure the volume of containers is much easier to implement but less accurate. Also the number of persons living in a household can be a factor, but the keeping track with each family's evolution bears many difficulties. Knowing the dates

of when families move which is necessary in order to calculate the service rendered proprata temporis, is delicate and often source for contestations.

Generally, the charge barely gives incentives to reduce waste and is very difficult to manage, especially in areas with many apartment buildings.

**16. Decision-Making Process Leading to Introduction of Instrument:**

The Grenelle 1 includes four main areas :

- a landfill and incineration tax that encourages the prevention and recycling as well as the environmental performance of waste treatment facilities
- taxation of products that produce great amounts of waste when there are substitution products available that have the same functionality but whose impact on the environment are smaller
- the revenue generated has to be used to fund projects aimed at implementing new waste policies, particularly in terms of prevention and recycling
- a legislative framework which allows the introduction of incentive pricing in order to finance the disposal of household and assimilated waste. Hence, over the next 5 years, the *REOM incitative* will have to be established.

In order to ensure an incentive tax systems, municipalities have to:

- change their assessment base for the pricing in the case that the REOM is already in place
- if the TEOM is in place, it has to be substituted with the *REOM incitative*

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

-

**19. References and Sources:**

http://www.besancon.fr/gallery_files/site_1/1071/1072/17761/ra2008_dgd_web.pdf

http://www.senat.fr/rap/r09-571/r09-5717.html

http://lesrapports.ladocumentationfrancaise.fr/BRP/054000565/0000.pdf

http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=17432

http://www.environnement.ccip.fr/Transversal/Aides-et-taxes/Dechets/Taxes-dans-le-domaine-des-dechets/Dechets-menagers-et-assimiles/Redevance-generale-enlevement-des-ordures-menageres

http://droit-finances.commentcamarche.net/legifrance/33-code-general-des-collectivites-territoriales/75929/redevance-pour-l-enlevement-des-dechets-ordures-et-residus-redevance-d-enlevement-des-ordures-menageres-sur-les-terrains-de-camping-et-redevance-spe

http://www.legifrance.gouv.fr/affichCode.do;jsessionid=B95457749A19E1A598E721911B368D57.tpdjo17v_2?idSectionTA=LEGISCTA000006181012&cidTexte=LEGITEXT000006070633&dateTexte=20100923

http://www.bm-besancon.fr/gallery_files/site_1/1071/1072/13201/13204/000019A2.PDF

## ANNEX 5: France – Waste Charge for Municipal Solid Waste in Paris

| |
|---|
| **1. Country:** |
| France (City of Paris) |
| **2. Instrument:** |
| TEOM (Taxe d'enlèvement des ordures ménagères) |
| **3. Type of Instrument** |
| Charge |
| **4. Level of Application:** |
| Municipalities, public institutions of inter-communal cooperation and joint associations that benefit from the competence of waste disposal and ensure at least the collection of household waste. |
| **5. Category of Waste:** |
| Household and assimilated waste |
| **6. Type of Recovery:** |
| Incineration, landfill, recycling |
| **7. Assessment Base:** |
| **Assessment base of the TEOM:**<br>The tax is based on the gross rental value of built property. 50% of the gross rental value times a percentage, voted on by authorities, gives the amount of the TEOM. The reduction of 50% is made to account for management fees, insurance, depreciation and maintenance of the flat which have to be taken care of by the owner. The authorities vote for the amount of the tax. In 2010, that is 6.21% (in Paris).<br><br>How to determine the rental value:<br>The rental value is identical to the one defined in the "taxe d'habitation" (residence tax). Since 1948, rented flats have a particular tax base.<br>The residence tax is based on the rental value of cadastral rental value of the housing and its dependencies. For primary residences, this value is reduced by mandatory discounts (charge de la famille) or optional ones (e.g. en function des revenues). This gives the net rental value.<br>The rental values of residential premises were updated in 1980 to the coefficient of 1.85. This coefficient is adjusted annually by a flat national coefficient. In 2010, the adjustment is set at 1.012.<br>For commercial premises, the gross rental value was determined in 1970. In the absence of rents, the rental value was determined by comparison or by direct assessment. They were updated in 1980 to the coefficient 2.23. They were then adjusted annually by national coefficient. In 2010, this adjustment is set at 1.012.<br><br>**Assessment Base of the Redevance Spéciale (Special Fee):**<br>The Special Fee is calculated according to the service; however, this is not always respected by communities. |

The Redevance Spéciale (RS) in Paris:

The amount of the RS which is charged quarterly by the City of Paris for the removal of non-household waste, is calculated as follows:

The RS in Paris has been established for the removal of non-household waste. The charge applies to all producers who are not exempt, on the daily produced waste whose volume exceeds 330 litres.

All the exercise a commercial activity offering public food consumption on the premises, are exempt from the RS.

The amount of the charge which is collected on a quarterly basis is fixed according to the following criteria:

- A flat-rate of 134,00 € every quarter corresponds to an subscription to pay for the fixed cost of the service.
- A quarterly Rate is applied according to the number of containers necessary to eliminate the collection of daily waste after the 330 litres mentioned in paragraph one, have been deducted.

**8. Adressee:**

**TEOM:**

It covers all properties and their dependencies which are subject to the property tax as well as the ones which are temporarily exempt. Factories and spaces rented by the public service do not have to pay the TEOM.

Exemptions and Reductions:

- Factories
- Premises belonging to public bodies if they do not have an industrial or commercial purpose
- Public institutions, scientific and educational establishments
- Local industrial and commercial businesses, these exceptions are subject to a decision of an annual council

**Redevance Spéciale:**

In order to offset the financial burden caused by industrial and commercial waste (both assimilated waste), municipalities that established the TEOM or that finance waste disposal through the general budget have to introduce the Special Tax (since the Act of 13th July 1992).

The Special Fee is calculated according to the service; however, this is not always respected by communities.

**9. Detailed Description of Instrument:**

Since the amount of the tax is based on gross rental value, there is no relation to the waste actually produced. Hence, the TEOM provides no incentives for waste prevention or recycling.

Since 1992, the TEOM has to be supplemented with the Special Tax (Redevance Spéciale) which is paid by businesses and public institutions whose waste is also collected by the community.

The TEOM is easy to implement for communities which do not have to identify the taxpayers, issue invoices and ensure the recovery. However, the TEOM has to be supplemented by the

Special Tax which is as difficult to implement and to maintain as the REOM, since the three above mentioned activities have to be handled by the municipalities. In 2004, the tax was paid by 82.4% of the French population and generated 4 billion euros.

In 2008, 67 percent of French municipalities and 85 percent of the population paid the TEOM.

The charge is collected directly by the municipality or the responsible EPCI (*Établissement public de coopération intercommunale*) or the responsible concessionaire.

**Facts and numbers for PARIS:**

Nature and volume of waste collected:

in 2008, 1.17 million tonnes of waste were collected in Paris. This is a significant decrease by 2.2 percent to 2007 taking into consideration the increase of population.

| Total Waste Production kg/capita | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| | 566 | 564 | 558 | 556 | 535 | |

The steady decline of incinerated green waste since 2005, is due to the reorientation of SYTCOM. They are using more and more organic recovery, such as composting, through private markets. Eventually the incineration of green waste should disappear.

Waste decreased due to two reasons. Firstly, the economic crisis slowed down economic activities. Secondly, Parisians started to take on eco responsibility and started to reduce their waste production.

Waste sorting has increased in the recent year. (Glass 6 percent, yellow bag 2 percent)

The City of Paris collects the waste, while the SYTCOM (Syndicat intercommunal de traitement des ordures ménagères) is responsible for the treatment of waste (except glass).

The collection of waste in Paris is taken care of by private companies (Régie, Véolia, Nicollin, Sita)

**10. Relevant Laws and Regulations**

Code général des collectivités territoriales: L2313-1, L2224-13 – L2224-17, L2333-76, L2333-78

Code général des impôts : 1520-1526, 1609 bis, 1609 quarter, 1609 quinquies, 1609 quinquies C, 1609 nonies, 1639 A and 1639 A bis modifié

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The TEOM follows a more fiscal logic: the service is financed through taxes and the amount paid is totally independent of the use of the service. Since the TEOM is not linked in any way to the amount of waste produced, it gives no incentives to reduce, compost, or separate waste.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

**Waste management costs in Paris: 2008**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| **Service contracts with enterprises** | | 90 M€ | 91,3 M€ | 86,5 M€ | 88,1 M€ |
| **Personnel charges** | | 128,8 M€ | 133,4 M€ | 134,6 M€ | 136,8 M€ |
| **General Charges** | | 19,7 M€ | 26,4 M€ | 19,5 M€ | 21,3 M€ |
| **SYTCOM (responsible of waste treatment)** | 92 M€ | 96,7 M€ | 101,8 M€ | 113,5 M€ | 120,0 M€ |
| **Immobilisations corporelles et en co□rs (achat de matériel roulant, outillage technique…)** | | 22,5 M€ | 11,7 M€ | 10,1 M€ | 20,0 M€ |
| **Total Costs** | **415,60 M€** | **357,7 M€** | **364,6 M€** | **364,2 M€** | **386,2 M€** |

**Principal Revenues :**

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| **TEOM** | 330,60 M€ | 340 M€ | 349 M€ | 357,9 M€ | 366,3 M€ |
| **Taxe de balayae** | 69,30 M€ | | | | |
| **Redevance Spéciale** | 16,30 M€ | 17,5 M€ | 17,5 M€ | 17,6 M€ | 16,8 M€ |
| **Other services** | - | - | - | - | 0,4 M€ |
| **Other revenues*** | 2,61 M€ | 4,4 M€ | 4,81 M€ | 9,5 M€ | 10,8 M€ |
| **Subsidies from Ile-de-France for purchasing 'bennes au GNV'** | - | 2,3 M€ | 1,3 M€ | 1,4 M€ | 1,2 M€ |
| **□otal Revenues** | **418,81 M€** | **364,2 M€** | **372,61 M€** | **386,4 M€** | **395,5 M€** |

The TEOM is used solely to cover the cost of the administration of the waste.

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

The TEOM is easy to implement for the community which does not have to identify the taxpayers, issue invoices and ensure recovery. However, the TEOM has to be supplemented by the Special Tax which is as difficult to implant and maintain as the REOM, since the three above mentioned activities have to be handled by the municipalities.

Devoting a well-established case law now allows binding, at least partially, the amount of the tax to the service rendered. This allows applying different rates to defined areas within the municipality. The criteria for definition of zoning have been identified. They can not only take physical elements (such as collection frequency, distance of the pickup service, etc.) into account but also the cost of the service. Thus, municipalities and their associations can identify areas of perceived TEOM on which they vote for different rates in view of proportioning the amount of the tax to the importance of the service depending on the conditions of its implementation and its cost.

**16. Decision-Making Process Leading to Introduction of Instrument:**

-

**17. Necessary Amendments of Previously Existing Legal Provisions:**

In order to increase the transparency in waste management, municipalities or the syndicates with at least 10,000 residents are required to track the revenue generated by collecting the TEOM, as well as the direct and indirect expenses linked to the collection and treatment of household waste. This will allow to follow to what extent the costs of picking up the waste are met by the tax and to know the expenses of the general budget.

**18. General Success and Acceptance:**

-

**19. References and Sources:**

http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=17424

http://lesrapports.ladocumentationfrancaise.fr/BRP/054000565/0000.pdf

http://doc.impots.gouv.fr/aida/brochures_idl2009/ud_100.html

http://www.lorraine-reel.net/documents/Liste_Textes_Dechets-3.pdf

http://www.paris.fr/portail/pratique/Portal.lut?page_id=195&document_type_id=5&document_id=3114&portlet_id=10637

http://www.paris.fr/portail/pratique/Portal.lut?page_id=195&document_type_id=5&document_id=3143&portlet_id=10637

http://vosdroits.service-public.fr/particuliers/N206.xhtml

http://www.environnement.ccip.fr/Transversal/Aides-et-taxes/Dechets/Taxes-dans-le-domaine-des-dechets/Dechets-menagers-et-assimiles/Taxe-enlevement-des-ordures-menageres

http://www.persee.fr/web/revues/home/prescript/article/coloc_0291-4700_2005_num_25_1_1839

http://www.paris.fr/portail/politiques/Portal.lut?page_id=5498&document_type_id=

5&document_id=9777&portlet_id=11859

http://labs.paris.fr/commun/v2asp/bmo/Delib/CMDELIB20081124/538.htm

## ANNEX 6: France – Landfill Tax for Household and Industrial Waste

| |
|---|
| **1. Country:** |
| France |
| **2. Instrument:** |
| Taxe générale sur les activités polluantes – déchets ménagers et assimilés (TGAP) (Landfill Tax for Household Waste)<br>Taxe générale sur les activités polluantes – déchets industriels (TGAP) (Landfill Tax for Industrial Waste) |
| **3. Type of Instrument** |
| Tax |
| **4. Level of Application:** |
| Federal |
| **5. Category of Waste:** |
| TGAP déchets ménagers et assimilés : Household and assimilated waste<br>TGAP déchets industriels: Special waste produced by industries (such as chemical, biological, radioactive, etc.) that present danger to human health and/or the environment |
| **6. Type of Recovery:** |
| Landfill and incineration (the tax on incineration was introduced in 2009 in order to make incineration and landfill at least as expensive as all other alternatives) |
| **7. Assessment Base:** |
| Volume |
| **8. Adressee:** |
| TGAP déchets ménagers: Landfill operators that treat household and assimilated waste<br>TGAP déchets industriels: Landfill operators that treat industrial waste [the number is very limited (78 in 2003), the ten most important facilities paid almost 70 percent of the 14 M€ that the tax brought in, in 2004] |
| **9. Detailed Description of Instrument:** |
| - |
| **10. Relevant Laws and Regulations** |
| The tax was implemented in 1993 after the Law of 13th July 1992 (92-646) was enacted. This was followed by two 1993 Decrees (93-169 and 93-745)<br>Code des douanes article 266 sexies<br>Article L 2333-78 of the Code général des collectivités territoriales<br>Circulaire du 10 novembre 2000, N°NORINTB0000249C |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| The number of unlicensed landfills, taxed, has decreased from 2,068 in 1994 to 1,118 units in 1999, then representing 2.85% of the taxed tonnage. As a result of their agreement or their closure, the |

number of unlicensed landfills approving to pay the TGAP continued to decline. They were only 172 in June 2005. In general, even if the tax is not the only cause for improving conditions of household waste disposal, we can estimate that it has helped.

From 1995 to 2006 annual household waste generation increased by 20 percent per inhabitant from 441 kg to 536 kg. Even though also the recycling rate increased over this period of time, 70 percent of municipal waste still goes to landfill site or is being incinerated. Even though the waste tax which was introduced in 1992 and integrated into the TGAP a couple of years later has help to improve the sanitary and environmental impacts and has improved the waste separation, etc., the volume of waste produced and put on landfills has not been reduced.

Household and assimilated waste according to their treatment (in millions of tons):

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| Landfill | 12 700 | 12 517 | 12 337 | 12 184 | 11 235 | 11 504 | 12 503 |
| Incineration without energy recovery | 1 320 | 1 016 | 725 | 683 | 641 | 595 | 549 |
| Incineration with energy recovery | 8 424 | 9 082 | 9 745 | 10 123 | 11 359 | 11 574 | 11 043 |
| Composting and Methanisation | 3 522 | 3 616 | 3 842 | 4 056 | 4 229 | 4 517 | 4 493 |
| Recycling | 3 782 | 4 124 | 4 385 | 4 599 | 4 990 | 5 160 | 5 282 |
| **Total** | **29 748** | **30 355** | **31 034** | **31 644** | **32 454** | **33 350** | **33 869** |

Source: http://www.stats.environnement.developpementdurable.gouv.fr/uploads/media/dechetsmenages2a_03.pdf

Numbers of treatment facilities of household waste:

| | 1996 | 1997 | 1998 | 1999 | 2000 | 2002 | 2004 | 2006 |
|---|---|---|---|---|---|---|---|---|
| Landfill Stations | 425 | 397 | 391 | 365 | 352 | 316 | 318 | 303 |
| Incineration Stations without energy recovery | 176 | 156 | 148 | 113 | 106 | 50 | 22 | 18 |
| Incineration facilities with energy recovery | 90 | 95 | 98 | 101 | 105 | 112 | 112 | 110 |
| Separation Stations | 54 | 77 | 104 | 112 | 195 | 229 | 296 | 281 |

Source:http://www.stats.environnement.developpement-durable.gouv.fr/uploads/media/dechetsmenages2b_02.pdf

In order to install the polluter-pays principle and in order to make landfill and incineration not cheaper possibilities to recycling, the Finance Act 2009 will increase the rate of the TGAP. Also, a rate on incineration will be established and augmented step by step. With the cost for incineration and landfill rising, it will be relatively less costly for local communities and businesses to redirect their waste stream to recycling and composting.

Additionally to the recycling incentives, the Finance Act of 2009 aims to promote waste prevention. Hence, the tax revenues are assigned to ADEME in order to finance waste prevention programs.

Source: http://www.developpementdurable.gouv.fr/IMG/spipwwwmedad/pdf/Le_point_sur_Dechets_menagers_cle06775b-1.pdf

**12. Direct and Indirect Economic Impact of Application of Instrument:**

Revenue generation: In 2004, the landfill tax generated €213 million

The heightening of the recycling rate leads to more recovering of important economic resources, such as lead, zinc, nickel and copper which might face global shortages by 2030. Hence, the increase of recycling and energy recovery can substitute imports of raw materials.

