

ANNEX 2: FULL CASE STUDIES

This annex contains the longer versions of the case studies presented throughout the main body of the report (on overall MS waste management performance, landfill, PAYT schemes and producer responsibility schemes).

Overall MS performance

- Germany
- Slovenia

Landfill

- Austria
- Germany
- UK

PAYT

- Austria
- Finland
- Germany
- Ireland

Packaging

- Belgium
- Germany
- The Netherlands
- Taxes and deposit-refund schemes

WEEE

- Denmark
- Germany
- Sweden

ELV

- Austria
- Belgium
- Germany

Introduction to the waste policy background

The center piece of waste policy and legislation is the German Kreislaufwirtschafts- und Abfallgesetz (Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal, basic law; see URL http://www.bmu.de/english/waste_management/downloads/doc/3230.php, accessed 06/09/2011).

This law lays down the principles of waste management in Germany, the waste management hierarchy (prevention – recycling– disposal), the share of public authorities and private waste managers in the collection and treatment of waste. It is also the legal basis for different ordinances regulating specific waste streams.

Important regulations in this context are:

- the Gewerbeabfallverordnung (ordinance on commercial waste, see URL <http://www.gesetze-im-internet.de/bundesrecht/gewabfv/gesamt.pdf>, accessed 06/09/2011),
- the Deponieverordnung (Ordinance on Landfill Sites and Long-Term Storage Facilities, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/ordinance_simplifying_landfill_law.pdf, accessed 08/09/2011),
- the Verpackungsverordnung (waste packaging ordinance, see URL http://www.gesetze-im-internet.de/bundesrecht/verpackv_1998/gesamt.pdf, accessed 06/09/2011),
- the Batteriegesetz (Act Concerning the Placing on the Market, Collection and Environmentally Compatible Waste Management of Batteries and Accumulators – Batteries Act, see URL http://www.bmu.de/files/english/pdf/application/pdf/battg_en_bf.pdf, accessed 06/09/2011),
- the Elektro- und Elektronikgerätegesetz (Electrical and Electronic Equipment Act, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/elektrog_uk.pdf, accessed 06/09/2011)
- and the Altfahrzeugverordnung (End-of-Life Vehicle Ordinance, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/vehicles_vo.pdf, accessed 06/09/2011).

The ordinance on commercial waste lays down principles of separate collection and treatment of waste streams. In general, producers and proprietors of commercial waste (i.e. paper/cardboard, glass, plastics, metals and biodegradable waste) must store, collect and recycle those separately. As an alternative, the waste need not be collected separately if the mixed waste is treated in a pre-treatment facility that sorts the materials and allows a recovery level of 85%.

The Ordinance on Landfill Sites and Long-Term Storage Facilities (Landfill Ordinance) combines the three ordinances, which were enacted to transpose the European Union Landfill Directive into German national law, strictly limits the types of waste eligible for landfill and most importantly bans the disposal of mixed municipal waste in landfills. This will be described in more detail in the German case study on economic instruments focusing on landfills.

The last three regulations listed above are relevant in that they establish producer responsibility schemes. The waste packaging ordinance specifies producer responsibilities concerning different

waste fractions, inter alia beverage packaging (Deposit on beverage packaging scheme) and all sales packaging aimed at private consumers (Green dot scheme). The Electrical and Electronic Equipment Act and the End-of-Life Vehicle Ordinance oblige producers and retailers to take back electrical and electronic equipment as well as of End-of-Life vehicles. They will be described in detail in the case studies on producer responsibility schemes in Germany.

The German federal states (“Länder”) develop regional waste management plans. There is no national waste management plan.

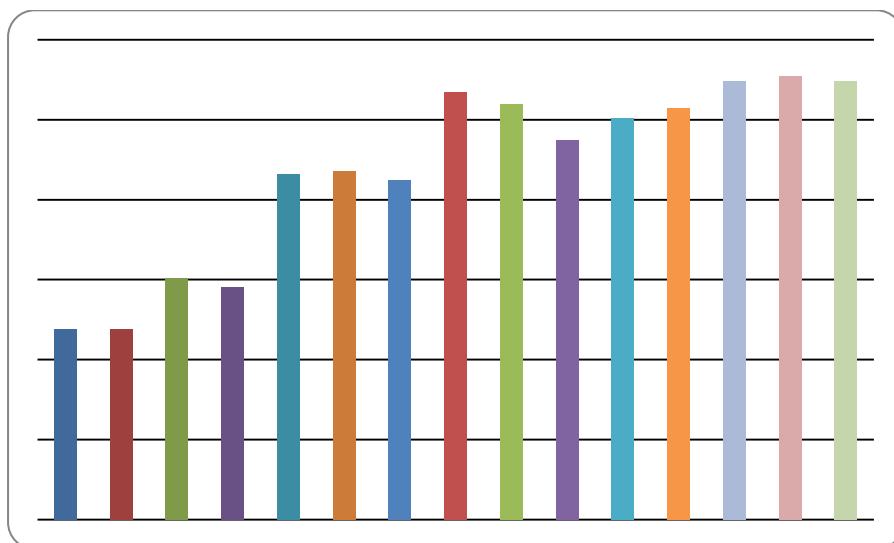
A national waste prevention programme is currently being developed (due in 2013 according to EU guidelines for national programmes on waste prevention).¹

Progress in waste management performance from 1995 – 2009

Overall, municipal waste generation has declined in Germany from approximately 51 mio. tonnes in 1995 to approximately 47 mio. tonnes in 2009. Within that period municipal waste generation peaked in 2002 with approximately 53 mio. tonnes.

The recycling rate of municipal waste strongly increased in the above-mentioned period. According to Figure 2 recycled quantities more than doubled from around 120 kg per capita in 1995 to approx. 260 kg per capita in 2002. Subsequently, recycling rates dropped until 2004 and subsequently increased again to about 270 kg per capita in 2009.

Figure 1 Municipal waste recycled, Germany, 1995 to 2009 (kg per capita)



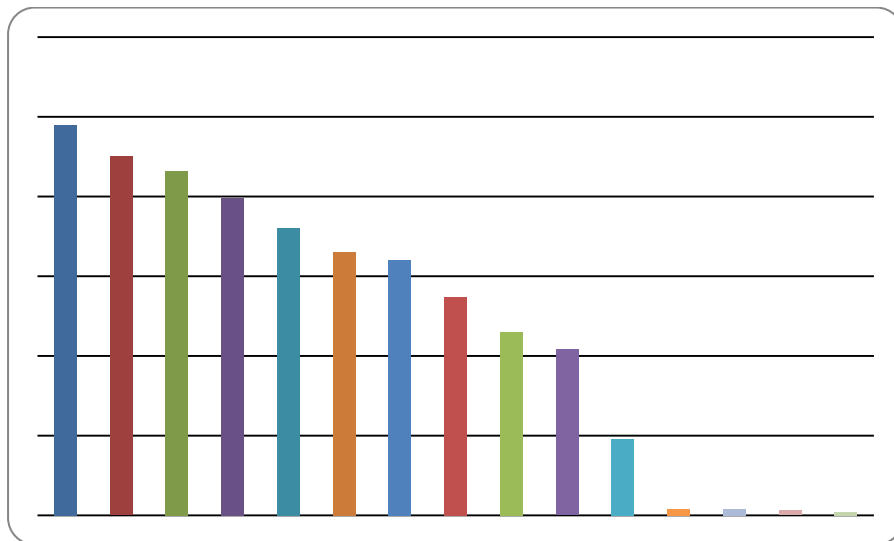
Source: Eurostat

From 1995 to 2005, the amount of municipal waste going to landfill decreased from around 240 kg per capita to less than 50 kg per capita (see Figure 3). The Landfill Ordinance restricted landfilling from 01/06/2005 onwards to pre-treated municipal waste with no more than 3 % of organic fraction

¹ See URL <http://www.recyclingportal.eu/artikel/23227.shtml>, in German, accessed 07/9/2011.