If the Grenelle aims will be achieved and 40 to 70 % of waste will be recycled, the recycling market will have been grown by €2 billion in 2015 and 10 000 to 20 000 jobs will have been created. Furthermore, €1.2 billion will be saved by the lowering of imports of raw materials and energy. Also an additional 4 TWh will be won in the form of energy or heat.

The market created should strengthen mainly French companies (bih corporations as well as SMEs) which dominate the market. Investments in waste separation, recycling et energy recovery should mainly benefit French (for example: CNIM, Vauché, Vannier, Vinci Environnement, Plastic Omnium) and European companies.

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

The Grenelle Environement 2007 (an open multi-party debate which bring together representatives of national and local goverment, industry, civil society, etc.) decided to establish an 5 year action plan on waste administration in order to achieve the goals set by the EU in this regard. The aims are:

- To reduce the production of household and assimilated waste by 7% per capita
- To increase the recycling rate of organic, household and assimilated waste to 35% in 2012 and to 45% in 2015. For industrial waste and household packaging waste, the recycling rate is supposed to be at 75% in 2012.
- Decrease the quantities of trash that is being incinerated or stored by 15%

The actions of the plan require extensive funding. The amount needed was estimated to be approximately 7 billion € in the period of 2009-2015. The progressive increase of the TGAP which was voted for in the budget law in 2009, will strengthen the engagement of the state significantly. In

2008, 55 million € were spent on this policy plan; a number which is supposed to increase up to € 259 million in 2011. The policy will be implemented by the Environment Agency and ADEME.

**17. Necessary Amendmends of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

The direct aim of the tax was 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 waste only that cannot be recovered by any other treatment by 2002.

**19. References and Sources:**

http://economicinstruments.com/index.php/solid-waste/article/200-

http://lesrapports.ladocumentationfrancaise.fr/BRP/054000565/0000.pdf

http://www.developpementdurable.gouv.fr/IMG/spipwwwmedad/pdf/Politique_des_dechets-V8_cle581cc3.pdf

Green Budget Reform (Robert Gale and Stephan Barg with Alexander Grillies)1995

http://www.developpement-durable.gouv.fr/Taxe-generale-sur-les-activites.html

http://www.developpementdurable.gouv.fr/IMG/spipwwwmedad/pdf/Le_point_sur_Dechets_menagers_cle06775b-1.pdf

http://www.developpement-durable.gouv.fr/IMG/pdf/02_cle7f33d7-2.pdf

http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=24147

http://www.stats.environnement.developpement-durable.gouv.fr/indicateurs/indicateurs-de-suivi-des-engagements-europeens/indicateurs-de-suivi-des-engagements-europeens/quantites-de-dechets-collectees-par-les-municipalites.html

http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do?dvsc=1

http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do

http://www.stats.environnement.developpementdurable.gouv.fr/uploads/media/dechetsmenages2a_03.pdf

## ANNEX 7: Germany – Waste Charge for Municipal Solid Waste

| | |
|---|---|
| **1.** | **Country:** |
| Germany | |
| **2.** | **Instrument:** |
| Waste fee, charged for collection and disposal of MSW and equal waste streams | |
| **3.** | **Type of Instrument** |
| Fee | |
| **4.** | **Level of Application:** |
| Communal | |
| **5.** | **Category of Waste:** |
| MSW, biodegradable waste, paper, glass, bulky waste, hazardous waste, often includes MSW-like waste from industry | |
| **6.** | **Type of Recovery:** |
| Material recycling (64%), incineration without energy recovery (19%), incineration with energy recovery (13%), landfill (< 1%) (numbers for 2008) | |
| **7.** | **Assessment Base:** |
| The assessment base depends on the fee type respective component: Basic fees are calculated per estate, person, household, number of containers collected or volume. Performance-based fees are calculated per volume, number of collections or weight. There are also combinations of different assessment bases. Usually the arrangement depends on the type of living area (multi-family houses or (semi-)detached houses). | |
| **8.** | **Addressee:** |
| Consumer, companies, public institutions (all producers of relevant waste categories) | |
| **9.** | **Detailed Description of Instrument:** |
| Waste producers pay the fee to the respective municipality. The disposal is organized either by the municipality or administration unions of multiple municipalities or by private contractor chosen per tender.<br><br>The fee level is determined by actual disposal-costs while surpluses/deficits are to be balanced within 3 years (cost-coverage principle). Relevant factors are waste quantities, rate of separation, treatment costs and market prize for recyclables. The fee is highest in regions without own treatment facilities as the treatment capacity has to be purchased from other regions.<br><br>There are different fee types varying between municipalities: Some design the fee as lump fee, others have multi-piece fees containing a basic fee and a performance based fee. Basic fees are to cover fixed costs (collection, containers, personnel, rents, interest rates etc.) and non-assignable costs (i.e. disposal of bulky waste, dangerous or toxic waste) and usually make up 60-80% of the total fee. Performance based fees serve above all environmental goals such as reduction of waste quantities and waste separation. However, there has been no total change to a sole performance based fee as with this model difficulties in terms of cost-coverage and illegal waste disposal often arise. | |

Composition of the average revenue-usage:

28% landfill

23% collection MSW

11% administration

10% collection waste paper

8% collection bulky waste

4% collection biodegradable waste

4% composting

3% collection hazardous and toxic waste

2% operation of recycling-centers

1% each: collection scrap, collection garden-waste, long-distance transports

**10. Relevant Laws and Regulations**

Fees: local fee statues and federal state laws on fees (Landesgebührenordnungen)

Example Nordrheinwestfalen: Kommunalabgabengesetz KAG NRW, Landesabfallgesetz LAbfG NRW

Waste in general (federal level):

Kreislaufwirtschafts- und Abfallgesetz KrW-/AbfG 1996

Technische Anleitung Siedlungsabfall TASi 1993

Abfallablagerungsverordnung AbfAblVO 2001

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The volume of waste generated has been constant since 1999. On the local level there have been several pilot projects to replace the lump fee with a performance based fee (mechanical lock-gates, token- or banderole-systems, identification systems, weighing systems). All these projects led to a significant reduction of waste volumes ranging from 25 % to 50 %.

Germany has one of the highest (material) recycling rate of all countries amounting to 77% in 2008.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

The change from lump fees to a performance-based fee often leads to a paradox rise of fees resulting from the triggered waste prevention. The rise is due to the high share of fix costs which rise proportionally per waste-unit when the total waste amount decreases.

As with pilot projects for waste quantity reduction the economic outcomes are difficult to access: While innovative systems (lock gates, identification systems etc.) are connected with high investment costs these are often compensated by reduction in waste quantities and increased shares of recyclables that can be sold on respective markets.

**13. Direct and Indirect Social Impact of Application of Instrument:**

Fees have risen significantly during the 1990s, however this is attributed rather to changes in non-

fee- policies (i.e. the restriction of landfill to inert waste only)

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

Common problems with volume based fees are residents compressing the waste within containers to lower the fee. This complicates the collection of waste which is why there is usually a obligatory minimum-collection (frequency or number of bins).

Token-, banderole or identification systems pose the risk of theft as well of hygiene-problems in cases of long collection-periods. Usually they are not feasible in areas with multi-family-houses.

**16. Decision-Making Process Leading to Introduction of Instrument:**

-

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

The performance-based fee has a high level of acceptance in comparison to the lump fee as residents only want to pay for their own waste. Citizens in municipalities with lump fee often demanded a change to performance-based fee.

**19. References and Sources:**

Abfallwirtschaftsbetrieb München: Zukunft der öffentlich-rechtlichen Abfallwirtschaft – Neuer Trend zur Privatisierung oder Renaissance der kommunalen Betriebe? Pressehintergrundgespräch mit Kommunalreferentin Gabriele Friderich, Do., den 27.08.2009; http://www.awm-muen-chen.de/uploads/media/pressehintergrundgespraech_27_08_09_Zukunft_der_oeffentlich_rechtlichen_Abfallwirtschaft.pdf (retrieved 26.07.10).

Bilitewski, Bernd, 2007: Verursachergerechte Gebührensysteme im Vergleich. Aufwand – Kosten – Nutzen; http://www.abfallforum.de/downloads/Praxisforum_2007_Bilitewski.pdf (retrieved 26.07.10).

BMU, 2006: Abfallwirtschaft in Deutschland. Motor für Jobs und Innovationen, Berlin; http://www.cleaner-production.de/fileadmin/assets/bilder/_73_broschuere_abw_deutschland.pdf (retrieved 26.07.10)

BMU, 2009: Fakten zur nachhaltigen Abfallwirtschaft; http://www.bmu.de/files/pdfs/allgemein/application/pdf/abfallw fakten.pdf (retrieved 29.07.10).

Destatis, 2009: Statistisches Jahrbuch 2009, Kapitel 12: UMWelt; http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/SharedContent/Oeffentlich/B3/Publikation/Jahrbuch/UMWelt,property=file.pdf (retrieved 15.09.10).

Gesellschaft für Verpackungsmarktforschung, 2010: Recycling-Bilanz 1991-2008;

http://www.gvm-wiesbaden.de/pdf/infocus/2010-03_RB16_de.pdf (retrieved 29.07.10).

Gesellschaft für Verpackungsmarktforschung, 2010: Mehrweg-Quoten 2008; http://www.gvm-wiesbaden.de/pdf/infocus/2010-05_EWMSW2008_de.pdf (retrieved 29.07.10).

Hofreiter, Anton, 2007: Eckpunkte einer grünen Wertstoffverordnung; http://www.toni-hofreiter.de/dateien/F_335-07_PP_Wertstoffverordnung.pdf (retrieved 26.07.10).

Mühle, S.; Balsam, I.; Cheeseman, C. R.: Comparison of carbon emissions associated with municipal solid waste management in Germany and the UK, in: Resources, Conservation and Recycling, 2010, 54:11, 793–801.

Slavik, Jan, 2006: Kommunale Gebühren – deutsche Erfahrungen in der tschechischen Praxis, Köln/
Prag; www.ieep.cz/editor/assets/projekty/komunalni_poplatky/bericht.pdf (retrieved 26.07.10).

Stadt Frankfurt am Main, 2008: Abfallgebühren in Frankfurt am Main. Die neue Abfallgebührenstruktur für Haushalt und Gewerbe;
www.frankfurt.de/sixcms/media.php/738/abfallgebuehren.pdf (retrieved 26.07.10).

Umweltbundesamt, 2010: Bewertung der Verpackungsverordnung. Evaluierung der Pfandpflicht;
http://www.uMWeltdaten.de/publikationen/fpdf-l/3931.pdf (retrieved 26.07.10).

http://www.bmu.de/abfallwirtschaft/fb/verpackungen/doc/41160.php (retrieved 29.07.10).

http://www.bmu.de/abfallwirtschaft/verpackungsverordnung/doc/5882.php (retrieved 29.07.10).

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/UMWelt/UMWeltstatistischeErhebungen/Abfallwirtschaft/Tabellen/Content75/ZeitreiheAbfallaufkommen1996__2008,property=file.pdf (retrieved 26.07.10).

http://www.spiegel.de/politik/deutschland/0,1518,262000,00.html(retrieved 26.07.10).

## ANNEX 8: Germany – Deposit Refund Scheme on Packaging Waste

| |
|---|
| **1. Country:** |
| Germany |
| **2. Instrument:** |
| Deposit-Refund-Scheme on Packaging Waste |
| **3. Type of Instrument** |
| Deposit-Refund-Scheme |
| **4. Level of Application:** |
| Federal |
| **5. Category of Waste:** |
| Beverage Packaging Waste (exemptions: milk, fruit/vegetables juice, wine, beverage carton, PET-bags, foil-bags) |
| **6. Type of Recovery:** |
| Reuse, recycling, incineration |
| **7. Assessment Base:** |
| Per unit |
| **8. Addressee:** |
| Legal: Packing producer<br>Economic: Consumer |
| **9. Detailed Description of Instrument:** |
| To support reusable beverage packaging the law requires one way beverage packaging to be sold with a deposit of (at least) 0.25 € per unit. Consumers receive the deposit back when returning the empty beverages to retailers.<br>Reusable beverage packaging is free of a mandatory deposit, however in order to get back the containers, manufacturers levy a deposit of 0.08 € for beer and 0.15 € for fruit juice. |
| **10. Relevant Laws and Regulations** |
| Packaging-Ordinance (Verpackungsverordung (VerpackV)) 1991, enactment of designated deposit-refund-scheme in 2005<br>The initial version of the ordinance only set a target of share of 72% reusable packaging without introducing a deposit-refund scheme. This was done in 2005 after manufacturers failed to meet the reusable-quota 2 years in a row (2003-04). |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| Despite promoting a high collection rate of ca. 95% the instrument failed to stop the constant reduction of the reusable packaging share which dropped from 71,7% in 1991 to 44,1% in 2008.<br>However, it can be seen as having contributed to the stabilization of the amount of packaging produced (1991 15,6 Mio t, 1997 13,7 Mio t, 2003 15,5 Mio t). Furthermore the material recy- |

cling rate almost doubled from 47,1% in 1991 to 81,2% in 2003.

A British study also partially attributes the 5 times lower CO2-emissions from waste in Germany to the deposit-refund-scheme.

Some studies ascribe the advancement in waste separation technologies which allow the current efficient extraction of resources from residual waste to the deposit refund scheme.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

The instrument's costs for the retail industry (handling, storage) are estimated at 800 – 900 Mio. €/year. There are little administrative costs related to controls concerning the illegal sale of deposit-free beverages.

The instrument poses no disadvantages for the domestic industry as imports are also subject to deposit-obligation and exports are deposit-free. However, the deposit-refund-scheme is said to have accelerated the market-concentration in beverage-commerce (sale) due to economic advantages for large discounters with lower take-back costs per unit. Furthermore, the extraction of recyclables from waste created profit opportunities via sale on markets for secondary raw materials leading to an accelerated shift from regional and public waste management of recyclables to transregional and private waste management.

**13. Direct and Indirect Social Impact of Application of Instrument:**

There has been an overall increase of jobs in packaging-sector of ca. 1,300 from 2002-2006. Further jobs have been created in the retail industry, finance and automation-industry.

The collection of inappropriate disposed (i.e. littering) deposit packaging provides income opportunity for poor and homeless people. Many take-back automates also offer the option to donate deposit for charity.

**14. Social or Political Opposition or Resistance:**

The introduction and revisions of the deposit-refund-scheme led to heavy protests of beverage industry and retailers including a public campaign against "deposit dictates" and threats with collective boycott.

**15. Technical or Legal Obstacles (and Solutions):**

The refusal of shops to take back packaging beyond their own product range ("island-solutions") led to large irritations of consumers. Therefore in 2006 the government introduced a general take-back obligation for all shops larger than 200 $m^2$. To compensate for imbalances between deposits received and refunded the ordinance prescribed a central coordination office to be organized by the concerned parties.

Until today it is difficult to tell apart one-way- and reusable packaging due to insufficient labeling. This severely undermines the promotion of reusable packaging which is why currently an ordinance concerning labeling rules is debated.

Several lawsuits have been brought before national courts and EuGH but were turned down as the ordinance was found to be consistent with relevant competition laws as well as profession and property rights.

There have been some technical problems with take-back automates unable to differentiate between one-way and reusable packaging.

**16. Decision-Making Process Leading to Introduction of Instrument:**

The deposit refund scheme was above all promoted by the Green Party hoping to promote ecologically favorable reusable packaging. Another reason was the massive rise of packaging waste and related littering since the 1970s.

An industry favored alternative consisting of a 5 Cent fee on one-way beverage packaging was refused.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

Official sources see the instrument as successful due to increased recycling rates. However environmentalists point to the continuing decline of reusable rate.

Ca. 75 % of consumers in Germany are generally in favor of the deposit system. However, just as many are critical of its specific configuration regarding the former "island-solution" and the difficulties in distinguishing one-way/reusable beverage packaging which poses an urgent need for reform.

**19. References and Sources:**

Abfallwirtschaftsbetrieb München: Zukunft der öffentlich-rechtlichen Abfallwirtschaft – Neuer Trend zur Privatisierung oder Renaissance der kommunalen Betriebe? Pressehintergrundgespräch mit Kommunalreferentin Gabriele Friderich, Do., den 27.08.2009; http://www.awm-muen-chen.de/uploads/media/pressehintergrundgespraech_27_08_09_Zukunft_der_oeffentlich_rechtlichen_Abfallwirtschaft.pdf (retrieved 26.07.10).

Bilitewski, Bernd, 2007: Verursachergerechte Gebührensysteme im Vergleich. Aufwand – Kosten – Nutzen; http://www.abfallforum.de/downloads/Praxisforum_2007_Bilitewski.pdf (retrieved 26.07.10).

BMU, 2006: Abfallwirtschaft in Deutschland. Motor für Jobs und Innovationen, Berlin; http://www.cleaner-production.de/fileadmin/assets/bilder/_73_broschuere_abw_deutschland.pdf (retrieved 26.07.10)

BMU, 2009: Fakten zur nachhaltigen Abfallwirtschaft; http://www.bmu.de/files/pdfs/allgemein/application/pdf/abfallw fakten.pdf (retrieved 29.07.10).

Gesellschaft für Verpackungsmarktforschung, 2010: Recycling-Bilanz 1991-2008; http://www.gvm-wiesbaden.de/pdf/infocus/2010-03_RB16_de.pdf (retrieved 29.07.10).

Gesellschaft für Verpackungsmarktforschung, 2010: Mehrweg-Quoten 2008; http://www.gvm-wiesbaden.de/pdf/infocus/2010-05_EWMW2008_de.pdf (retrieved 29.07.10).

Hofreiter, Anton, 2007: Eckpunkte einer grünen Wertstoffverordnung; http://www.toni-hofreiter.de/dateien/F_335-07_PP_Wertstoffverordnung.pdf (retrieved 26.07.10).

Mühle, S.; Balsam, I.; Cheeseman, C. R.: Comparison of carbon emissions associated with municipal solid waste management in Germany and the UK, in: Resources, Conservation and Recycling, 2010, 54:11, 793–801.

Slavik, Jan, 2006: Kommunale Gebühren – deutsche Erfahrungen in der tschechischen Praxis, Köln/Prag; www.ieep.cz/editor/assets/projekty/komunalni_poplatky/bericht.pdf (retrieved 26.07.10).

Stadt Frankfurt am Main, 2008: Abfallgebühren in Frankfurt am Main. Die neue Abfallgebührenstruktur für Haushalt und Gewerbe; www.frankfurt.de/sixcms/media.php/738/abfallgebuehren.pdf (retrieved 26.07.10).

Umweltbundesamt, 2010: Bewertung der Verpackungsverordnung. Evaluierung der Pfandpflicht; http://www.umweltdaten.de/publikationen/fpdf-l/3931.pdf (retrieved 26.07.10).

http://www.bmu.de/abfallwirtschaft/fb/verpackungen/doc/41160.php (retrieved 26.07.10).

http://www.bmu.de/abfallwirtschaft/verpackungsverordnung/doc/5882.php (retrieved 26.07.10).

http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/UMWelt/UMWeltstatistischeErhebungen/Abfallwirtschaft/Tabellen/Content75/ZeitreiheAbfallaufkommen1996__2008,property=file.pdf (retrieved 26.07.10).

http://www.spiegel.de/politik/deutschland/0,1518,262000,00.html (retrieved 26.07.10).

http://www.mehrweg.org/index2.html# (retrieved 26.07.10).

## ANNEX 9: Japan – PAYT-System for Municipal Solid Waste

| |
|---|
| **1. Country:** |
| Japan |
| **2. Instrument:** |
| Municipal Solid Waste Fees (e.g. Pay as you throw (PAYT)) |
| **3. Type of Instrument** |
| Fee |
| **4. Level of Application:** |
| Communal (municipal) |
| **5. Category of Waste:** |
| Municipal solid waste / household garbage |
| **6. Type of Recovery:** |
| Incineration, waste deposit, recycling |
| **7. Assessment Base:** |
| Per bag/volume |
| **8. Addressee:** |
| Consumers |
| **9. Detailed Description of Instrument:** |
| Normally paid-for garbage bag system:<br>Residents have to buy special garbage bags.<br>Mostly there are various types of garbage bags, e.g. for combustible, non-combustible, recyclable, non-recyclable waste. The prices vary from bag to bag. Normally garbage bags for non-recyclable solid waste are more expensive than garbage bags for recyclable waste to increase the incentive for recycling.<br>Municipalities collect the bags and discard the garbage properly. |
| **10. Relevant Laws and Regulations** |
| Waste management and public cleansing law http://www.env.go.jp/en/laws/recycle/01.pdf |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| - |
| **12. Direct and Indirect Economic Impact of Application of Instrument:** |
| For consumers: costs for garbage bags, waste fee<br>For municipalities: both the total cost for waste treatment and the waste treatment cost per person increased from 1997-2001 and decreased from 2001-2006. In the whole period there has been an overall decrease from 17700 in 1997 to 14600 in 2006 with a peak of 20500 in 2001.<br>The total amount of operating expenses for garbage processing in fiscal 2006 was 1,862.7 billion yen, this averages out to about 14,600 yen per person, a decrease of 300 yen on the previous year.<br>(MoE 2009) |

| | |
|---|---|
| Total costs for municipal solid waste treatment in 2008: | 1,816.9 billion yen |
| Of which: | |
| Construction and improvement of facilities: | 179.7 billion yen |
| Treatment and maintenance/operation: | 1,530.1 billion yen |

(MoE 2010)

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

Increasing total waste generation (see 12.)

Decreasing capacity of remaining Sustainable Years of Final Disposal Facilities for MSW

Lowest value with 7,6 years in 1990. Since then increasing again to 12,2 years in 2000, 15,5 years in 2006 and 18,0 years in 2008.

(METI 2004); (MoE 2008/2010)

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

-

**19. References and Sources:**

MoE (2009): Establishing a sound material-cycle society - Creating economic development through the establishment of a sound material-cycle society 2009; source: http://www.env.go.jp/en/wpaper/index.html (23.08.2010)

METI (2004): Handbook on Resource Recycling Legislation and Trends in 3R; source: http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/handbook2004_e.pdf (23.08.2010)

MoE (2008): State of Discharge and Treatment of Municipal Solid Waste in FY 2006, source: http://www.env.go.jp/en/headline/file_view.php?serial=245&hou_id=796 (25.08.2010)

MoE (2010): State of Discharge and Treatment of Municipal Solid Waste in FY 2008, source: http://www.env.go.jp/en/headline/file_view.php?serial=359&hou_id=1333 (25.08.2010)

http://www.ncbi.nlm.nih.gov/pubmed/18799298 (25.08.2010)

http://www.env.go.jp/en/laws/recycle/01.pdf (25.08.2010)

## ANNEX 10: Japan – Cost-Based Designated Garbage Bag Program

| | |
|---|---|
| **1. Country:** | |
| Japan (City of Kyoto) | |
| **2. Instrument:** | |
| Cost-Based Designated Garbage Bag Program (Paid-for Garbage Bags for Household Garbage) | |
| **3. Type of Instrument** | |
| Fee | |
| **4. Level of Application:** | |
| Communal (municipal) | |
| **5. Category of Waste:** | |
| Municipal solid waste / household garbage | |
| **6. Type of Recovery:** | |
| Incineration, waste deposit, recycling | |
| **7. Assessment Base:** | |
| Per bag/volume | |
| **8. Addressee:** | |
| Consumers | |
| **9. Detailed Description of Instrument:** | |

In the Cost-Based Designated Garbage Bag Program the city residents use municipally designated garbage bags (available to buy for a fee) to dispose of garbage. Through this program, improvements can be made to promote reduction and separation of waste and recycling while making the burden of costs for waste disposal fair. Further, the designated garbage bags will be made semi-transparent in consideration of privacy. Business-related and recyclable garbage will be separated using transparent garbage bags to prevent being mixed with hazardous materials.

Fee rate:

Authorized bag for household garbage (yellow)

| Size | Price (10 bags) |
|---|---|
| – 45L | ￥450 -→ per bag 45 Yen and 1 Yen per litre |
| – 30L | ￥300 |
| – 20L | ￥200 |
| – 10L | ￥100 |
| – 5L | ￥50 |

For recyclable garbage (Cans, glass bottles, plastic bottles)（clear）

| Size | Price (5 bags) |
|---|---|
| – 45L | ￥110 -→ per bag 22 Yen and ~ 0.5 Yen per liter |
| – 30L | ￥75 |
| – 20L | ￥50 |

Recyclable garbage has further to be sorted into two categories in separate bags:

- Plastic Containers and Wrapping
- Cans, Bottles, PET-Bottles

**10. Relevant Laws and Regulations**

Waste Management and Public Cleansing Law http://www.env.go.jp/en/laws/recycle/01.pdf

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The total amount of household-related garbage has been reduced by about 23% (64,000t) since the introduction of the system in 2005. Waste from cans, bottles and plastic bottles was reduced by about 26% (4,600t). The amount of plastic containers and packaging collected expanded all over the city to about 10,000 t (from near zero).

**12. Direct and Indirect Economic Impact of Application of Instrument:**

Consumers have additional expenditures for garbage bags.

The revenue generated is pooled in the „Kyoto City Environment Fund“. The budget for 2009 amounts to 916 million Yen. The money is used to finance the further promotion of garbage reduction/separation/recycling, town beautification and the prevention of global warming

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

Schedule of implementation

| | |
|---|---|
| October 2005 : | Announcement of basic policy for inducing the Cost-Based Designated Garbage Bag Program |
| December 2005: | Public Sessions about the Program |
| January 2006: | Kyoto City’s decision on final policy |
| February 2006: | Submission of ordinance amendment to city council |
| April 2006: | Start of PR activity for the induction of the Cost-Based Designated Garbage Bag Program |
| September 2006: | Distribution of trial bags and garbage dictionaries to all homes |
| October 2006: | Induction of Cost-Based Designated Garbage Bag Program |

The fee has been introduced in order to reduce garbage by 20%. It aims at leaving a better environment for next generations and reducing greenhouse gas emissions through the further promotion of waste reduction and recycling.

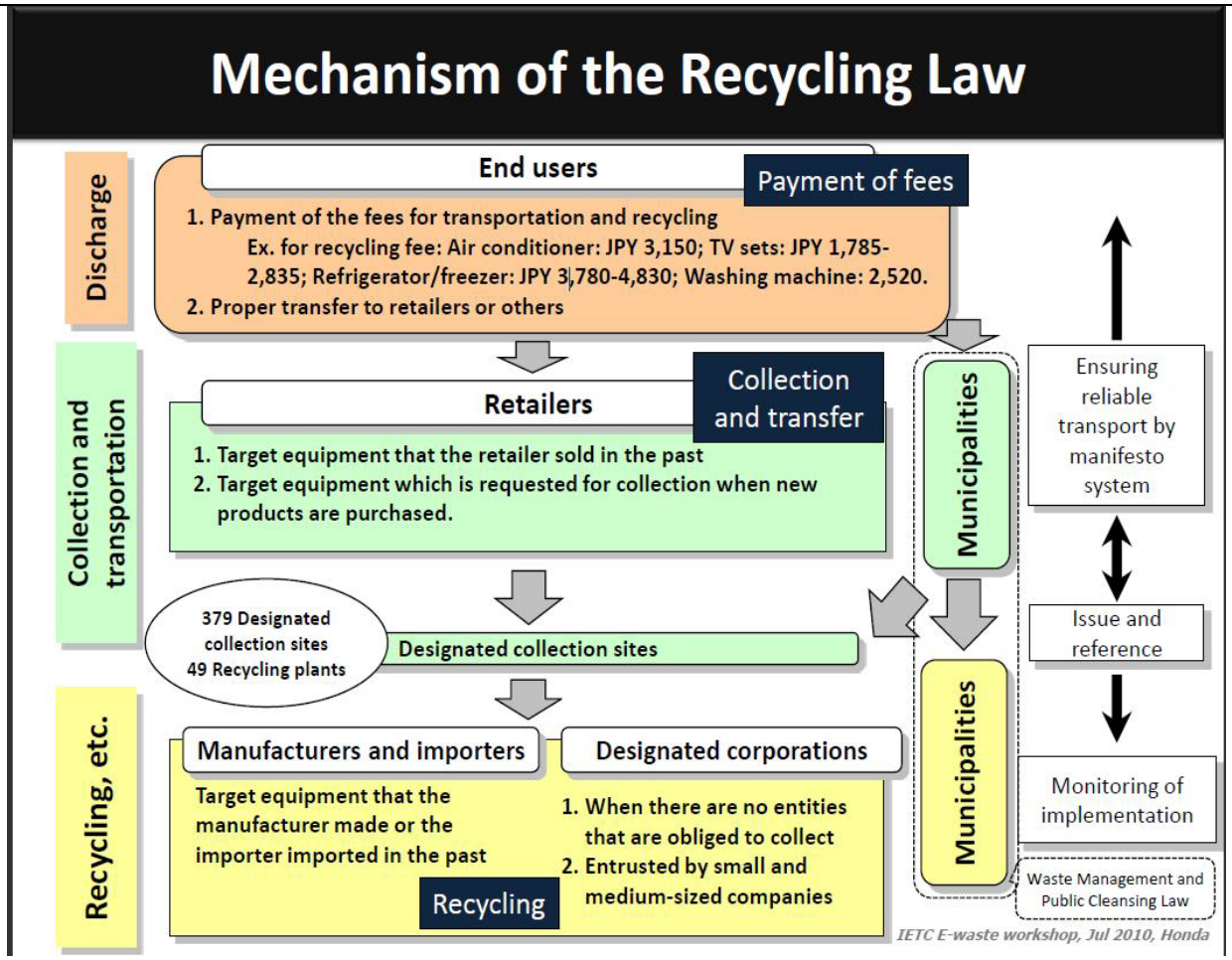
**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

| 18. General Success and Acceptance: |
|---|
| In 2007 a public survey about the Cost-Based Designated Garbage Bag Program was conducted in order to reveal the acceptance of the public. It targeted 2000 people aged 20 or older of which 987 responded. Over 50% responded that they had definitely changed their waste handling habits because of the program. 56% said, that they had worked to reduce the volume of their garbage by doing things like breaking down paper boxes. 22% said that they had changed their shopping habits to reduce waste by, for example, choosing products with less packaging. 36% did not regard the cost of the garbage bags as a burden. 48% felt it was a burden or even a heavy burden.<br>Government urges other municipalities to implement municipal solid waste fee-systems. |
| **19. References and Sources:** |
| Japan Environmental Exchange (J.E.E.) (2008): How to Reduce Waste, Recycle and Dispose of Garbage in Kyoto City; source: http://www.jeeeco.org/project/how_to_reduce.pdf (25.08.2010)<br><br>Kyoto City Environment Policy Bureau (2009): Guide on garbage disposal in Kyoto; source: http://www.city.kyoto.lg.jp/kankyo/cmsfiles/contents/0000065/65614/eigo.pdf (25.08.2010)<br><br>Kyoto City Recyclable Society Promotion Section (2006): Basic Policy for Inducting a Cost-Based Designated Garbage Bag Program for Household Garbage Collection, source: http://www.city.kyoto.lg.jp/kankyo/cmsfiles/contents/0000000/767/eigo.pdf (25.08.2010)<br><br>Japan for Sustainability (JFS) (2007): Pay-As-You-Throw Program Reduces Household Waste in Kyoto; source: http://www.japanfs.org/en/pages/026871.html (25.08.2010)<br><br>MoE (2009): Establishing a sound material-cycle society - Creating economic development through the establishment of a sound material-cycle society 2009; source: http://www.env.go.jp/en/wpaper/index.html (23.08.2010)<br><br>http://www.env.go.jp/en/laws/recycle/01.pdf |

## ANNEX 11: Japan – Home Appliance Recycling Law

| 1. Country: |
|---|
| Japan |
| **2. Instrument:** |
| The Home Appliance Recycling Law<br>Consumers have to pay for collection and recycling of home appliances that are being collected by retailers and passed on to manufacturers for recycling. |
| **3. Type of Instrument** |
| Fee |
| **4. Level of Application:** |
| federal |
| **5. Category of Waste:** |
| Home Appliances (air conditioners, refrigerators, televisions, washing machines, since 2009 also flat-screen televisions, cloth dryers) |
| **6. Type of Recovery:** |
| Recycling, incineration, landfill |
| **7. Assessment Base:** |
| per item |
| **8. Addressee:** |
| Home appliance manufacturers and importers<br>Home appliance retailers<br>Consumers |
| **9. Detailed Description of Instrument:** |
| Retailers and municipalities take back waste home appliances from consumer. They issue home appliance recycling coupons to manufacturers who collect and recycle the waste. |




(Honda 2009)

Mandatory recycling rates are:

CRT TVs: 55%

LCD/PDP TVs: 50%

Washing machines/cloth dryers: 65%

Air conditioners: 70%

Refrigerators/Freezers: 60%

Additionally all chlorofluorocarbons (CFCs) contained in these appliances have to be recovered and destroyed.