(measured as Total Organic Carbon, TOC)², from 2006 to 2009 de facto no municipal waste was landfilled, but largely recycled (48 %), incinerated (34 %) and composted (18 %).³

Figure 2 Municipal waste landfilled, Germany, 1995 to 2009 (kg per capita)



Source: Eurostat

Economic instruments focusing on landfills and incineration

As regards landfills, there is a ban for the disposal of untreated municipal waste in landfills originating from the landfill ordinance. Economic instruments focusing on landfills and incineration mainly cover fees (charge and gate fees per tonne landfilled and per tonne incinerated).⁴ These aspects will be further elaborated in the case study on landfill in Germany.

Pay-as-you-throw (PAYT) schemes

PAYT schemes in particular apply to household waste collection. There is no federal legislation specifying PAYT-schemes. In general, bin volume-based systems are most widely-used. For instance, the city of Stuttgart fortnightly collects residual waste for the tonne types 60l, 120l and 240l, which incur raising costs depending on the volume. If the waste exceeds the respective household bin-volume, then the waste holder has to pay for an additional waste plastic sack.

² See URL http://www.voithpaper.de/media/vp_de_twogether17_05_meri_d.pdf, in German, accessed 07/09/2011.

³ See URL <http://www.eds-destatis.de/de/press/download/2011/03/037-2011-03-08.pdf>, in German, accessed 07/09/2011.

⁴ There is hardly any data on a German average available since in Germany municipal authorities are competent for laying down the respective fees through by-laws. Therefore, the effective fees vary widely across Germany. However, according to the source http://www.voithpaper.de/media/vp_de_twogether17_05_meri_d.pdf the landfill fees range from 60 – 220 € per tonne. Incineration fees range from 80 to > 200 € per tonne) according to the source http://www.abfallforum.de/downloads/Vortrag_Alwest_Kassel_2007.pdf.

Much more rarely used are sack volume-based systems, frequency-based systems and weight-based systems. They will be discussed in detail in the German PAYT case study.

Producer responsibility schemes

Producer responsibility schemes are established by various German waste related acts and ordinances, for instance the Electrical and Electronic Equipment Act as well as the End-of-Life Vehicle Ordinance and the waste packaging ordinance. They oblige producers and retailers of electrical and electronic waste, of vehicles and of sales packaging waste to take back and comply with minimum recycling and recovery rate. The electrical and electronic waste and end-of-life vehicles are regulated similar to most European countries via producer responsibility schemes. The scheme on packaging waste is in Germany known as the Green Dot scheme and has been in force more than 20 years.

Further producer responsibility schemes exist concerning batteries, waste oil and waste from building & construction sector.

Introduction / waste policy background

The total waste generation in Slovenia lies at about 7 million tonnes per year or 3.5 tonnes per capita and year. From these about 900.000 tonnes per year or 450 kg/capita and year is municipal waste.

Recovery of waste from manufacturing and services has reached around 70 % in recent years, while the figure for municipal waste is 31 to 34 %. In previous years the majority of municipal waste was landfilled. In the meantime schemes for the collection and treatment of individual waste types along with financing of activities that ensure proper management of such waste have been established. With changes to legislation and policy instruments, with the establishment of municipal waste management centres, better separate collection and treatment of mixed municipal waste before disposal and consequently a greater percentage of recycled municipal waste is anticipated.

The structure of waste management legislation is in line with EU law. The general acts are the national Environmental Protection Act (Official Gazette, No. 39/06, 70/08-ZVO-1B) and the Decree on Waste Management (Official Gazette, No. 34/08) (EEA 2010).

Progress in waste management performance from 1995 – 2009 (using Eurostat data – i.e. showing progress in reducing landfill and increasing recycling)

In the period 1995 to 2009 the generation of municipal waste in Slovenia can be separated into to phases (see **Figure 1**):

- from 1995 to 2002 the municipal waste generation went down following the break-up of the former Yugoslavia and the restructuring of the Slovenian economy.
- From 2002 to 2009 municipal waste generation increased at an average rate of 1.7 %/year.

In the first phase more municipal waste was generated than treated (including disposal). In the second phase, that is since 2002, more municipal waste is treated (including disposal) than generated. This is a hint, that currently there is sufficient disposal and other treatment capacity.

Figure 2 shows the treatment of municipal waste in Slovenia by treatment type over the period 1995 to 2009. From 1995 to 2001 waste treatment was almost exclusively landfilling. Since the year 2002 a waste incineration installation with a maximum throughput of 15.000 tonnes per year of municipal waste has been in operation. However, really impressive was the increase of material recycling from 14.000 tonnes in 2001 to 377.000 tonnes in 2005. By this increase material recycling achieved a market share of 36 % on total municipal waste treatment. Since 2005 this market share has stayed at a level of 31 to 34 % (see **Figure 3**).

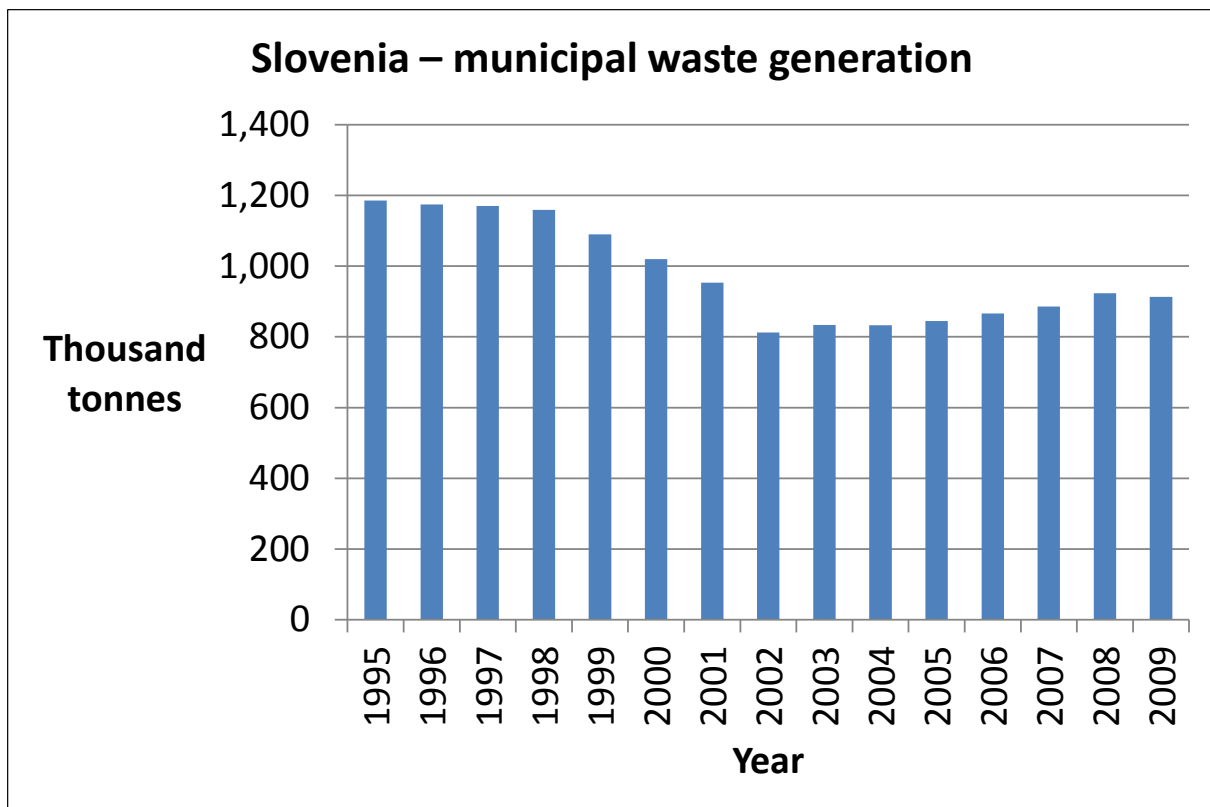


Figure 1: Municipal waste generation in Slovenia (Eurostat 2011)

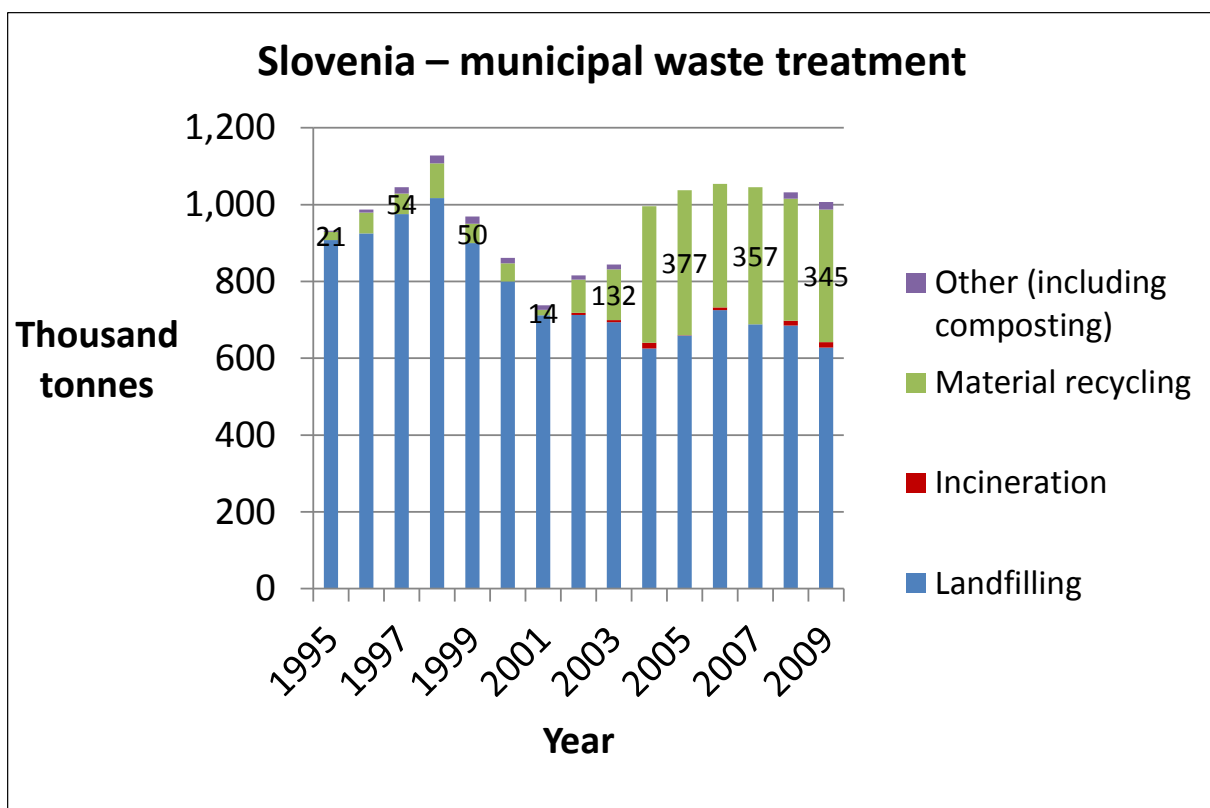


Figure 2: Treatment of Slovenian municipal waste (Eurostat 2011)

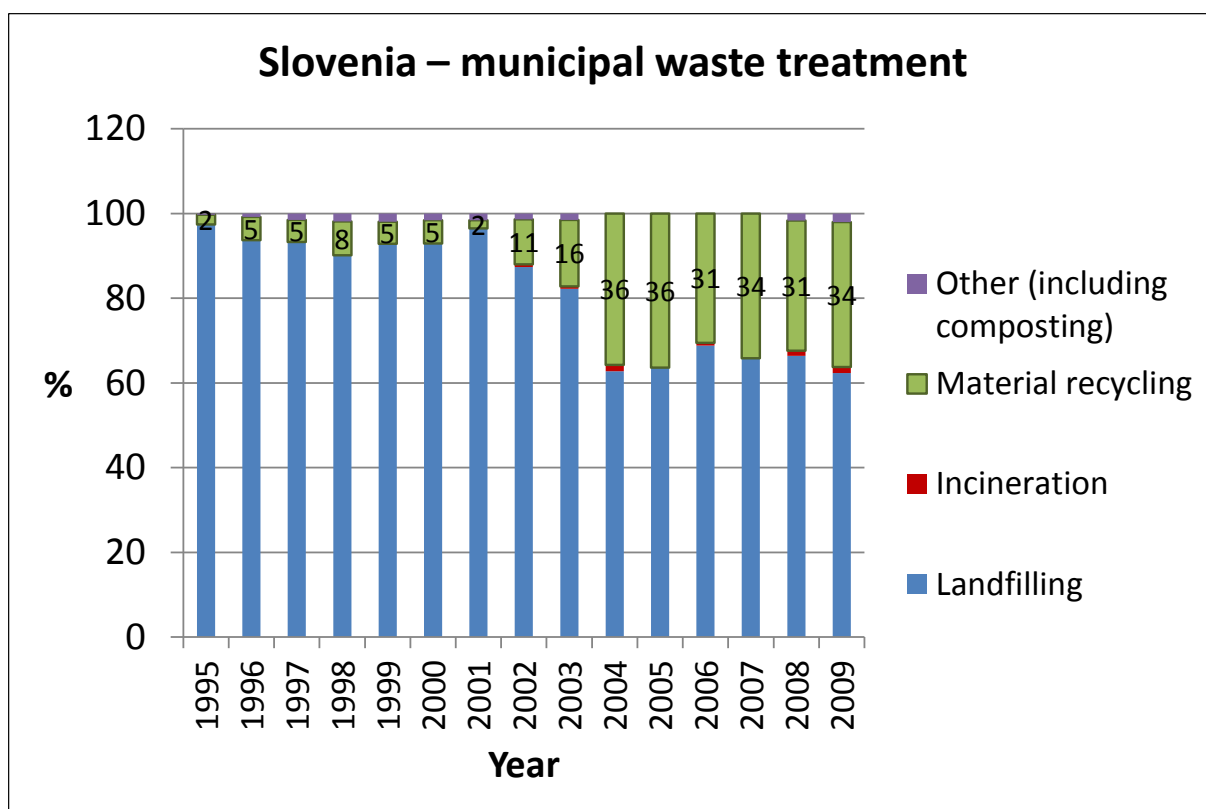


Figure 3: Treatment of Slovenian municipal waste – share of treatment options in % (Eurostat 2011)

Economic Instruments Connected to Landfilling

An environmental tax for pollution caused by landfilling was introduced for waste disposal 2001, revised in 2004 and again in 2010 (Decree on environmental tax for environmental pollution caused by waste disposal (Official Gazette RS, No. 70/2010).