The recycling fee is set by the manufacturers and should represent the costs of recycling (including transport etc.):

CRT TVs: 1,785-2,835 Yen

LCD/PDP TVs: 1,785-2,835 Yen

Washing machines/cloth dryers: 2,520 Yen

Air conditioners: 3,150 Yen

Refrigerators/Freezers: 3,780 - 4,830 Yen

**10. Relevant Laws and Regulations**

Law for the Recycling of Specified Kinds of Home Appliances

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

Collection results:

| 2009 | Million units | Share in % | Change since 2008 |
|---|---|---|---|
| CRT TVs | 10.32 | 55 | +92,3% |
| clothes washers and dryers | 3.09 | 16 | +9,4% |
| Air conditioners | 2.15 | 12 | +9,5% |
| refrigerators and freezers | 3.01 | 16 | +9,5% |
| LCD and plasma TVs | 0.22 | 1 | +/- 0% |
| Total: | 18,79 | 100 | +45,8% |

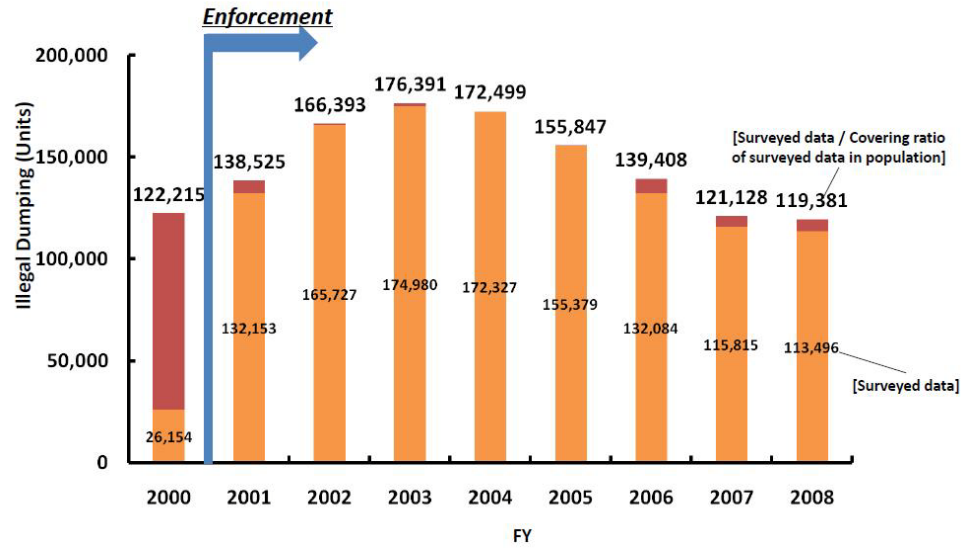
Recycling rates:

| | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | legally required | FY 2009 - leg. req. |
|---|---|---|---|---|---|---|---|
| **CRT TVs** | 77% | 77% | 86% | 89% | 86% | 55% | 31% |
| **Washing machines and dryers** | 75% | 79% | 82% | 84% | 85% | 65% | 20% |
| **Air conditioners** | 84% | 86% | 87% | 89% | 88% | 70% | 18% |
| **Refrigerators and freezers** | 66% | 71% | 73% | 74% | 75% | 60% | 15% |
| **LCD and plasma TVs** | - | - | - | - | 74% | 50% | 24% |

*LCD and plasma TVs and clothes dryers were added as designated appliances in FY 2009.
(For this reason, the recycling rates for clothes washers and dryers for FY 2007 and FY 2008 refer to clothes washers only.)

http://www.meti.go.jp/english/press/data/nBackIssue20080603_02.html
http://www.meti.go.jp/english/press/data/20100601_01.html

illegal dumping:




(Honda 2009 , Page 8)

**12. Direct and Indirect Economic Impact of Application of Instrument:**

-

**13. Direct and Indirect Social Impact of Application of Instrument:**

Prices of home appliances increased significantly due to inclusion of the fee.

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

The Home Appliances Law was introduced in the light of a increasing shortage of landfill space where most of the devices have been dumped before.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

As the fee is paid per unit, this provides no incentives for an eco-friendly design of home appliances.

In the beginning illegal dumping increased, however after improved monitoring the number of illegal dumped home appliance units decreased from a peak in 2003 (176,391 units) to 119,381 units in 2008..

**19. References and Sources:**

Honda, Shunichi (2009): Japan's Experiences in Environmentally Sound Management of E-waste – Home Appliances Recycling Law, http://gec.jp/gec/jp/Activities/ietc/fy2010/e-waste/ew_1-5.pdf (23.08.2010).

METI (2004): Handbook on Resource Recycling Legislation and Trends in 3R; http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/handbook2004_e.pdf (23.08.2010).

METI (1999): Law for Recycling of Specified Kinds of Home Appliances; http://www.meti.go.jp/english/information/data/cReHAppre.html (25.05.2010).

Inform (2003): Electric Appliance Recycling in Japan; http://www.informinc.org/japanepr.pdf (26.08.2010).

http://www.env.go.jp/en/wpaper/index.html (23.08.2010).

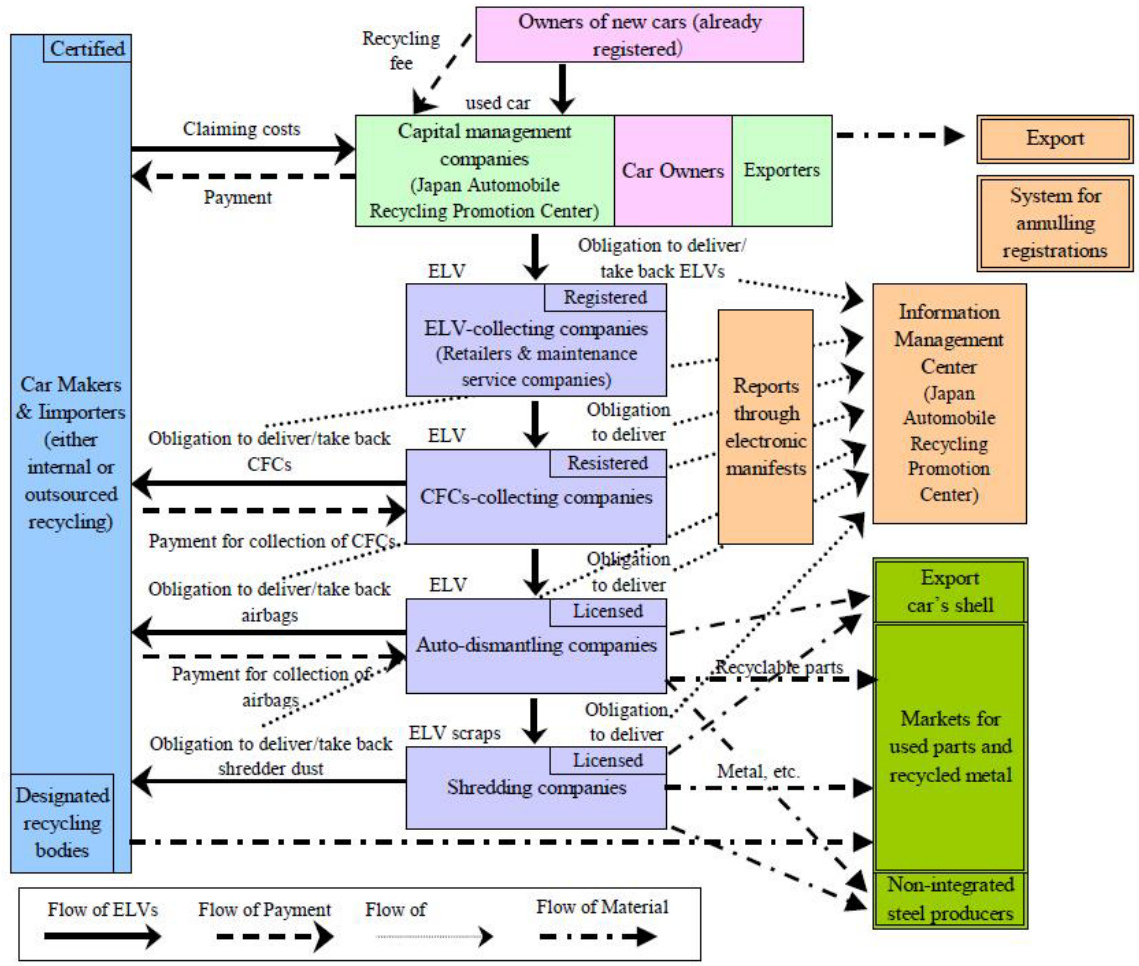
http://www.meti.go.jp/english/press/data/20100601_01.html (26.08.2010).

http://www.meti.go.jp/english/press/data/nBackIssue20080603_02.html (26.08.2010).

## ANNEX 12: Japan – ELV Recycling Law

| |
|---|
| **1. Country:** |
| Japan |
| **2. Instrument:** |
| Law on Recycling of End-of-Life Vehicles (ELV Recycling Law)<br>The law obliges car manufacturers to take back and recycle scrap cars. Consumers make up for the costs via a fee when purchasing the car. |
| **3. Type of Instrument** |
| fee |
| **4. Level of Application:** |
| federal |
| **5. Category of Waste:** |
| All types of four-wheel vehicles (including large vehicles and commercial vehicles, such as trucks and buses) |
| **6. Type of Recovery:** |
| Recycling, landfill, incineration |
| **7. Assessment Base:** |
| The fee has to represent the costs of recycling and differs from car to car. The government will intervene if fees are considered inappropriate. |
| **8. Addressee:** |
| Consumers (fee), car manufacturers (obligation to take back and recycle certain parts of ELVs, recycling rate) |
| **9. Detailed Description of Instrument:** |
| Car manufacturers have to collect and recycle airbags, fluorocarbon gas contained in air conditioners and automobile shredder residue (ASR). Mandatory recycling rates for ASR are 30 % in 2005, 50 % in 2010 and 70 % in 2015.<br>Consumers have to pay the fee when purchasing or registering a new (after 2005) car or at the first periodic inspection. They have to take scrap cars to registered ELV-services who pass on the ELV to recycling-, dismantling- and shredder-services. After these services the ELV/residues are forwarded to the manufacturers.<br>The fee level depends on the type of vehicle. It reflects the costs for collection, recycling and ranges from 6,000 to 18,000 Yen (about US$ 51-153). Collected fees are handled by the Japan Automobile Recycling Promotion Centre (JARC) and organized in a recycling fund. |

Fig. 7 ELV Recycling Law Overview




Source: Ministry of Economy, Trade and Industry

(Source: JETRO 2006)

## 10. Relevant Laws and Regulations

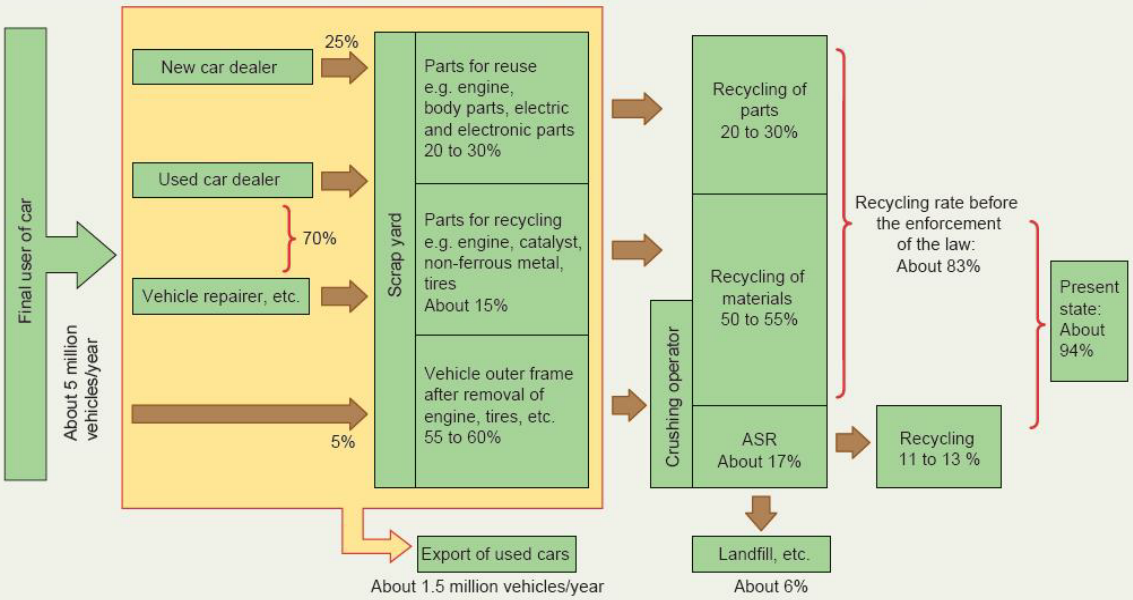
Law on Recycling of End-of-Life Vehicles (ELV Recycling Law)

## 11. Direct and Indirect Ecological Impact of Application of Instrument:

Following the introduction of the fee the collection rate increased from 83 % to 94 %. The recycling rate in 2005 was between 57 % and 66 % depending on the manufacturer. Thus the mandatory recycling rate of 2010 has already been met.

**Figure 2-28** Used vehicle disposal flow (fiscal year 2007)

Due to the enforcement of the Law for the Recycling of End-of-Life Vehicles, recycling rate of vehicles increased to about 94%.




Source: Created based on materials distributed at the 13th Joint Meeting of the Expert Committee on Vehicle Recycling in the Waste and Recycling Committee of the Central Environment Council, and the Vehicle Recycling WG in the Waste and Recycling Subcommittee under the Environment Division of the Industrial Structure Council, held in May 2008

The fee did not lead to a decrease of collected ELV. Numbers increased from 3.05 Mio in 2005 to 3.57 Mio in 2006.

Because of the prior fee payment agreement (fee paid at the time of purchase) and because of higher industrial metal prices the overall number of unlawfully dumped ELV in Japan dropped significantly from 126,000 (2001) to 35,000 (2007)

## 12. Direct and Indirect Economic Impact of Application of Instrument:

Treatment costs for manufacturers: (2006)

**Table 4** ASR Treatment Balances of Automakers for Fiscal 2006

| | Toyota | Honda | Nissan |
|---|---|---|---|
| Receipt from fee deposit | 6,263,650,936 | 1,955,838,038 | 4,168,360,089 |
| Spending for recycling | 6,311,093,506 | 1,915,981,327 | 4,003,550,859 |
| Balance | -47,442,570 | 39,856,711 | 164,809,230 |
| | **Mazda** | **Mitsubishi** | **Fuji Heavy** |
| Receipt from fee deposit | 1,100,280,654 | 1,690,986,596 | 1,055,790,492 |
| Spending for recycling | 1,118,789,803 | 1,704,422,890 | 1,004,499,805 |
| Balance | -18,509,149 | -13,436,294 | 51,290,687 |

Source: Websites of the automakers.

(Togawa 2007 ; Page 12)

To avoid the recycling costs Japanese car manufacturers increased their export orientation as for exported cars there is no recycling obligation.

The government introduced subsidies to allow ELV to be transferred from small islands to the mainland (see section 15). In 2006 these subsidies amounted to 94.5 Mio yen.

**13. Direct and Indirect Social Impact of Application of Instrument:**

Costs for consumers of 6,000 up to 18,000 yen per car are negligible compared to car prices.

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstacles (and Solutions):**

The law constituted a problem to Japans large number of small islands where no recycling facilities exist so that ELV have to be forwarded by sea causing high costs. As a solution the Japanese government introduced subsidies for ELV-shipments for these cases.

**16. Decision-Making Process Leading to Introduction of Instrument:**

The fee resulted from problems with illegal dumping of ASR and rising disposal costs due to a shortage of landfill capacity in the 1990s.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

While the government judges the instrument to be successful, experts make up relatively small effects due to the restriction of recycling obligations to airbags, fluorocarbons and ASR only. As an eco-friendly car design will not significantly reduce the recycling-costs for these parts, there are no incentives for such developments.

**19. References and Sources:**

Japan External Trade Organization (JETRO) (2006): Japan Economic Report, June-July 2006: Car Recycling Business in Japan; http://www.jetro.go.jp/en/reports/market/pdf/2006_21_as.pdf (16.08.2010)

Japan for Sustainability (JFS) (2006): Newsletter No.50 October 2006: The Recycling of End-of-Life Vehicles in Japan; http://www.japanfs.org/en/mailmagazine/newsletter/pages/027816.html (16.08.2010)

METI (2004): Handbook on Resource Recycling – Legislation and Trends in 3R; http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/handbook2004_e.pdf (16.08.2010).

Togawa, K. (2007): Japan´s Automotive Recycling System: Evaluation Three Years after Implementation; http://www.ide.go.jp/English/Publish/Download/Spot/pdf/30/006.pdf (16.08.2010)

Toyata (2009): Sustainability Report 2009 Environmental Aspects; http://www.toyota.co.jp/en/csr/report/09/download/pdf/sr09_p28_p31.pdf (24.08.2010)

http://www.jarc.or.jp/en/recycling/index03.html (24.08.2010)

http://www.japaneselawtranslation.go.jp/law/detail/?printID=&ft=1&re=02&dn=1&x=0&y=0&co=01&ky=vehicles&page=1&vm=02 (24.08.2010)

## ANNEX 13: Spain – PAYT-System for Municipal Solid Waste

**1. Country:**

Spain (City of Argentona, Catalonia)

**2. Instrument:**

Waste charge: "Pay as you throw system" (PAYT)

**3. Type of Instrument**

Charge

**4. Level of Application:**

Municipality

**5. Category of Waste:**

Municipal solid waste

**6. Type of Recovery:**

Waste collection

**7. Assessment Base:**

The charge is divided into two parts, a flat part and a variable one. The latter depending on the volume of waste produced (2 fractions: packaging and refuse).

**8. Addressee:**

Households and commercial businesses

**9. Detailed Description of Instrument:**

In a PAYT system, the service user pays waste collection according to his actual waste generation.

Waste generation in Argentona:

| Year | Waste production (ton) | Waste production per capita (kg/hab/year) | Incineration (ton) |
|---|---|---|---|
| **2004** | **6,730** | **600** | **3,900** |
| **2005** | **6,351** | **583** | **3,083** |
| **2006** | **6,807** | **610** | **3,298** |
| **2007** | **6,913** | **606** | **3,407** |
| **2008** | **6,732** | **583** | **3,187** |
| **2009** | **7,000** | **600** | **2,500** |

On the first of February of 2010, the PAYT system was launched, after a three months period of trial. It was implemented for two fractions: packaging waste and the rest of waste that cannot be recovered (refuse).

The charge is divided into two parts, a general part (95 € / year for residents and for commercial activities depending on the businesses category) collected by bill and a variable part charged in the price of the standardized waste bags of obligatory use, both for homes and shops. These standardized bags have the logo of the council. Prices are listed below:

Table 2. Standardized waste bags: features and prices

| Bag | Features | Volume (liters) | Price (€/unit) |
|---|---|---|---|
| Domestic refuse | Red translucent bag with black logo | 17 | 0.65 |
| Domestic packaging | Yellow translucent bag with black logo | 35 | 0.35 |
| Commercial refuse | Red translucent bag with black logo | 65 | 2.50 |
| Commercial packaging | Yellow translucent bag with black logo | 100 | 1.00 |

Source: Argentona's Council decree number 11.

During the trial period, standardized bags were given for free by the Council. Since 1st of February of 2010 they have to be purchased in any of the 12 collaborative shops, who signed an agreement with the Council.

For commercial activities one had to pay a variable part depending on the size of the organic waste container, hired by the Council. This part is paid in the annual bill.

Table 3. Annual charge applied for the organic waste container in Argentona

| Volum of organic container | Price (€/year) |
|---|---|
| 25 liters | 43 |
| 35 liters | 54 |
| 60 liters | 66 |
| 120 liters | 143 |
| 240 liters | 203 |

Source: Argentona's Council decree number 11.

In 2009, the flat charge was 151€ per household. In the PAYT system, a household producing one bag of refuse and one of packaging per week pays 147 €/year.

**10. Relevant Laws and Regulations**

Royal Legislative Decree 2/2004 of March 5th on local treasuries (Real Decreto Legislativo 2/2004, de 5 de marzo, por el que se aprueba el Texto Refundido de la Ley Reguladora de las Haciendas Locales).

Argentona' s Council decree number 11 (Ordenanza fiscal No.11 de Argentona)

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

Waste recovery was 65% in the period February-March 2009 (without PAYT system). In the same period in 2010 (implementation period) waste recovery increased to 66.9%.

Waste decreased by 7% during the trial period compared to the rest of the year (January-September

| |
|---|
| 2009). During the implementation period (February-April 2010) waste was reduced by 6%. |
| **12. Direct and Indirect Economic Impact of Application of Instrument:** |
| Due to the reduction of waste, treatment costs decreased by approximately 3%. Cost savings in Argentona so far exceed the implementation costs of the PAYT system. |
| **13. Direct and Indirect Social Impact of Application of Instrument:** |
| There is no increase in the global price of the charge. There has been a positive distributional impact as each household pays for the quantity of waste it produces.<br>During the period of the PAYT implementation (3 months), 3 new jobs were created. One person that before was working part time, with the PAYT system is working full time. |
| **14. Social or Political Opposition or Resistance:** |
| During the trial period and the first months of implementation, a minority of inhabitants opposed PAYT. Probably they were practicing illegal waste disposal or "waste tourism" (see part 18) during the first months. |
| **15. Technical or Legal Obstacles (and Solutions):** |
| Illegal waste disposal can hardly be controlled. However, this problem can be reduced by for instance identifying each user with an electronic chip.<br>There are just few experiences with PAYT in Catalonia, making it difficult to calculate a charge based on estimations of waste generation. In practice, charges are fixed either below or above the optimal price. |
| **16. Decision-Making Process Leading to Introduction of Instrument:** |
| The Argentona Council was interested in applying a system for improving waste recovery levels and lowering waste production. They contacted the Catalonian Waste Agency (Agència de Residus de Catalunya) which provided technical and economic support. |
| **17. Necessary Amendments of Previously Existing Legal Provisions:** |
| Council Fiscal Decree No.11 regulating the charge for collection, treatment and disposal of municipal waste, approved in February 2010.<br>Council Decree on waste collection in Argentona's municipality, approved in February 2010. This decree regulates the collection system and sets sanctions. |
| **18. General Success and Acceptance:** |
| Although PAYT generally seems to be successful there are some remaining problems:<br>Public waste bins are used to discard of one's waste. The problem was solved by punishing this activity with a fine.<br>"Waste tourism", the illegal discard of one's waste in another neighbourhood, has been mitigated by asking the respective authorities to move their containers to places where they are more difficult to reach. |
| **19. References and Sources:** |
| Webpage of Argentona's Council: http://www.argentona.cat, [August 28th, 2010] |

**ANNEX 14: Spain – Charge for Municipal Solid Waste in Barcelona**

| | |
|---|---|
| **1.** | **Country:** |
| Spain (City of Barcelona) | |
| **2.** | **Instrument:** |
| Municipal waste treatment charge (TMTR) | |
| **3.** | **Type of Instrument** |
| Charge | |
| **4.** | **Level of Application:** |
| Municipality: Barcelona (it is applied in the metropolitan area of Barcelona/Barcelona province that comprises several municipalities) | |
| **5.** | **Category of Waste:** |
| Municipal solid waste | |
| **6.** | **Type of Recovery:** |
| Waste treatment | |
| **7.** | **Assessment Base:** |
| For waste produced in households the charge is calculated considering two criteria:<br>1) water flow and water consumption.<br>2) value per capita of waste sent to final disposal | |
| **8.** | **Addressee:** |
| Households and commercial activities | |
| **9.** | **Detailed Description of Instrument:** |

The TMTR is a charge for municipal waste treatment, not a municipal waste charge. It is used to finance the Waste Metropolitan Program of 1997 (Programa Metropolità de Gestió de Residus, PMGRM) and subsequent updatings. Revenue obtained by this charge goes to the Metropolitan Environmental Authority (EMA) which is in charge of water and waste management in the Metropolitan Area of Barcelona.

It is charged in the water bill so all citizens that have contracted water supply are payers of TMTR. It classifies contributors in two categories: waste generators in households and waste generators in commercial activities (retailers and industries). As for the first classification, the charge is calculated using two different criteria

CRITERIA 1

1) Dwellings are classified from A to I in the water decree considering the level of water flow in the house: type A-0,25 $m^3$/h, type B and C-0,40 $m^3$/h, type D and E-0,63 $m^3$/h, type F-1,00 $m^3$/h, type G-1,60 $m^3$/h, type H-2,50 $m^3$/h and type I-4,00 $m^3$/h.
2) Dwellings are classified considering water flow and water consumption.

CRITERIA 2

The amount of the charge is also affected by the quantity waste per capita sent to final disposal in 2007 in the relevant municipality (for the case of the 2010 charge calculation). This is expressed as a ratio:

Total waste going to final disposal / population.

Bonuses:

Families with more than 3 members can get a discount, as well as handicapped people or inhabitants having an income below the inter-professional minimum salary.

In order to give environmental incentives, the charge also includes some discount for the use of the recycling centers.

The charge to commercial activities is calculated with the help of a coefficient which is determined according to a classification that groups different waste producers by type of waste.

Charges for this type of waste producers can be reduced if they prove that are recycling part of their wastes with a private company.

In order to promote selective waste collection, in 2004 the EMA set up an economic incentivisation scheme to reward the municipalities that are performing well. The idea is that any of the 12 basic tariffs is multiplied by a coefficient depending on the percentage of source separation achieved by the municipality, in relation to the average results in the metropolitan area. A coefficient above 1 means that the municipality is performing lower than average, resulting in higher charges for their citizens, and vice versa. Fee rates in this case are calculated in the following way (Puig-Ventosa, 2006):

$$coeficient_i = 1 + 0{,}15 * \left( \frac{\frac{Tn_i}{hab_i}}{\frac{\sum_{i=1}^{p} Tn_i}{\sum_{i=1}^{p} hab_i}} - 1 \right)$$

Where

$Tn_i$: annual amount of waste not collected separately (i.e. carried to landfills, incinerators or mechanical-biological treatment plants)
hab: population of the municipality.

There are no studies on the effects given to municipalities to improve waste separation. However, the effect must be low since the variable part (that changes in function of recycling levels, etc) is not explicit on the receipts. Citizens do not know whether they are getting a bonus or not for the recycling levels in their municipality.
TMTR and municipal waste charges are totally different and independent from each other. TMTR is charged for waste treatment and the money goes to the EMA. Waste charges are charged for collecting waste and the money goes to the municipalities.

**10. Relevant Laws and Regulations**

Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The ecological impacts intended to be obtained are the ones of the Waste Metropolitan Program:

1) To maintain or reduce waste production in the Metropolitan Area through preventive measures.
2) To complement and improve the facilities for waste treatment in order to reach a recycling level of more than 50% of total waste, both in the separation process carried out by citizens and recovering in the treatment plants.
3) To ensure treatment of 100% of all municipal waste fractions or similar, including refuse. The

treatment of refuse is essential to recover materials and produce compost and biogas.

4) To ensure a stable management of waste that prioritize energy recovery over disposal, as indicated by the Waste Framework Directive 2008.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

It is expected that in the 2010 budget of the Metropolitan Environmental Entity (EMA), this charge will account for 78.3% of total revenues obtained with taxes, charges and public prices by EMA. TMTR total revenue amounts to 107,579,000€ per year.

The tax goes to the EMA budget, it is not earmarked for the Waste Metropolitan Program.

**13. Direct and Indirect Social Impact of Application of Instrument:**

Water consumption increases with the income, but at a lower rate. As the charge is linked to water consumption can be considered as regressive for households. However, considering that waste charges are usually conceived as flat-rates in most Spanish municipalities, it is less regressive than most waste charges.

**14. Social or Political Opposition or Resistance:**

When the water charge increased during the 90s, a significant percentage of the population were led to "fiscal insubmission", organised by a neighbours association (associacions de veins). One of their main reivindications was to pay tamgrem (solid waste charge) and water charges separately. This is now an accepted option for those households who ask for this option.

**15. Technical or Legal Obstacles (and Solutions):**

None

**16. Decision-Making Process Leading to Introduction of Instrument:**

Before the introduction of the tax, some municipalities were not paying for waste treatment. Therefore, the EMA decided to charge the citizens directly by creating the TMTR.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

The charge is revised annually to adapt to new financial needs.

**18. General Success and Acceptance:**

The charge succeeded in financing the Waste Metropolitan Program of 1997 and subsequent amendments. The level of collection of this charge is very high, due to its link with the water charge.

**19. References and Sources:**

The Metropolitan Environmental Authority (EMA) website: http://www.amb.cat/web/emma/inici ,[August 25nd, 2010]

Waste Metropolitan Program 2009-2016 (Programa Metropolità de Gestió de Residus, PMGRM 2009-2016)

Metropolitan Environmental Authority (EMA). Pressupost 2010. Direcció de Serveis Generals. Serveis de Finances, Barcelona. http://www.amb.cat/c/document_library/get_file?p_l_id=5806&folderId=7366&name=DLFE-5640.pdf, ,[August 21st, 2010]

Fiscal ordinance regulating treatment and disposal of municipal waste (TMTR) in the Metropolitan Area of Barcelona, of 26 December 2009

Puig-Ventosa, I(2006). “Fee and rebate systems to foster ecologically sound urban waste management”. In Cavaliere, A., Ashiabor, H., Deketelaere, K., Kreiser L., Milne, J.,(Eds). Critical Issues in Environmental Taxation: International and Comparative Perspectives. Volume III. Richmond Law & Tax.

**ANNEX 15: Spain – Landfill Tax**

| **1. Country:** |
|---|
| Spain (Federal State of Madrid) |
| **2. Instrument:** |
| Landfill tax on waste in Madrid |
| **3. Type of Instrument** |
| Tax |
| **4. Level of Application:** |
| Federal State |
| **5. Category of Waste:** |
| Solid hazardous and non-hazardous waste including construction and demolition waste, and excluding municipal solid waste. |
| **6. Type of Recovery:** |
| Waste deposit in landfills |
| **7. Assessment Base:** |
| Weight or volume of waste (depending on the waste fraction) |
| **8. Addressee:** |
| The taxpayer as the natural or legal person who<br>1) deposits waste in public or private landfills or<br>2) abandons waste in non-authorized places. In the first case, the taxpayer's substitute is the owner of the landfill. |
| **9. Detailed Description of Instrument:** |
| Act 6/2003 of March 20 sets a tax on waste deposit in public and private landfill as well as on its abandonment in non-authorised places. Emission of liquid effluents, emission of pollutants into the atmosphere, waste incineration and temporary storage of waste are not included. Urban waste managed by the State, discharges from waste energy recovery such as ashes and slags from waste incineration are exempted.<br><br>The tax intends to incentivate recovery and recycling of materials.<br><br>The owner of the landfill as substitute of the taxpayer is the final responsible for the payment who passes the tax on to the waste producer.<br><br>The total amount is calculated applying the following rates:<br>- 10 € per tonne of hazardous waste<br>- 7 € per tonne of non-hazardous waste, excluding construction and demolition waste<br>- 3 € per cubic meter of waste from construction and demolition activities |
| **10. Relevant Laws and Regulations** |
| Law 6/2003 of March 20th on tax on waste (Ley 6/2003, de 20 de marzo, del impuesto sobre depósito de residuos). |

Treasury Order of 23 April 2003 regulating repercussion of tax on waste (Orden de 23 de abril de 2003, del Consejero de Hacienda, por la que se regula la repercusión del Impuesto de Depósito de Residuos)

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

As for industrial and construction waste (affected by the tax), there is no recent information available for the Community of Madrid. However, the responsible for this tax believe that waste production has been reduced recently due to the crisis and not because of the tax.

Hazardous waste production

| Year | Hazardous waste production (ton) | Industrial non-hazardous waste production (ton) | Construction waste (ton) (projections)* |
|---|---|---|---|
| 2003 | 285,062 | 285,577 | 5,674,911 |
| 2004 | 277,243 | 306,231 | 5,810,229 |
| 2005 | | 322,303 | 5,929,097 |
| 2006 | | | 5,995,601 |
| 2007 | | | 6,063,108 |
| 2008 | | | 6,116,403 |
| 2009 | | | 6,163,554 |
| 2010 | | | 6,204,749 |

Source: Community of Madrid. Waste Strategy (2006-2016).

*From 2008, construction waste should have decreased due to the crisis in the building sector

**12. Direct and Indirect Economic Impact of Application of Instrument:**

Revenue generation: in the budget of Madrid Community –which comprises City of Madrid and the Metropolitan Area– for 2010, revenue from landfill tax is projected to be 6,000,000 €. This tax only represents 0.05% of total tax revenue (Comunidad de Madrid, 2010).

| Year | Landfill tax revenue (€) | Total tax revenue (€) |
|---|---|---|
| 2010 | 6,000,000 | 11,980,322,590 |
| 2009 | 9,000,000 | 15,563,080,000 |
| 2008 | 9,000,000 | 16,602,735,935 |
| 2007 | 12,000,000 | 15,795,902,825 |
| 2006 | 5,000,000 | 14,425,980,000 |

Source: Community of Madrid. . www.madrid.org

As municipal solid waste is not affected by this tax, it is not passed on to the consumer through waste charges or community taxes.

In the Community of Madrid there are two landfill sites belonging to the Community and one owned by the Association of municipalities from the Eastern part of Madrid (Alcala de Henares). The municipality of Madrid City has one landfill (Las Dehesas). All are managed by two private companies. As for hazardous waste there is just one landfill in the Community of Madrid (San Fernando de Henares).

| 13. Direct and Indirect Social Impact of Application of Instrument: |
|---|
| None |
| **14. Social or Political Opposition or Resistance:** |
| As the current government (right party-conservatives) has the absolute majority in the regional parliament there was no political resistance. The Law 6/2003 of March 20th on tax on waste was approved without opposition. |
| **15. Technical or Legal Obstacles (and Solutions):** |
| None |
| **16. Decision-Making Process Leading to Introduction of Instrument:** |
| Authorities wanted to incentivate recovery and recycling of materials through the introduction of this tax given the geographical caracteristics of Madrid (small territory and big aglomeration of population), and the fact that most industrial waste was going to landfill. |
| **17. Necessary Amendments of Previously Existing Legal Provisions:** |
| None |
| **18. General Success and Acceptance:** |
| The responsible stated that the tax is not enough to stimulate waste reduction and should be incremented. |
| **19. References and Sources:** |
| Government of Madrid City (Gobierno de Madrid) www.madrid.es [ September 9th, 2010]<br><br>Roca, J., Puig, I., Tello, E. (2005 ) Experiències autonomiques de fiscalitat ambiental. Temes de Medi Ambient i Habitatge. Departament de Medi Ambient I Habitatge, Generalitat de Catalunya, Barcelona.<br><br>Community of Madrid (Comunidad de Madrid). www.madrid.org [ September 9th, 2010]<br><br>Interview by telephone with the responsible of urban waste in Community of Madrid, Sr. Jaime Placencia. 22 September 2010.<br><br>Community of Madrid (Comunidad de Madrid).Waste Strategy (2006-2016) [Estrategia de residuos de la Comunidad de Madrid (2006-2016] |

## ANNEX 16: Spain – Tax on Landfill and Incineration of Municipal Solid Waste

| | |
|---|---|
| **1. Country:** | |
| Spain (Federal State of Catalonia) | |
| **2. Instrument:** | |
| Tax on landfill and incineration of municipal solid waste | |
| **3. Type of Instrument** | |
| Tax | |
| **4. Level of Application:** | |
| Federal State | |
| **5. Category of Waste:** | |
| Municipal solid waste (MSW) | |
| **6. Type of Recovery:** | |
| Landfill and incineration | |
| **7. Assessment Base:** | |
| Weight | |
| **8. Addressee:** | |
| The taxpayer, substituted by the owner of the landfill, and waste generating industries | |
| **9. Detailed Description of Instrument:** | |

The tax was created in 2003 and put in practice January 1, 2004. It is paid quarterly. It is calculated as follows:
For landfills: 10 €/ton; in municipalities without separate waste collection of biowaste: 20 €/ton
For incineration: 5 €/ton; in municipalities without separate waste collection of biowaste: 15 €/ton

The owner of the landfill deposits the tax in a fund (Fons de Gestió de Residus) managed by the Waste Agency of Catalonia (Agència de Residus de Catalunya).