With the latest revision the tax no longer takes into account the potential of waste to generate methane. Now, the tax simply assigns a number of 'units of environmental burden' to each of inert, non-hazardous and hazardous waste (the numbers are 1, 5 and 10, respectively) and multiplies this figure by a tax rate per unit of environmental burden of €0.022. Hence, for a tonne of non-hazardous waste, the tax rate is now €11 per tonne (see Table 1).

Landfill operators no longer have the opportunity to reduce the tax they pay in line with the energy they generate. The view was taken that since, from mid-July 2009, all landfill operators have to fulfil all requirements of the EU Landfill Directive (and the Slovenian Decree on the landfill of waste), then because this makes the collection of landfill gas a mandatory requirement, no reduction in the tax rate should be allowed

Table 1: Environmental tax in the year 2010 for 1 tonne of landfilled waste (Decree 70/2010)

TYPE OF WASTE	€/ t
Inert	2.2
Non hazardous waste	11.0
Hazardous waste	22.0

Since 2001 the investments in public infrastructure (landfilling of municipal waste) raised annually up to EUR 13 million. Originally the tax could be directly spent by the landfill operator in infrastructure improvement. Therefore the largest share of the tax was directly spent on landfills of municipal and hazardous waste, with also significant investment into collection and recycling schemes. The amount of the tax transferred to the state budget was practically zero in the period prior to 2004.

Since the year 2010 all landfill tax is submitted to the state budget, but the municipalities get part of the tax back. They get more money, the more waste they collect and the more this waste is recovered.

That virtually no revenue accrued to the state budget from sites operated by public service utilities up to 2004 implied that there was probably little incentive by the tax for not landfilling waste. The revised (post-2010) revenue recycling mechanism is an improvement, and should reward the best-performing municipalities.

Further economic instruments which may affect landfilling are:

- a financial guarantee to be provided by landfill operators as part of the acquisition of an environmental permit for operating a landfill, which enables the authority, issuing a permit, to cash it in the event of irregularities in the closure and after closure of the landfill (EEA 2010)
- an environmental impact tax on the discharge of waste water.

PAYT schemes (perceived impacts / strengths / factors for success / weaknesses of the EIs)

Residents pay 'directly' for the collection and treatment of waste (either as one service, or along with other utilities which may be provided by the same company). The charge depends mainly on the bin volume and the costs of the municipality for providing the services.

Cost allocation according to the volume of the waste bin is regarded as a viable compromise which does not incur excessive costs.

Producer responsibility schemes (perceived impacts / strengths / factors for success / weaknesses of the EIs)

The polluter pays principle and extended producer responsibility is applied in Slovenia for the following waste streams:

packaging waste;

- waste from plant protection agents containing hazardous substances
- waste electrical and electronic equipment.
- In 2008 regulations also introduced extended producer responsibility for
- waste batteries and accumulators,
- graveside candles
- medical waste, and
- end-of-life car tyres.

In order to discuss the perceived impacts a closer look is taken to the development of the producer responsibility scheme on end-of-life vehicles (ELV) and on tyres.

An ELV's management system has been established in May 2004 as public service operated by four concessionaires.

In the period between May 1, 2004, when the system of performing public utility service of the management of end-of-life vehicle became operative, and March 2007, four temporary contractors performed this public utility service. In this period, the system did not recover the planned quantities; most of the recovered end-of-life vehicles were collected as so-called "old burdens" (i.e. end-of-life vehicles collected by local communities as abandoned vehicles whose last owner was not identifiable) (see **Figure 4**). In 2005, when the obligation of paying the cost of decommissioning of end-of-life vehicles put on the market before 2002 was transferred to the last owner, the quantity of end-of-life vehicles in the system deteriorated (see **Figure 4**). The method of temporary deregistration of end-of life vehicles by means of declaration of the location of the vehicle began to be abused. Another reason for fewer recoveries was illegal disposals and illegal scrap yards. Owing to these circumstances, intensified surveillance began in 2005 and scrap yards were gradually integrated into the recovery system. The essential measure that increased the number of vehicles collected for recovery was the elimination of the last owners' payment liability for disassembly in December 2005. This resulted in a significant increase of end of- life vehicles delivered for disassembly by the last owners in 2006 (see **Figure 4**). Since April 2007, this public utility service has been provided by three concessionaires who were selected by a public tender. However, the system of decommissioning still covers less ELVs than expected.

After the expiration of the existing concession contracts, on 01.04.2012 an extended producer responsibility scheme for end-of-life-vehicles, based on free of charge take back obligations directly for the producers and importers will become effective (Gospodarska zbornica Slovenije 2011).

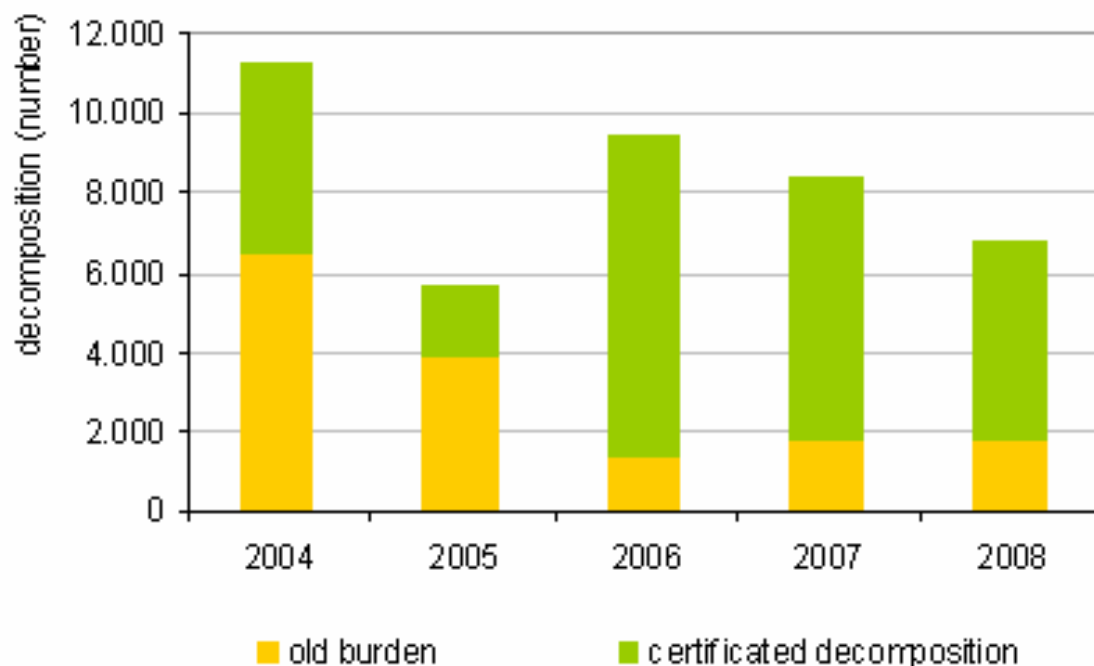


Figure 4: Number of end-of-life vehicles treated in Slovenia

Source: Reports of concession-holders – SARA – web application for dismantling cars, Ministry of the Environment and Spatial Planning, 2007 (Ref: Environmental Indicators in Slovenia, OD16) * old burdens - end-of-life vehicles collected by local communities as abandoned vehicles whose last owner was not identifiable