According to the law, resources obtained by this tax are destined to the following activities:

1) At least 50% to the separate collection of organic waste
2) Waste recovery of other material types that reduces waste production
3) Waste reduction treatments
4) Environmental education campaigns

Most of these resources are channeled back to the municipalities according to their recycling levels. In 2010, measures that municipalities can apply to get money back are the following:

| *Measure* | *Unitary value* |
|---|---|
| 1.Organic fraction treatment and collection (FORM) | 33.50 €/ton |
| 2.Reduction treatment of the quantity or improvement of quality of refuse destined to controlled landfill | 2.50 €/ton |
| 3.Reduction treatment of the quantity or improvement of quality of refuse destined to energetic valorization | 1.25 €/ton |
| 4.Separate collection of organic waste | 8.5 €/ton* |

| | |
|---|---|
| 5.Separate collection of paper and cardboard | 3.8 €/ton* |
| 6. Collection in recycling centers (special waste in small quantities up to a max. of 0.38kg/inhabitant | 500 €/ton |

Source: Catalonia Waste Agency, 2009

*In case of points 4 and 5, correction coefficients are applied according to the following criteria:

| *Type of Municipality:* | *Impurities:* |
|---|---|
| • Urban (over 50,000 inhabitants): 1 | • 0≤%≤5: 2 |
| • Semiurban (5,000 to 50,000 inhabitants): 1.28 | • 5≤%≤10: 1.5 |
| • Rural (less than 5,000 inhabitants): 1.5 | • 10≤%≤15: 1.2 |

Source: Catalonia Waste Agency, 2009

## 10. Relevant Laws and Regulations

Act 8/2008 on financing waste infrastructures and on waste landfill and incineration tax

Art 3 of the Legislative Decree 1/2009 of 21th July, approving Waste Act.

## 11. Direct and Indirect Ecological Impact of Application of Instrument:

The tax is one among a list of instruments implemented by the ARC to reach the Catalonian waste program objectives (PROGREMIC 2007-12).

Official data shows that waste generation per capita was constant from 2005 to 2007 (1.64 kg/capita/day) and in 2008 (1.59 kg/capita/day) and 2009 (1.54 kg/capita/day) went down.

Waste selective collection clearly increased from 2001 onward. In 2008-2009 selective collection increased by 7.1%, while refuse decreased by 6.8%.

| Fraction | Growth rate 2008-2009 | Quantity col-lected in 2009 | Tendency |
|---|---|---|---|
| Organic | 7.88% | 340,670 tons | It is increasing since 2001. |
| Glass | -6,23% | 191,645 tons | A clear tendency to increase from 2001. However in 2007 and 2008 it remained approximately constant |
| Paper and card-board | 4.21% | 427,988 tons | A clear tendency to increase from 1995. From 2005 to 2008 it has remained constant. |
| Packaging | 10.12% | 127,624 tons | A clear tendency to increase since 1996. |

Source: Catalonia waste agency statistics (ARC), 2010

## 12. Direct and Indirect Economic Impact of Application of Instrument:

| | 2008 | 2007 | 2006 |
|---|---|---|---|
| Revenue generation | 33,101,088 € | 31,530,604 € | 32,953,994 € |
| Revenue remaining in 2006 | | 1,695,042 € | -1,695,042 € (transferred to 2007) |
| TOTAL | 33,101,088 € | 33,225,646 € | 31,258,952 € |
| Revenue channeled back to taxpayers: | | | |

| | | | |
|---|---|---|---|
| For organic treatment | 15,417990 € | 15,351,599 € | 13,238,318 € |
| For waste separation and recycling | 16,385,328 € | 15,665,238 € | 14,763,309 € |
| Management Cost paid to ARC | 1,176,530 € | 1,261,224 € | 1,318,160 € |
| TOTAL | 32,980,248 € | 32,278,061 € | 29,319,787 € |
| Remaining revenue | 120,840 € | 947,585 € | 1,939,165 € |

Source: Catalonia Waste Agency website.

In 2008 the remaining revenue was only 0.4% of the revenue obtained with the tax while 99.6% was channeled back to municipalities. The remaining revenue is either used in actions focused on waste separation or it is kept to be channeled back to municipalities in the following years.

The Catalan Waste Agency keeps around 4% of the total revenue in order to cover its cost for managing the scheme.

The costs of the tax are passed on to households and commercial activities through the municipal waste charges.

There are approximately 25 landfills and 4 incinerators of municipal solid waste in Catalonia. Some of them are privately owned, some are public.

**13. Direct and Indirect Social Impact of Application of Instrument:**

Due to the canon collection the authority hired two more people. In the characterization part of wastes, 20 workers were hired (although this might have happened without the introduction of the landfill tax as well).

Municipalities were encouraged by the tax to invest in facilities for waste separation and recycling. Citizens benefit from these facilities and are provided with awareness programs.

**14. Social or Political Opposition or Resistance:**

The introduction of the tax was agreed on by the Catalan Government and all politic teams at the Catalan Parliament without social opposition.

**15. Technical or Legal Obstacles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

The tax was implemented to reinforce the Catalan waste management model. Before its implementation, it was already agreed on by all political parties.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

The tax was created by Act 16/2003, of 13-06-2003, on financing waste infrastructures and landfill tax.

**18. General Success and Acceptance:**

Although the tax can be regarded a success, its effect would improve if it was raised. Since their introduction in 2004 and 2009, the amount of the landfill tax and the incineration tax has remained 10 €/t and 5 €/t respectively. However, due to the economic crisis most municipalities oppose an increase in the tax rates which is why it cannot be expected in the near future.

**19. References and Sources:**

Catalan waste agency website (ARC)

http://www20.gencat.cat/portal/site/arc [Accessed September, 7th, 2010]

Catalan waste agency statistics/ Agència de Residus de Catalunya (2010) estadístiques /www20.gencat.cat/portal/site/arc/menuitem.0b722e55d906c87b624a1d25b0c0e1a0/?vgnextoid=31ea095c3aa76210VgnVCM1000008d0c1e0aRCRD&vgnextchannel=31ea095c3aa76210VgnVCM1000008d0c1e0aRCRD&vgnextfmt=default^, [Accessed September, 8th, 2010]

Agència de Residus de Catalunya- ARC (2009). "Guia d'orientació als ens locals sobre l'aplicaciò del retorn dels cànons sobre la disposició del rebuig dels residus municipals per a l'any 2010", Barcelona.

Interview with Mr. Josep Simó i Cabre. Responsible for the Municipal Area of the Catalan Waste Agency. September 9th 2010.

## ANNEX 17: Sweden – Waste Fee for Municipal Solid Waste and Hazardous Waste

| |
|---|
| **1. Country:** |
| Sweden |
| **2. Instrument:** |
| Waste Fee |
| **3. Type of Instrument** |
| Fee |
| **4. Level of Application:** |
| Local |
| **5. Category of Waste:** |
| Municipal solid waste, hazardous waste<br>Excluded: packaging, WEEE, batteries (producer responsibility) |
| **6. Type of Recovery:** |
| Incineration, recycling, biological treatment, landfilling |
| **7. Assessment Base:** |
| Mostly volume-based fee, only 26 out of 290 municipalities have a weight-based scheme (PAYT – Pay As You Throw) |
| **8. Adressee:** |
| Consumer, companies (waste producers) |
| **9. Detailed Description of Instrument:** |
| Waste is collected and treated by municipalities, often in cooperation with private companies. Most municipalities are organized in respective administration unions.<br>The fee contains a basic fee covering administration, waste management planning, custom service, future funds, information, service at the recycling stations, etc. and a performance (or weight-based) fee covering collection and treatment. The latter is used to further waste prevention and separation (there is a discount for separated collection of recyclables in 50 % of the municipalities),<br>The income from fees must not exceed the costs for the municipal waste management (cost-coverage principle). The average fee for households was 1940 SEK (179 €[67]) in 2007. |
| **10. Relevant Laws and Regulations** |
| Environment Act 1998 (Miljøbalken): Obligates municipalities to collection and treatment of waste (ea4)<br>Waste regulation 2001 (Avfallsförordning): obligates municipalities to ensure separated collection of waste for incineration, MBT (mechanical-biological treatment) and since 13.8.2005 WEEE (ea4f) |

[67] 1 € = ~ 10,82 SEK (in 2010)

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

The change to weight-based fees led to average reduction in waste amounts of 20% within 3-5 years. However there was no impact on the recycling quota. Increases in illegal disposal have not been reported.

**12. Direct and Indirect Economic Impact of Application of Instrument:**

In some municipalities the fee level increased after changing to a weight-base, however in other municipalities with volume-based fee similar or even higher increase have been reported.

On the one hand weight-based fees require higher administrative efforts concerning handling of waste-quantity-data. On the other hand the electronic support allows more detailed and flexible waste management, so the fee (level and composition) can be adjusted every year to exact development of waste quantities.

In the municipality of Bjuv the introduction of a weight based fee led to almost doubling of disposal-costs (collection and disposal) due to a reduction of waste quantities but constant high fix costs. There were also high administrative costs as waste amounts and fees have to be registered for every household.

The reduction in waste quantities led to lower workload of incineration-plants and thus increased imports of waste from Norway.

**13. Direct and Indirect Social Impact of Application of Instrument:**

The change from fix to weight based fees can lead to increased costs for families with many children.

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstactles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

The weight base fee was introduced to meet national targets for waste prevention and recycling.

**17. Necessary Amendmends of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

The weight based fee is successful in terms of reduction of waste quantities, however no effects on the recycling quota is to be seen.

There is a high acceptance of weight based fees in 25 of 26 municipalities by residents and officials. They are considered fair similar to quantity-based costs for water and electricity.

**19. References and Sources:**

Avfall Sverige (2009): Swedish Waste Management, www.avfallsverige.se/fileadmin/uploads/Rapporter/SWM.pdf (retrieved 15.07.10).

Dahl, Courtney A. (2010): Connecting consumption with environmental impact: Waste prevention and Pay as You Throw, a collective case study in Sweden (Master Thesis); http://www.lumes.lu.se/database/alumni/08.10/Thesis/Dahl_Courtney_Thesis_2010.pdf

(retrieved 13.08.2010).

Dahlén, Lisa; Lagerkvist, Anders (2010): Pay as you throw. Strengths and weaknesses of weight-based billing in household waste collection systems in Sweden, in: Waste Management, Vol. 30, No. 1, p 23–31.

Eunomia (2002): Financing and Incentive Schemes for Municipal Waste Management. Case Studies. Final Report to Directorate General Environment, European Commission; http://ec.europa.eu/environment/waste/studies/pdf/financingmuncipalwaste_management.pdf (retrieved 21.07.2010).

European Topic Centre on Resource and Waste Management (ETCRWM) (2006): Country Fact Sheet: Sweden; http://eea.eionet.europa.eu/Public/irc/eionet-circle/etc_waste/library?l=/country_fact_sheets/swedenpdf/_EN_1.0_&a=d (retrieved 17.08.2010).

Miliūtė, Jūratė; Plepys, Andrius (2009): Driving Forces for High Household Waste Recycling. Lessons from Sweden, in: Environmental Research, Engineering and Management, Vol. 47, No. 1, p 50-62.

Swedish Environmental Protection Agency (2009): Comparative study of solid waste management in Macedonia and Sweden; http://www.moepp.gov.mk/WBStorage/Files/Improved%20System%20for%20Communal%20Waste%20Management.pdf (retrieved 12.08.2010).

## ANNEX 18: Sweden – Landfill Tax

| |
|---|
| **1. Country:** |
| Sweden |
| **2. Instrument:** |
| Landfill Tax |
| **3. Type of Instrument** |
| Tax |
| **4. Level of Application:** |
| Federal |
| **5. Category of Waste:** |
| MSW, hazardous waste, MSW-like industrial waste<br>Exemptions: waste for incineration or MBT (mechanical-biological treatment), waste for construction purposes |
| **6. Type of Recovery:** |
| Landfill |
| **7. Assessment Base:** |
| Weight |
| **8. Adressee:** |
| Legal: Landfill-operators<br>De facto: consumers, industry (have to pay tax via waste fee) |
| **9. Detailed Description of Instrument:** |
| The tax was introduced on 1.1.2000 and is paid by residents via integration into the waste fees. The municipality or disposal contractor passes the revenues on when the waste is delivered to landfill. The landfill operator passes the tax revenues to the government.<br>The tax level was raised several times from 250 SEK/t (23 €[68]) in 2001 to 288 SEK/t (27 €) in 2002 to 370 SEK/t (34 €) in 2003 to 435,- SEK/t (40 €) since 2006. Currently this amounts to ca. 1/3rd of the total price for landfilling of waste. |
| **10. Relevant Laws and Regulations** |
| Waste Tax Act 1999<br>Environment Act 1998 (Miljøbalken): landfill operator must charge all costs relating to the landfill of waste. In the cost calculation all costs for the establishment and operation of the landfill must be included as well as all costs, as far as possible, necessary for meeting the obligations of the landfill as an enterprise (ea4)<br>Förordning om deponering av avfall 2001 (ordinance on landfill of waste): transposition of EU- |

[68] 1 € = ~ 10,82 SEK (in 2010)

landfill directive 99/31 (ea6)

Föreskrifter om deponering 2004: transposition of EU-landfill decision 33/03 (ea6)

## 11. Direct and Indirect Ecological Impact of Application of Instrument:

Reduction of waste generation and landfilling:

| Year | Generation (kg per capita) | Generation (Mio t) | Landfill (kg per capita) | Landfill (Mio t) | Landfill (% of total MSW) | Recycling (kg per capita) | Recycling (Mio t) | Recycling (% of total MSW) |
|---|---|---|---|---|---|---|---|---|
| 1995 | 386 | 3.4 | 136 | 1.2 | 35 | 77 | 0.68 | 20 |
| 1996 | 385 | 3.4 | 126 | 1.11 | 33 | 87 | 0.77 | 23 |
| 1997 | 416 | 3.7 | 130 | 1.15 | 31 | 97 | 0.86 | 23 |
| 1998 | 431 | 3.8 | 121 | 1.07 | 31 | 114 | 1.01 | 26 |
| 1999 | 428 | 3.8 | 108 | 0.96 | 25 | 119 | 1.05 | 28 |
| 2000 | 428 | 3.8 | 98 | 0.87 | 23 | 123 | 1.09 | 29 |
| 2001 | 442 | 3.9 | 99 | 0.88 | 22 | 127 | 1.13 | 29 |
| 2002 | 468 | 4.2 | 93 | 0.83 | 20 | 145 | 1.3 | 31 |
| 2003 | 471 | 4.2 | 64 | 0.58 | 14 | 151 | 1.35 | 32 |
| 2004 | 464 | 4.2 | 42 | 0.38 | 9 | 163 | 1.46 | 35 |
| 2005 | 482 | 4.3 | 23 | 0.21 | 5 | 174 | 1.57 | 36 |
| 2006 | 497 | 4.5. | 25 | 0.23 | 5 | 186 | 1.68 | 37 |
| 2007 | 518 | 4.7 | 21 | 0.19 | 4 | 191 | 1.74 | 37 |
| 2008 | 515 | 4.7 | 15 | 0.14 | 3 | 181 | 1.66 | 35 |

(source: Eurostat)

The annual increase in waste amounts is estimated to have decreased from 3.4 % to 2.6 % due to the tax. Furthermore the instrument contributed to the significant diversion of waste disposal to material recycling and waste-to-energy. However there is no clear effect on the amount of waste generated which has increased about 13% from 2003-2007.

## 12. Direct and Indirect Economic Impact of Application of Instrument:

Revenues in Mio. SEK (€):

2000: 1,085 (100)

2001: 899 (83)

2002: 906 (84)

2003: 892 (82)

2004: 729 (67)

2005: 735 (68)

2006: 646 (60)

2007: 608 (56)

2008: 333 (31)

2009: 230 (21)

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

-

**15. Technical or Legal Obstactles (and Solutions):**

-

**16. Decision-Making Process Leading to Introduction of Instrument:**

The tax was introduced to support the diversion from landfill to other ways of disposal and increase recycling of waste.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

There has been a significant reduction of landfilled waste in the period concerned, however a direct effect is hard to measure due to parallel measures like landfill-bans for bio-degradable and combustible waste (2002/2005). Nevertheless official reports ascribe the main reduction in landfilling to the landfill tax.

**19. References and Sources:**

Avfall Sverige (2009): Swedish Waste Management, www.avfallsverige.se/fileadmin/uploads/Rapporter/SWM.pdf (retrieved 15.07.10).

CEWEP (2010): Country Report 2010. Sweden; http://www.cewep.eu/storage/med/media/creports/subdir/357_Sweden_Country_Report_CEWEP_2010.pdf?fCMS=8543ef42d93fddecace65973609be18d (retrieved 23.09.2010).

European Topic Centre on Resource and Waste Management (ETCRWM) (2006): Country Fact Sheet: Sweden; http://eea.eionet.europa.eu/Public/irc/eionet-circle/etc_waste/library?l=/country_fact_sheets/swedenpdf/_EN_1.0_&a=d (retrieved 17.08.2010).

Eurostat (2010a): Municipal Waste Landfilled (kg per capita); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastemanagement/landfill (retrieved 23.09.2010).

Eurostat (2010b): Municipal Waste Landfilled (total); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/Municipal_%20waste_%20landfilled_1000t_%20update_%20website18012.mht (retrieved 23.09.2010).

Eurostat (2010c): Municipal Waste Incinerated (kg per capita); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastemanagement/waste_treatment (retrieved 23.09.2010).

Eurostat (2010d): Municipal Waste Incinerated (total); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/Municipal_%20waste_%20incinerated_1000t_%20update_%20website1801.mht (retrieved 23.09.2010).

Eurostat (2010e): Municipal Waste Generated (kg per capita); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/sectors/municipal_waste (retrieved 23.09.2010).

Eurostat (2010f): Municipal Waste Generated (total); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/Municipal_%20waste_%20generated_1000t_%20update_%20website180112.mht (retrieved 23.09.2010).

Eurostat (2010g): Municipal Waste Recycled (kg per capita); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/Municipal_%20waste_%20recycled_kg_per_capita_%20update_%20websi2.mht (retrieved 23.09.2010).

Eurostat (2010h): Municipal Waste Recycled (total); http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/documents/Municipal_%20waste_%20recycled_1000t_%20update_%20website1801103.mht (retrieved 23.09.2010).

http://www.naturvardsverket.se/en/In-English/Menu/Products-and-waste/Waste/Objectives-strategies-and-results/Results/ (retrieved 23.09.2010).

http://www.scb.se/Pages/TableAndChart____39451.aspx (retrieved 23.09.2010).

http://www.retech-germany.net/files/pdf_dokumente/application/pdf/lp_schweden_091126.pdf (retrieved 23.09.2010).

Ministry of Finance (2002): Skatt pa avfall idag—och i framtiden (Tax on waste today—and in the future, in Swedish with English summary), Stockholm.

Miliūtė, J.; Plepys, A. (2009): Driving Forces for High Household Waste Recycling. Lessons from Sweden, in: Environmental Research, Engineering and Management, Vol. 47, No. 1, p. 50-62.

Ministry of Environment (2009): Sweden's Fifth National Communication on Climate Change; http://unfccc.int/resource/docs/natc/swe_nc5.pdf (retrieved 19.08.2010).

RETech (2009): Abfallwirtschaftliches Länderprofil Schweden; Full version available upon request at www.retech-germany.net. (retrieved 23.09.2010).

Swedish environmental protection agency (2009): Comparative study of solid waste management in Macedonia and Sweden; http://www.moepp.gov.mk/WBStorage/Files/Improved%20System%20for%20Communal%20Waste%20Management.pdf (retrieved 12.08.2010).

Skatteverket (Swedish Tax Agency) (2009): Tax Statistical Yearbook of Sweden 2009; http://www.skatteverket.se/privat/blanketterbroschyrer/broschyrer/info/152.4.39f16f103821c58f680007237.html (retrieved 17.08.2010).

Swedish Environmental Protection Agency and Swedish Energy Agency (2007): Economic Instruments in Environmental Policy; http://www.energimyndigheten.se/Global/Engelska/News/620-5678-6_webb.pdf (retrieved 15.09.2010).

Tojo, N.; Neubauer, A.; Bräuer, I. (2006): Waste management policies and policy instruments in Europe. An overview; http://lup.lub.lu.se/luur/download?func=downloadFile&fileOId=1168083 (retrieved 13.08.2010).

## ANNEX 19: Sweden – Deposit Refund System

| 1. Country: |
|---|
| Sweden |
| **2. Instrument:** |
| Deposit-refund system for plastic bottles and cans |
| **3. Type of Instrument** |
| Deposit-refund system |
| **4. Level of Application:** |
| Federal |
| **5. Category of Waste:** |
| Reusable glass bottles for wine and liquors (voluntary), PET/plastic-bottles (mandatory), (aluminium)-cans (mandatory) (ea14) |
| **6. Type of Recovery:** |
| Reuse, recycling |
| **7. Assessment Base:** |
| Per unit |
| **8. Adressee:** |
| Legal: producers/fillers, retail (take back obligation, mandatory recycling-quota)<br>Economic: consumer (purchase decision) |
| **9. Detailed Description of Instrument:** |
| PET/plastic-bottles:<br>To meet the legal requirements the bottle industry created two systems for the financial administration of collection and transport – one for one-way plus one for reusable bottles - while reuse/recycling is directly performed by the industry. For each bottle issued the manufacturer pays a handling fee to the respective system.<br>The deposit-level depends on weight and material and ranges from 1-2 SEK (0,09-0,18 €) for one-way bottles to 4 SEK (0,37 €) for reusable bottles. The handling fee is 0.27 SEK (0,02 €) or 0.77 SEK (0,07) for one-way bottles < or > 1 litre and 0.60 SEK (0,06 €) for reusable bottles. There is also an extra sorting fee for coloured bottles of 0.15 SEK (0,01 €).<br>Cans:<br>Already in 1984 the Swedish Government set a mandatory recycling goal for aluminium cans of 75% leaving the implementation to the industry. However as a voluntary collection scheme did only result in a recycling quota of 63% a mandatory deposit-refund-system was introduced in 1987.<br>The deposit level has been 0.50 SEK (0,05 €) since. |

**10. Relevant Laws and Regulations**

plastic-bottles:

1991 Act on Certain Beverage Containers (ab4)

1993 Resolution on the recycling of PET-bottles

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

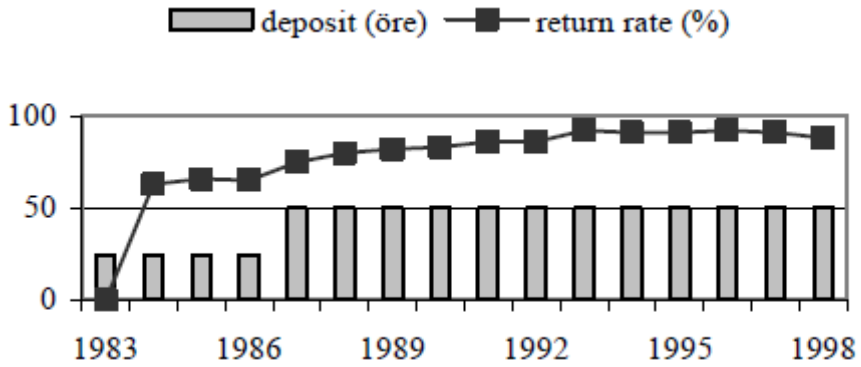
As for plastic-bottles the recycling rate increased from 51% in 1994 to almost 80% since 1995. However as the rate is significantly higher for large bottles (> 1 litre) than for small bottles and as the share of small bottles continues to increase the recycling rate is expected to decrease.

Recycling material is used for new bottles that usually contain 25 % recycled plastic and in the textile industry.

Cans:

Collection rate: 90% (ea14)

As for cans the recycling rate increased from 63% to 75% within one year after introducing the deposit-refund system and now remains at a high level around 80 to 90%. The collection rate is estimated at 90%.




**12. Direct and Indirect Economic Impact of Application of Instrument:**

To ensure competitiveness with foreign markets plastic-bottles and cans from foreign countries are charged with a fee according to the deposit-level.

The collection of plastic-bottles via industry-run system has led to a shift of (disposal-)costs from municipalities to the beverage-industry.

**13. Direct and Indirect Social Impact of Application of Instrument:**

-

**14. Social or Political Opposition or Resistance:**

There has been a heavy opposition by retail against both plastic-bottles- and aluminium-deposit based on warning of sanitary-risks from storage of used packaging at stores. The opposition was overcome by locating the recycling-depots at gas stations. In the end no sanitary problems have been reported.

Initially small beverage companies opposed the plastic-bottles-deposit in times when only re-usable bottles were permitted to the market as the companies expected economic advantage for large breweries. Therefore one-way plastic-bottles where permitted.

**15. Technical or Legal Obstactles (and Solutions):**

Aluminium cans have been hardly to distinguish from steel-cans causing an erosion of acceptance as for apparently similar products sometimes a deposit has to be paid and sometimes not. Therefore in 2006 the deposit-system was extended to all metal cans.

**16. Decision-Making Process Leading to Introduction of Instrument:**

The deposit for cans was introduced after debates on resources and high energy use in the aluminium-production in the early 1980s.

**17. Necessary Amendmends of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

-

**19. References and Sources:**

Amano, Michiko: PET Bottle System in Sweden and Japan: an Integrated Analysis from a Life-Cycle Perspective; http://www.lumes.lu.se/database/alumni/03.04/theses/amano_michiko.pdf (retrieved 17.08.2010).

European Topic Centre on Resource and Waste Management (ETCRWM), 2006: Country Fact Sheet: Sweden; http://eea.eionet.europa.eu/Public/irc/eionet-circle/etc_waste/library?l=/country_fact_sheets/swedenpdf/_EN_1.0_&a=d (retrieved 17.08.2010).

http://www.glasatervinning.se/in_english.php (retrieved 21.07.2010).

http://en.academic.ru/dic.nsf/enwiki/667922 (retrieved 21.07.2010).

Miliūtė, Jūratė; Plepys, Andrius: Driving Forces for High Household Waste Recycling.

Lessons from Sweden, in: Environmental Research, Engineering and Management, 2009, 47:1, 50-62.

Swedish Ministry of Finance, 2002: An Ecoefficient Society: non-toxic, resource-saving environmental life cycles. Summary of Government Bill 2002/03:117; http://www.regeringen.se/content/1/c4/09/53/528dde86.pdf (retrieved 21.07.2010).

Zero Waste, 2002: Extended Producer Responsibility: Container Deposit Legislation Report; http://www.google.de/url?sa=t&source=web&cd=2&ved=0CCYQFjAB&url=http%3A%2F%2Fwww.zerowaste.co.nz%2Fassets%2FReports%2FBeveragecontainers.pdf&ei=Z-VrTJfnMYSIOJyH6YQB&usg=AFQjCNEqZw6EnhDMQ1q9xihTHEU665ZjBQ (retrieved 18.08.2010).

## ANNEX 20: Sweden – Deposit Refund System for Motor Vehicles

| |
|---|
| **1. Country:** |
| Sweden |
| **2. Instrument:** |
| Deposit-refund system for motor vehicles |
| **3. Type of Instrument** |
| Deposit-refund system |
| **4. Level of Application:** |
| Federal |
| **5. Category of Waste:** |
| End of life vehicles (passenger cars, busses, transporters up to 3.5 t) |
| **6. Type of Recovery:** |
| Recycling |
| **7. Assessment Base:** |
| Per unit |
| **8. Adressee:** |
| Consumer |
| **9. Detailed Description of Instrument:** |
| Consumers have to pay a charge when purchasing a car, at return of ELV at a licensed operator the car owner receives a premium of 700-1.600 € depending on the age of the vehicle.<br>In 1998 a producer-responsibility (EPR) was introduced for cars making producers liable to take back ELV for free. For cars not falling under EPR the premium was raised to adjust to the disposal costs. |
| **10. Relevant Laws and Regulations** |
| Vehicle Disposal Act 1975 |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| The recycling quota of ELV was 85% in 2006. However the instrument did not lead to a significant reduction of abandoned cars. |
| **12. Direct and Indirect Economic Impact of Application of Instrument:** |
| - |
| **13. Direct and Indirect Social Impact of Application of Instrument:** |
| - |
| **14. Social or Political Opposition or Resistance:** |
| - |

| 15. Technical or Legal Obstacles (and Solutions): |
|---|
| As the disposal fee is not set by the government but by the ELV-disposal-operators some raised the disposal-fees beyond what is needed for disposal to benefit from the mechanism. |
| **16. Decision-Making Process Leading to Introduction of Instrument:** |
| The instrument was introduced to reduce the numbers of illegal abandoned cars. |
| **17. Necessary Amendments of Previously Existing Legal Provisions:** |
| - |
| **18. General Success and Acceptance:** |
| As the main goal of the premium was the reduction of abandoned cars, the instrument cannot be rated as success. |
| **19. References and Sources:** |
| Cassells, Sue; Holland, John; Meister, Anton: End-of-life vehicle disposal: Policy proposals to resolve an environmental issue in New Zealand, in: Journal of Environmental Policy & Planning, 2005, 7:2, 107–124.<br><br>Swedish Ministry of Finance, 2002: An Ecoefficient Society: non-toxic, resource-saving environmental life cycles. Summary of Government Bill 2002/03:117; http://www.regeringen.se/content/1/c4/09/53/528dde86.pdf (retrieved 21.07.2010). |

## ANNEX 21: United Kingdom – Landfill tax

| |
|---|
| **1. Country:** |
| UK |
| **2. Instrument:** |
| Landfill tax (and Landfill Communities Fund) |
| **3. Type of Instrument** |
| Tax (and tax relief fund) |
| **4. Level of Application:** |
| The tax is applied at a national level. The tax relief fund is applied at a local level in communities affected by a landfill site (often within 10km range), but overseen nationally. |
| **5. Category of Waste:** |
| Non-hazardous waste types from business and households. Some hazardous waste types are accepted as well. Some materials and/or sites are exempt (e.g. some mining and quarry waste, pet cemeteries etc.) or have lower rates (e.g. certain quarry infill sites). |
| **6. Type of Recovery:** |
| Landfill |
| **7. Assessment Base:** |
| Weight |
| **8. Addressee:** |
| Landfill operator |
| **9. Detailed Description of Instrument:** |
| The tax was introduced to reduce the quantities of landfilled waste and connected environmental costs.<br><br>Residents pay the tax via integration in their council tax bill. Municipalities pay to landfill operators who must register with and pass the revenues on to HMRC (Department for Revenue and Customs). The Environment Agency (under the Department for Environment) is the responsible institution for regulatory matters and controls the implementation of the relevant regulations.<br><br>Tax Rates are £48/t for active waste and £2.50/t for inert waste (+VAT) (2010/11). Rates will be raised by £8 per year until at least 2014/15, when it will reach £80/t.<br><br>The landfill operator has to account for the tax collected quarterly and keep records of tax due, any credits of tax or adjustments (where permitted), the tonnage of waste accepted and the rate of tax attributable to that tonnage. Records must be kept for 6 years as with all tax records.<br><br>Most landfills are operated by international operating companies and run contracts with the municipalities and private companies including collection and transport of waste, sometimes even recycling.<br><br>Landfill operators can claim a credit against their tax payment in case of a voluntary contribution to an approved Environmental Body (EB) under the regulations for the Landfill Communities Fund. The fund specified that they can contribute up to 5.5% of their landfill tax liability to EBs, |

and reclaim 90% of this contribution as a tax credit in any financial year. The fund aims to reduce the negative impacts of living very close to a landfill site.

## 10. Relevant Laws and Regulations

The primary law on Landfill Tax and the Landfill Communities Fund is contained in the Finance Act 1996 (sections 39 to 71 inclusive, and schedule 5). This Act also provides for the following secondary legislation:

Landfill Tax Regulations 1996 (SI 1996 No. 1527) concerning registration, information gathering requirements and accounting procedures as well as the Landfill Communities Fund

Landfill Tax (Qualifying Material) Order 1996 (SI 1996 No. 1528) defining the categories of waste to which the lower rate of tax applies

Landfill Tax (Prescribed Landfill Activities) Order 2009 listing certain activities on a landfill site that are subject to tax

Landfill (England and Wales) Regulations 2002

Landfill (England and Wales) (Amendment) Regulations 2005

Landfill (England and Wales) (Amendment) Regulations 2004

Environmental Permitting (England and Wales) Regulations 2010 SI 675.

## 11. Direct and Indirect Ecological Impact of Application of Instrument:

Landfill is currently the most common waste disposal method in the UK. There are over 4000 landfill sites in the UK. 2009/10 approximately 111 million tonnes of waste (including commercial and industrial waste) were landfilled.

Waste amounts declined since the tax introduction from 82,830 t in 1999 to 67,008 t in 2007, 58,206 t in 2008 and 43,066 t in 2009.

The recycling rate increased from 6% in 1997 to around 27% in 2007.

The exact impact of the landfill tax is hard to estimate due to several other relevant measures concerning the landfilling of waste.

There are no clear incentives for waste prevention as the municipalities do not make explicit to householders the amount of money they pay to landfill household waste. Small businesses, another large source of active waste, consider the tax too small to force a behavior change although rates have increased more sharply recently.

## 12. Direct and Indirect Economic Impact of Application of Instrument:

Revenues make up less than 1 % of the total tax revenues in the UK (0.15 % in 2004).

| Year | Revenues in Mio £ | Year | Revenues in Mio £ |
|---|---|---|---|
| 1998/99 | 333 | 2004/05 | 672 |
| 1999/00 | 430 | 2005/06 | 733 |
| 2000/01 | 462 | 2006/07 | 804 |

| | | | |
|---|---|---|---|
| 2001/02 | 502 | 2007/08 | 877 |
| 2002/03 | 541 | 2008/09 | 954 |
| 2003/04 | 607 | 2009/10 | 842 |

The Government tends to regard landfill as a revenue generation tool independent of the objective of reducing waste whereas most lobby groups, and even the public, would expect it to be applied to the objective of reducing waste.

**13. Direct and Indirect Social Impact of Application of Instrument:**

The tax is passed on to residents via integration in the council tax bill or via increased prices as businesses pass on costs associated with waste disposal to landfill.