The decree for the management of waste tyres introduced extended producer responsibility for tyres.

The quantity of collected and recovery-destined used tyres increased significantly when this decree became effective in 2006. Before 2006, a total of 2.5 kg per person of used tyres were collected annually, while in 2008 a total of 19,000 tonnes were collected – 8.4 kg per person (see **Figure 5**). Tyres are subjected either to material or energy recovery, while smaller quantities are destined for reuse or renewal. In 2008 a total of 47 % of used tyres were destined for material recovery, and 50 % for energy recovery.

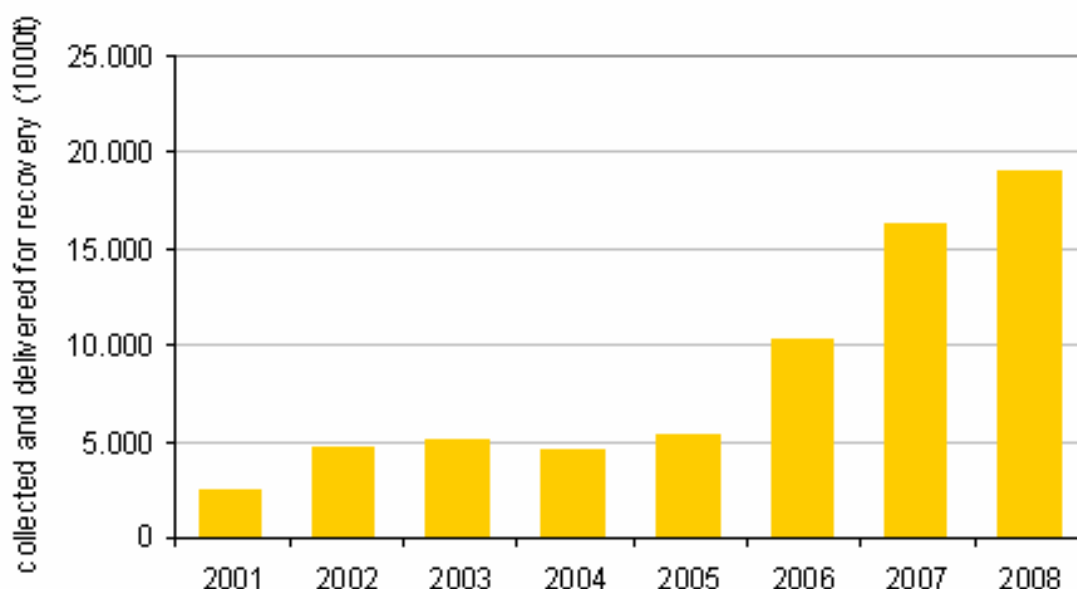


Figure 5: Quantity of used car tyres collected and supplied for recovery in Slovenia

Source: Report of concession-holders, Ministry of the Environment and Spatial Planning, 2007 (Ref: Environmental Indicators in Slovenia, OD15)

Other economic instruments

Environmental pollution taxes were, among others, introduced for

- the use of lubricating oils (Decree on the tax on the use of lubricating oils and fluids),
- the generation of ELVs (Decree on environmental tax on the generation of end-of-life vehicles)
- WEEE (Decree on environmental tax on the generation of waste electrical and electronic equipment)
- batteries,
- packaging waste (Decree on environmental tax on the generation of packaging waste)
- graveside candle waste and
- end-of-life tyres (Decree on environmental tax on the generation of waste pneumatic tyres)

- landfilling of waste
- waste water discharging

The tax rate is based on the environmental pressure caused, expressed in so-called environmental load units (ELU) per individual polluter and has to be calculated by rather complex formula.

For the average tax per tonne of municipal waste disposed see **Error! Reference source not found.** above.

The main share of taxes and contributions is used directly for the purpose of environmental protection investments.

References:

Republic of Slovenia (2010): Decree 70/2010 on the taxation of environmental pollution caused by waste disposal in landfills (Uredbo o okoljski dajatvi za onesnaževanje okolja zaradi odlaganja odpadkov na odlagališčih). Ljubljana. <http://www.uradni-list.si/1/content?id=99738&part=&highlight=Uredba+o+okoljski+dajatvi+za+onesna%C5%BEevanje+okolja+zaradi+odlaganja+odpadkov>

Main features

The Act on the Remediation of Contaminated Sites (ALSAG) was first established in 1989 and frequently amended thereafter. It introduced a levy, which on the one hand, was intended to finance the remediation of contaminated sites, and on the other hand, was intended to provide an incentive for improved management of waste.

The levy was made dependent on the environmental impact associated with the different waste treatment options and differentiated by waste type. The levy is lower for construction and demolition waste, or for incineration, and is higher for reactive waste, and for landfilling.

Up to the year 2004 it was still possible to deposit on old non-compliant landfills. For using these non-compliant landfills an additional charge had to be covered which was as high as 73 €/tonne in the year 2000.

For landfilling of municipal solid waste (MSW) on compliant landfills, the levy gradually grew from 4.4 €/tonne in the year 1995 to 26 €/tonne in the year 2008. This levy is scheduled to be increased to 29.8 €/tonne in the year 2012 (see figure **Error! Reference source not found.**). The landfill levy with currently 26 €/tonne is much higher than the waste incineration levy. Biological treatment, recycling and reuse does not carry such a levy, so that the landfill levy provided an incentive for waste management along the waste hierarchy.

In parallel to the increase of the landfill levy a requirement was introduced by the Austrian landfill ordinance in the year 2004, that waste may only be landfilled if its total organic carbon contents (TOC) is lower than 5 %. This effectively bans the landfilling of untreated municipal waste. There were some temporary exemptions from these TOC restrictions for the period 2004 to 2008. There are some additional exemptions (e.g. residues from mechanical-biological treatment may be landfilled if their upper heating value lies below 6,600 kJ/kg) which assure that non-reactive waste with higher carbon contents may be landfilled, when further treatment would cause more impacts than the landfilling.

Impacts

Error! Reference source not found. compares the amount of municipal solid waste generated in Austria in the period 1995 to 2009 to the amount of municipal solid waste landfilled in this period. Already in 1995 less than 50 % of the Austrian municipal solid waste were landfilled indicating that in comparison to other European countries the Austrian waste management system already was quite advanced at the time. In the period 1995 to 2003 municipal solid waste generation increased by 42 % while the amount of MSW landfilled decreased by 9 %.

This decrease can be related to several factors:

- The establishment of separate waste collection and recycling systems for different packaging types and paper
- The establishment of incineration and biological treatment capacity
- The phasing out of non-compliant landfills
- The un-popularity to introduce new landfills limiting the available landfill capacity
- But also the increasing landfill levy making landfilling economically less attractive.

As can be seen in **Figure 1** then in the year 2004 the landfilling of MSW dropped by another 75 % and virtually disappeared in the year 2009. This clearly can be related to the introduction of the 5 % TOC threshold introduced in this period.

When directly comparing the time series of MSW landfilled in Austria to the landfill levy (see **Figure 2**), it can be concluded

- a) that the levy helped to divert MSW from landfills
- b) that the contribution of the levy, however, cannot be quantified, as a bundle of different other measures was applied in parallel, the most important of which was the TOC limit (the landfill ban on reactive waste).

With respect to household waste the combination of the applied instrument led to the complete phase out of landfilling (as the first treatment step), an a steady increase of thermal treatment (incineration) especially from 2003 to 2004, but also to a steady increase of biological recovery and recycling (see **Figure 3**). By 2009 approximately 36 % of the household waste were incinerated, 32 % recycled and 19 % biologically recovered.

Strengths/weaknesses

Strengths of the landfill levy are

- It can be adapted to the different environmental impacts of different waste types and treatment options. Thus it is a good instrument for driving the waste management system.
- With on average less than 10 € per citizen and year the land fill fee is on the one hand affordable, on the other hand, while applying the polluter pays principle, it is fed back to the waste generator and thus provides a small incentive for producing less waste.
- While annually some 50 to 80 million € are raised and spent for the actual remediation of contaminated site. With approximately 1 mio. € per year spent for the management of the funds this instrument carries reasonable transfer costs..

The weaknesses of the landfill levy are:

- It is difficult to define the level of the levy where effects towards the waste hierarchy are achieved while avoiding market barriers (VOEB 2007).
- They may provide an incentive for illegal landfilling and waste exports. In order to prevent illegal dumping (driven by the economic incentive to “save” the disposal costs as well as the remediation contribution) Austria had to make intensive awareness and information campaigns. Especially the improper backfilling of construction and demolition waste and the illegal transfrontier shipment of waste increased after the rise of the levy. This unintended side effect is being addressed by the intensified cooperation with the waste management industry and increased control activities. Furthermore unfair practises are also hindered by the improved electronic recording of the waste streams (electronic data management in environment and waste management).

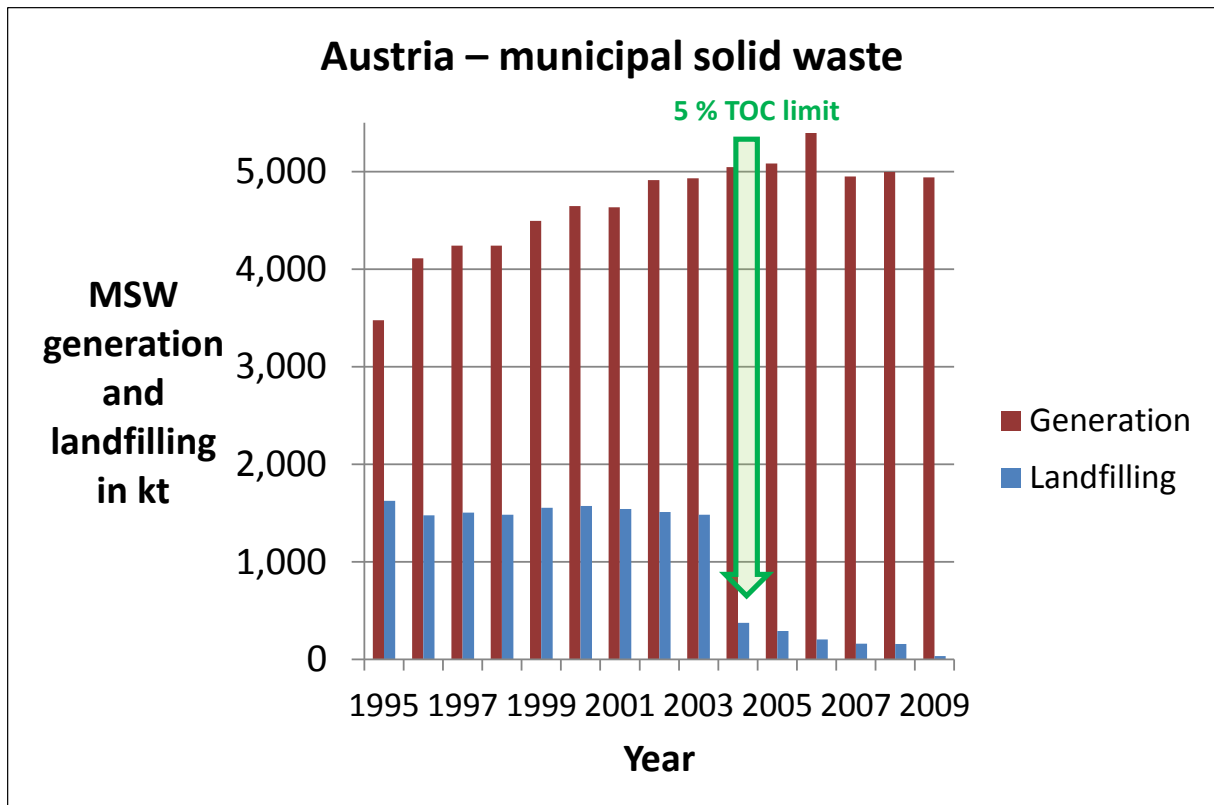


Figure 1: Generation and landfilling of municipal solid waste in Austria (Eurostat 2011)