The landfill communities fund provides communities affected by landfill operations means to reduce the impact of landfills to their residents. However detailed numbers about benefits are not available.

**14. Social or Political Opposition or Resistance:**

As landfills are not very popular with the population and environmental NGOs the tax aiming at reducing waste quantities going to landfills faces no significant public opposition

**15. Technical or Legal Obstacles (and Solutions):**

Administrative problems with collection of fees arise from the mixed nature of much waste coming onto landfills. The HMRC has therefore provided a number of acceptable proxy measures for weights of waste brought onto landfill sites including (for example) methods of converting volumes of household waste into tonnes.

**16. Decision-Making Process Leading to Introduction of Instrument:**

The introduction of the landfill tax reflected the wish to reduce the environmental impact of landfills as well as rising waste volumes, increased public demands for environmental protection and tightening EU regulations concerning the environment in the 1990s.

Crucially it also received the support of the chancellor of the party in government at that time (1993) as a measure that could raise money and protect the environment without costing business large sums of money. Thus the tax was accepted rapidly and implemented within three years. It was UK‘s first tax with an explicit environmental purpose.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

Early versions of the relevant legal provisions had to be changed regarding the waste definitions in order to prevent loopholes for landfill operators

**18. General Success and Acceptance:**

The tax contributed to a significant reduction of waste amounts going to landfills and is widely accepted.

**19. References and Sources:**

Davies B.; Doble M. (2004): The development and implementation of a landfill tax in the UK, in: OECD: Addressing the Economics of Waste, p 63- 78, http://browse.oecdbookshop.org/oecd/pdfs/browseit/9704031E.PDF.

Defra (2003): A study to estimate the disamenity costs of landfill in Great Britain, http://www.defra.gov.uk/environment/waste/strategy/legislation/landfill/documents/landfill_disamenity.pdf.

Friends of the Earth (1997): The Landfill Campaign Guide, http://www.foe.co.uk/resource/reports/landfill_campaign_guide.pdf.

HM Customs and Excise (1998): Review of the Landfill Tax: Report, Newcastle.

Hogg D.; Baddeley A.; Montag H. (2008): Impact Assessment of the Landfill Tax Escalator, http://www.eunomia.co.uk/shopimages/Eunomia%20-%20LfT%20Impact%20Assessment%20Final.pdf.

Leicester A. (2006): The UK Tax System and the Environment. Report of the Institute of Fiscal Studies, http://www.esmeefairbairn.org.uk/docs/tax_system_environ.pdf.

Morris J.R.; Phillips P.S.; Read A.D. (1998): The UK Landfill Tax: an analysis of its contribution to sustainable waste management, in: Resources, Conservation and Recycling, Vol. 23, No. 4, p. 259–270.

Royal Commission on Environmental Pollution (1993): Incineration of Waste. 17th Report, http://www.rcep.org.uk/reports/17-waste/1993-17waste.pdf.

http://www.defra.gov.uk/environment/waste/topics/

http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&propertyType=document&id=HMCE_CL_000509

http://www.environment-agency.gov.uk/static/documents/Business/wacv2_1006008.pdf

http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&id=HMCE_CL_001206&propertyType=document

http://www.landfill-site.com/html/waste_management_cos.html

http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageExcise_ShowContent&id=HMCE_PROD_009941&propertyType=document

http://www.entrust.org.uk/

http://www.environment-agency.gov.uk/business/regulation/31867.aspx

http://www.opsi.gov.uk/si/si2010/uksi_20100675_en_1

http://www.ace.mmu.ac.uk/eae/sustainability/Older/Waste_Disposal.html

http://www.360environmental.co.uk/legislation/waste_legislation/landfill_tax/

https://www.uktradeinfo.com/index.cfm?task=bulllandfill

http://www.recycle-more.co.uk/nav/page2128.aspx

http://economicinstruments.com/index.php/solid-waste/charges-and-taxes-/article/223

http://www.homecomposting.org.uk/content/view/20/49/

http://www.wasteonline.org.uk/resources/Wasteguide/mn_wmo_landfil_overview.html

http://www.wasteonline.org.uk/resources/InformationSheets/HistoryofWaste.htm

http://www.parliament.uk/briefingpapers/commons/lib/research/briefings/snbt-00237.pdf

http://www.360environmental.co.uk/legislation/waste_legislation/landfill_tax/

http://www.defra.gov.uk/environment/waste/strategy/factsheets/landfilltax.htm
http://www.politics.co.uk/briefings-guides/issue-briefs/economy-and-finance/landfill-tax-$366600.htm

**ANNEX 22: United Kingdom – Landfill Allowances Trading Scheme**

| **1. Country:** |
|---|
| UK |
| **2. Instrument:** |
| Landfill Allowance Trading Scheme (LATS) |
| **3. Type of Instrument** |
| Tradable landfill allowances |
| **4. Level of Application:** |
| National and local |
| **5. Category of Waste:** |
| Biodegradable municipal waste (BMW) |
| **6. Type of Recovery:** |
| Composting, recycling, incineration, digestion/fermentation/pyrolysis |
| **7. Assessment Base:** |
| Weight |
| **8. Addressee:** |
| Local authorities (and consumers/households only indirectly through local authorities) |
| **9. Detailed Description of Instrument:** |
| The Landfill Allowances and Trading Scheme (LATS) limits the amount of BMW each waste disposal authority in England can send to landfill.<br>The scheme allocates tradable landfill allowances permitting to landfill one tonne of BMW to each Waste Disposal Authority (WDA) in England.<br>Allowances are allocated according to each WDA's percentage contribution to the total waste in the base year 2001/02. This percentage is applied to the maximum amount of BMW that can be sent to landfills from England in the target years (2009/10, 2012/13 and 2019/20. The allocation reduces progressively until 2020.<br>The Environment Agency monitors the authorities and reports on their performance annually in England.<br>An authority which does not need all of its allowances can sell them or bank them into the following year. An authority which requires more allowances can increase its rate of diversion, purchase additional allowances or borrow forward up to 5% of its following year's allocation. However, allowances cannot be banked out of a target year or the year preceding a target year as this may cause England as a whole to breach its target.<br>Trading and Borrowing are recorded on the web-based allowance Register that is being developed by Defra. Defra's Mass Balance Estimator and Allowance Manager (M-BEAM), can additionally help WDAs to use LATS in the most effective way.<br>WDA's are required to provide quarterly returns to the Environment Agency via WasteDataFlow, a web based system for municipal waste data reporting. The provided information can be downloaded by the general public if they register to do so.<br>A fixed penalty of £150/tonne will be incurred if a WDA breaches its landfill allowances target in |

a scheme year. Other penalties apply if authorities fail to report on time or with sufficient quality.

**10. Relevant Laws and Regulations**

Council Directive 1999/31/EC (Landfill Directive), specifically Article 5.2.. Biodegradable waste and municipal waste are defined separately in the Landfill Directive.

Waste and Emissions Trading Act 2003. Part 1 of the Act provides for an allowance scheme which will help the UK to meet, in the most cost effective and efficient way, its obligations under Articles 5(1) and 5(2) of the Landfill Directive 1999/31/EC. Section 21 defines biodegradable municipal waste as waste that is both biodegradable and municipal.

The Landfill (Scheme Year and Maximum Landfill Amount) Regulations 2004. These Regulations amend the definition of the scheme year to 1 April-31 March and divide the UK's Landfill Directive targets between the four constituent countries.

The Landfill Allowance and Trading Scheme (England) Regulations 2004 came into force on 1 April 2005. These Regulations provide detail for the operation of the Landfill Allowance Trading Scheme in England. The Schedule to the Landfill Allowances and Trading Scheme (England) Regulations 2004 determines the proportions of certain waste types that are deemed to be biodegradable.

The Landfill Allowances and Trading Scheme (England) (Amendment) Regulations 2005 came into force on 9 May 2005. These Regulations reduce the LATS financial penalty from £200 per tonne to £150 per tonne.

**11. Direct and Indirect Ecological Impact of Application of Instrument:**

In real terms the EU directive requires that the amount of BMW sent to landfill in England to be reduced to 11.2 million tonnes in 2010, 7.5 million tonnes in 2013 and 5.2 million tonnes in 2020. In 1995 it was estimated to have landfilled nearly 15,000,000 tonnes. In 2001/02, the base year for calculating allowances, England landfilled 15,706,000 tonnes BMW.

In 2005/6 the calculated amount that was landfilled was 12,386,666 tonnes, which is 18.5% less BMW than was allocated to waste disposal authorities.

In 2008/09 over 1.2 million tonnes less were landfilled than in 2007/08. England now landfills 40% less BMW than it did in 2001/02 and Defra considers that since the beginning of the scheme in 2005/06, LATS has helped to divert over three million tonnes of biodegradable waste away from landfill.

Diverting BMW from landfill will save valuable resources and reduce methane emissions as well as pollution through toxic chemicals

**12. Direct and Indirect Economic Impact of Application of Instrument:**

It is assumed that the costs of the scheme will be passed on from the WDAs onto their customers.

Banking and trading of allowances is taking place but allowance prices are kept confidential. Nominated WDA users of the LATS Register are able to view a list of anonymous historic trades displaying the year the trade relates to, the number of allowances sold and the value of the trade.

As 2009-10 is the first target year for the UK under the EU Landfill Directive allowances cannot be banked 2008-09 or 2009-10 and councils with a surplus for the period 2005-06 to 2008-09 may need to write allowances off.

The market demand and price for allowances seems to be low at the moment and many WDAs are facing writing them off. Future demand is uncertain as the scheme is experiencing the first target year (2009/2010).

The LATS public register indicates no penalty payments have been made under the system to date.

Additional administrative cost adds up to around £150,000 each year. The industry is more driven by landfill tax than the LATS scheme. LATS is expected to divert BMW away from landfill sites to other uses. Such reuse or recycling should create further economic opportunities for companies to recycle material and/or process it in some way. Some of the diversion technologies can be used to produce energy or as alternative fuels in transport.

**13. Direct and Indirect Social Impact of Application of Instrument:**

Social impacts of landfills like the disamenity value of living near landfill sites, potential health hazards and pollution are mitigated.

Reuse or recycling should provide employment and research opportunities.

**14. Social or Political Opposition or Resistance:**

Many environmental groups fear that LATS will encourage non-sustainable use of biological resources and in particular increase the proportion of household and municipal waste incinerated to which most of them are opposed. They do however welcome some of the opportunities that the scheme affords for diverting waste away from landfill and the many potentially sustainable development opportunities it offers to councils.

**15. Technical or Legal Obstacles (and Solutions):**

The effectiveness of the Landfill Allowance Trading Scheme depends on the reliability of data from authorities and contractors and the information collecting system is relatively complex. As of 10 July 2006 validation has not been feasible for 25 of the 40 waste disposal authorities in two tier areas because of the lack of data from some waste collection authorities in their areas.

As collection and disposal are separated there is a potential for conflict between waste disposal authorities, which are allocated allowances and waste collection authorities, which are not. However, the Act contains measures to promote joint working between the authorities.

As the cost of landfill is steadily increasing through the tax escalator, thereby providing an incentive to divert waste from landfill anyway, some authorities argue that LATS is irrelevant.

In cases where the costs of local authority collection have increased, businesses opt to rely on private contractors instead who are not necessarily registered for the scheme. This is because Defra defines BMW as "all waste under the control of local authorities be they waste disposal, waste collection or unitary authorities". The contradiction appears to have been resolved by deeming total BMW to be 68 per cent of municipal waste collected.

Waste-to-Energy plants may be necessary to achieve the reductions in landfill required and to take material diverted under LATS, but typically take nine years to become operational. This risked that many of these plants would not be operational in time for the UK to comply with the European Landfill Directive.

**16. Decision-Making Process Leading to Introduction of Instrument:**

Limiting Landfill (1999) outlined several options for meeting Article 5(2) of the Landfill Directive. The option of a tradable landfill permit scheme was explored in more depth in the Tradable Landfill Permits consultation (2001). The Waste and Emissions Trading Act (2003) provided the legal framework for the scheme which was incorporated into the Act. The LATS was launched on 1

April 2005.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

The financial penalty was reduced from £200 per tonne to £150 per tonne in 2004 to ensure that local authorities have the flexibility to meet challenging targets for the diversion of BMW.

**18. General Success and Acceptance:**

The scheme would appear to be successful because no authority has been fined to date and all have met their allowances. However, the low price and demand for tradable allowances would indicate that authorities are finding other ways to divert BMW from landfill.

**19. References and Sources:**

A beginners guide to the Landfill Allowance Trading Scheme (LATS). http://www.defra.gov.uk/environment/waste/localauth/lats/documents/lats-leaflet-0405.pdf

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste. Official Journal L 182 , 16/07/1999 P. 0001 – 0019. Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0031:EN:HTML

Directive on the Landfill of Waste (1999/31/EC). http://www.wasteonline.org.uk/resources/InformationSheets/Legislation.htm accessed 8 August 2010.

Waste and emissions trading act (2003). Defra. Available at http://www.defra.gov.uk/environment/waste/strategy/legislation/wet/index.htm. Accessed 31 August 2010.

The Landfill (Scheme Year and Maximum Landfill Amount) Regulations 2004 http://www.legislation.gov.uk/uksi/2004/1936/contents/made

The Landfill Allowances and Trading Scheme (England) Regulations 2004. http://www.legislation.gov.uk/uksi/2004/3212/contents/made

The Landfill Allowances and Trading Scheme (England)(Amendment) Regulations 2005. http://www.legislation.gov.uk/uksi/2005/880/contents/made

Land filling Biodegradable Municipal Waste in England - Landfill Allocation Scheme Targets And Achievement.

Defra. http://www.defra.gov.uk/evidence/statistics/environment/waste/kf/wrkf21.htm

Report on the Landfill Allowances and Trading Scheme (LATS) 2005/6. Version 3. Environment Agency. November 2006. http://publications.environment-agency.gov.uk/pdf/GEHO1106BLQM-e-e.pdf

Report on the Landfill Allowances and Trading Scheme 2008/09. Environment Agency. http://www.environment-agency.gov.uk/business/topics/waste/38989.aspx

Landfill Allowance Trading Scheme. Briefing, September 2007. Friends of the Earth. http://www.foe.co.uk/resource/briefings/lats.pdf

Department for Environment, Food and Rural Affairs: Reducing the reliance on landfill in England. (2006).http://www.nao.org.uk/publications/0506/food_and_rural_affairs_reduci.aspx

## ANNEX 23: USA – Electronic Waste Recycling Fee

| |
|---|
| **1. Country:** |
| USA, State of California |
| **2. Instrument:** |
| Electronic Waste Recycling Fee |
| **3. Type of Instrument** |
| Fee |
| **4. Level of Application:** |
| State (California) |
| **5. Category of Waste:** |
| Covered electronic devices (CED) = electronic waste with displays (TVs and monitors) |
| **6. Type of Recovery:** |
| Recycling |
| **7. Assessment Base:** |
| Volume (display size) |
| **8. Addressee:** |
| Consumers |
| **9. Detailed Description of Instrument:** |
| Consumers pay a recycling fee when purchasing a CED. Waste CED are collected by retailers. Revenues are deposited in an account managed by the Board of Equalization. Upon approval of a payment claim, an approved recycler receives a payment from the Electronic Waste Recycling Account based on the weight of covered electronic devices recycled.<br>The fee level ranges from US$ 8 to US$ 25 according to the display's size. |
| **10. Relevant Laws and Regulations** |
| Electronic Waste Recycling Act (2003) → Senate Bill No. 50<br>Senate Bill No. 20 |
| **11. Direct and Indirect Ecological Impact of Application of Instrument:** |
| In California in 2005 only 1.8 pounds per capita of recycled e-waste was collected. In 2007, that number had increased to 5 pounds per capita. |
| **12. Direct and Indirect Economic Impact of Application of Instrument:** |
| The instrument led to the creation of a large number of jobs in the recycling industry. |
| **13. Direct and Indirect Social Impact of Application of Instrument:** |
| - |
| **14. Social or Political Opposition or Resistance:** |
| Several politicians opposed the law as it required hiring new public servants in times where |

several thousand positions had to be cut.

**15. Technical or Legal Obstacles (and Solutions):**

As the recycling industry involves huge sums of money it led to several cases of fraud of recycling companies claiming to have recycled more CED than actually done. California has rejected about $23 million in fraudulent claims, it wrongly paid as much as $30 million in other ineligible claims (including illegal material smuggled in from out of state)

**16. Decision-Making Process Leading to Introduction of Instrument:**

The introduction reflected the will to reduce environmental pollution especially with heavy metals caused by electronic waste plus costs associated with disposal of electronic waste.

**17. Necessary Amendments of Previously Existing Legal Provisions:**

-

**18. General Success and Acceptance:**

The instrument can be regarded as successful as many other states followed the Californian example passing legislation mandating e-waste recycling.

**19. References and Sources:**

California Department of Resources Recycling and Recovery (CalRecycle) (2010): Electronic Waste Recycling Act of 2003: Covered Electronic Waste Payment System (SB 20/SB 50); http://www.calrecycle.ca.gov/electronics/act2003/ (September 15, 2010)

State of California (2007): Electronic Hazardous Waste (E-Waste). http://www.dtsc.ca.gov/HazardousWaste/EWaste/#E-Waste%20Recycling%20Act (September 15, 2010).

Electronics TakeBack Coalition (ETBC): The Problem With Electronics and E-Waste. http://www.electronicstakeback.com/ (September 15, 2010).