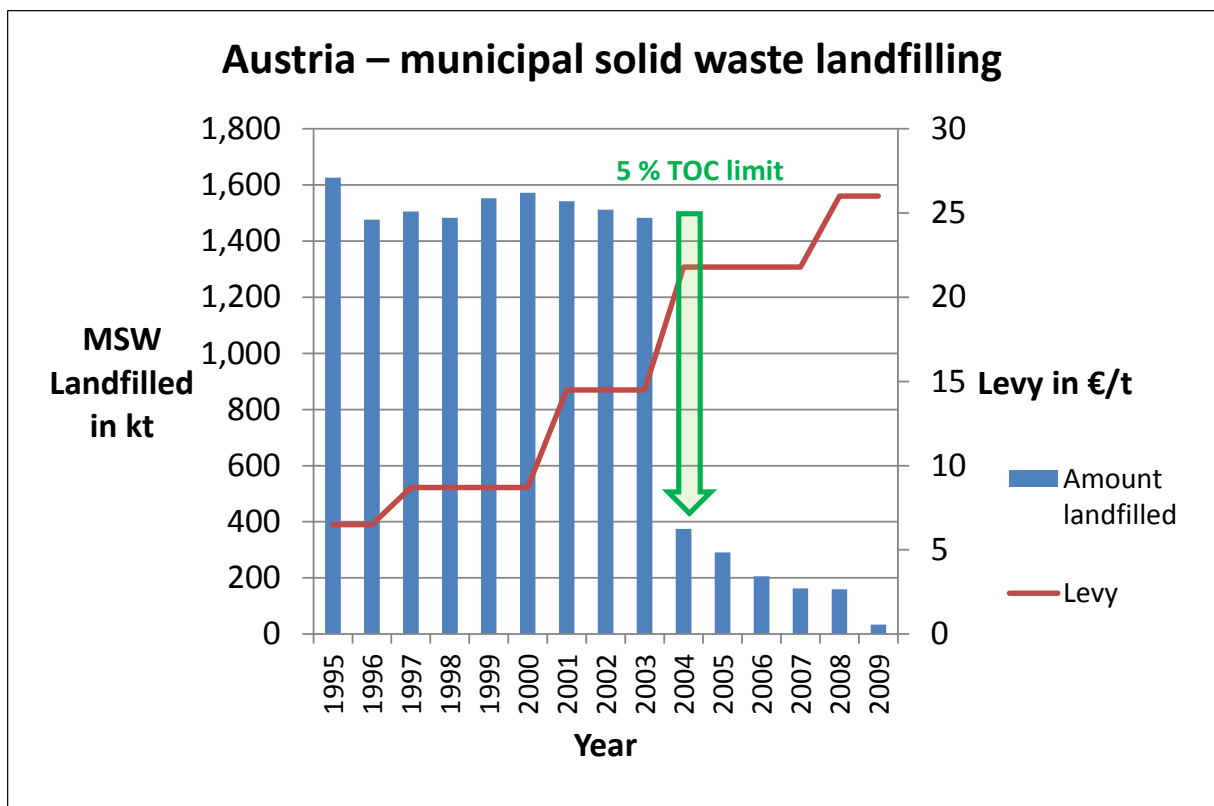


Figure 2: Comparison of annual amount of municipal solid waste landfilled and municipal solid waste landfill levy (Eurostat 2011, Wirtschaftskammer 2011, Umweltbundesamt 2000)

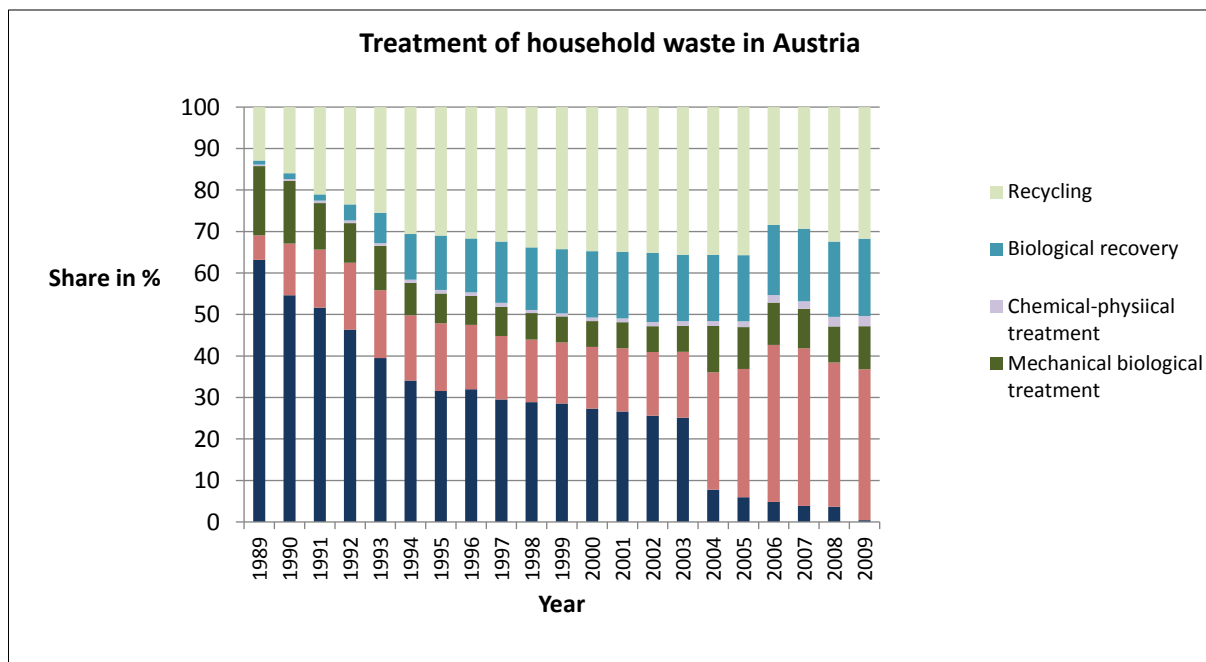


Figure 3: Comparison of annual amount of municipal solid waste landfilled and municipal solid waste landfill levy (Eurostat 2011, Wirtschaftskammer 2011, Umweltbundesamt 2000)

References:

Lebensministerium (2011): Bundes-Abfallwirtschaftsplan 2011. Vienna.
www.bundesabfallwirtschaftsplan.at

VOEB (2007): Entwurf der Novelle des Altlastensanierungsgesetzes 2007 – Stellungnahme des Verband Österreichischer Entsorgungsbetriebe 27.April 2007.
http://voeb.at/media/2007/voeb_stellungnahme_alsag2007.pdf

In general, Economic Instruments (EIs) focusing on landfills in Germany originate from the Ordinance on Landfill Sites and Long-Term Storage Facilities (Landfill Ordinance). The Landfill Ordinance entered into force in 2009 and simplifies landfill law. To this end, it combines the previously enacted ordinances.

Main features of Economic instruments related to landfilling in Germany

The national ordinances transposing the European Union Landfill Directive into German national law made the requirements for landfilling stricter as compared to the Directive. Altogether, the national government originally enacted three ordinances for transposition:

(1) The Ordinance on Environmentally Compatible Storage of Waste from Human Settlements (Abfallablagerungsverordnung, see URL http://www.bmu.de/english/waste_management/downloads/doc/3371.php, accessed 08/09/2011, enacted in 2001) aimed to close the loopholes in the 1993 administrative regulation.

This ordinance fixed the transition period to 1 June 2005. Together with the Technical Instructions on Waste from Human Settlements (Technische Anleitung Siedlungsabfall, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/tasi_ges.pdf, accessed 08/09/2011) this ordinance acts as a legal ban to landfill untreated municipal waste from 1 June 2005 onwards. After this date, only such municipal waste is permitted for landfill that has been sufficiently pre-treated via incineration or mechanical-biological treatment (MBT) so that it is neither able to degrade further nor to release pollutants.⁵ Such pre-treatment greatly reduces the generation and release of the greenhouse gas methane.

Thus, for instance, only landfilling residues of MBT with an organic content below 3 % (measured as Total Organic Carbon, TOC) is allowed.

(2) The Ordinance on Landfills and Long-term Storage (Deponieverordnung, enacted in 2002) transposed the technical parts of the Landfill Directive that were not already implemented in German legislation.

(3) In 2005 the Ordinance pertaining to the recovery of waste at surface landfills entered into force (Deponieverwertungsverordnung, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/depverwv_engl050728.pdf, accessed 08/09/2011). It laid down standards for waste recycling on landfills. These standards are almost equally strict as those for waste disposal.⁶

⁵ See URL http://www.bmu.de/english/waste_management/doc/3432.php, accessed 08/09/2011.

⁶ See URL http://www.bmu.de/abfallwirtschaft/neue_rechtsvorschriften/doc/41593.php, in German, accessed 08/09/2011.

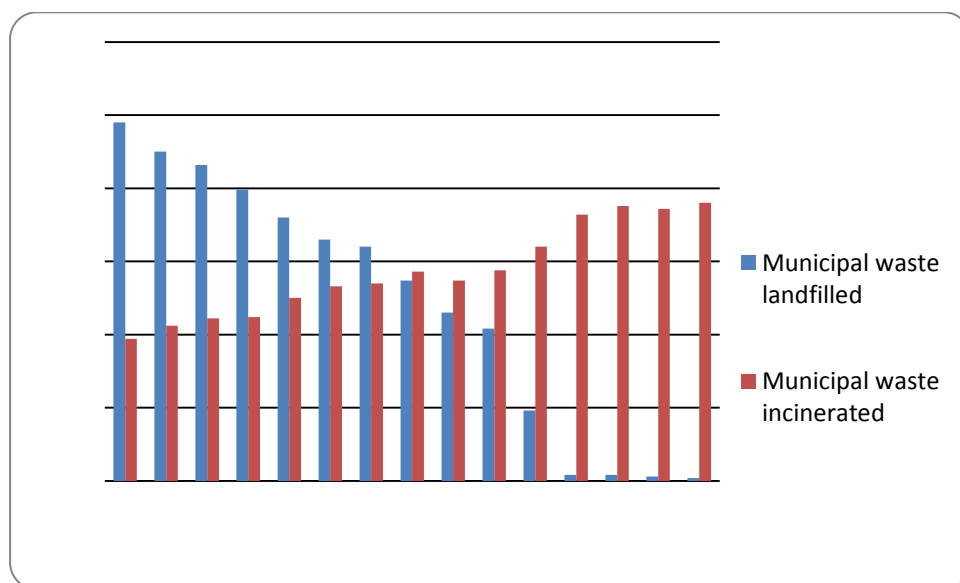
In 2009 the three ordinances have been unified in the above-mentioned Landfill Ordinance (see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/ordinance_simplifying_landfill_law.pdf, accessed 08/09/2011).

The ranges for landfill fees for waste that is residual from the treatment vary widely across Germany because municipal authorities are competent for laying down the respective fees through by-laws. Therefore, there is hardly any data on a German average available. However, according to one source identified the landfill fees range from 60 – 220 € per tonne.⁷

Impacts of EIs related to landfilling in Germany

The amount of waste put to landfill has drastically decreased in the last five years, going down to only 35 Mio. Tonnes (all waste fractions) and virtually reducing quantities of untreated municipal waste landfilled to zero in 2009.⁸ According to data from the German Federal Statistics Office municipal waste in 2009 was largely recycled (48 %), thermally treated (34 %) and composted (18 %).⁹ Figure 1 displays the amount of municipal waste in Germany landfilled versus incinerated from 1995 – to 2009. It shows two contrary trends: while the amount landfilled significantly decreased, almost down to zero from 2006 onwards, the quantities incinerated increased. This also reflects the effect of the landfill ban on untreated municipal waste, causing much more waste to be pre-treated by incineration.

Figure 3: Municipal waste landfill and incinerated, Germany, 1995 – to 2009 (kg per capita)



⁷ See URL http://www.voithpaper.de/media/vp_de_twogether17_05_meri_d.pdf, in German, accessed 07/09/2011.

⁸ See URL http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Presse/pm/2011/01/PD11_032_321,templateld=renderPrint.psml, in German, accessed 07/09/2011.

⁹ See URL <http://www.eds-destatis.de/de/press/download/2011/03/037-2011-03-08.pdf>, in German, accessed 07/09/2011.

Source: Eurostat

In consequence, it can be assumed that the landfill ban of unpretreated municipal waste is well enforced. The landfill ban on unpretreatedmunicipal waste has reduced greatly the masses of waste going to landfill.

Strengths / factors for success / weaknesses of the EIs

The landfill ban originates from the 2001 Waste Disposal Ordinance in conjunction with the 1993 administrative regulation on municipal waste (Technische Anleitung Siedlungsabfall). While the TASI enabled various exceptions concerning the waste eligible for landfilling, the 2001 ordinance was much stricter and obliged municipalities and landfill operators to comply with the regulations at the latest with the ending of the transition period at 01 June 2005. Compared to the former low-level landfilling, the pre-treatment procedures waste incineration or MBT according to strict technical standards legally required by relation to the ban impose higher costs for landfilling. Therefore, there has been an abundant debate on this issue and much pressure from specific stakeholders to allow far-reaching exemptions from the landfill ban at the time when the ordinances have been debated. Furthermore, between 2001 and 2005 many municipalities and landfill operators encouraged landfilling and substantially lowered the gate fees in order to fill as much as possible the landfill capacities as long as this was still permitted and thus generate additional revenue.^{10,11}

In some cases the landfill ban triggered illegal dumping of untreated municipal waste in landfills, but also in quarries. Available data suggest that the overall illegal dumping amounts to several hundred thousand tons of waste. It is assumed that local authorities were lacking resources and experience to sufficiently enforce and monitor the ban.⁶

However, the landfill ban yielded relevant environmental benefits. In particular, the higher costs for pre-treating waste going to landfill triggered intelligent waste management and also prevention concepts (e.g. incentives) on municipal level, which in turn raised recycling rates and also moderately waste prevention rates because. Due to these concepts the overall waste management costs per household increased only marginally. Furthermore, according to data from the Federal Environment Agency (UBA) the landfill ban also helped to significantly reduce CO₂-emissions in 2010 compared to 1990 by more than 31 mio. tons CO₂-equivalents.^{7,12}

¹⁰ WRAP and Eunomia Research & Consulting (2010): Landfill Bans: Feasibility Research. Appendices. Banbury, UK. See URL http://www.wrap.org.uk/downloads/Landfill_Bans_Feasibility_Research_Appendices_Final.cc333c39.8866.pdf, accessed 08/09/2011.

¹¹ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

¹² See URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/co2_bilanz_2007.pdf, accessed 09/09/2011.

As a supporting measure, an amendment of the Recycling Management and Waste Act introduced a simplified permit procedure for waste treatment facilities other than landfills in order to enable federal states to establish pre-treatment capacity faster.

The UK Landfill Tax was introduced in October 1996. It is a tax on all landfilled waste, with some exemptions. It is applied at two rates: a standard rate, applied to a range of materials, including household waste; and a lower rate, applying to specific 'qualifying materials', typically, those deemed to be 'inert', including materials such as rubble.

The tax affects all sectors of the economy. As the levels of landfilling at the introduction of the tax were very high, the tax could be considered a 'general disposal tax', as most residual waste was (and still is) disposed of to landfill.

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

'to ensure that landfill costs reflect environmental impact thereby encouraging business and consumers, in a cost effective and non regulatory manner, to produce less waste; to recover value from more of the waste that is produced; and to dispose of less waste in landfill sites'

From this, it seems clear that the primary aim was, in the early stages, to internalise external environmental impacts.

Ecotec's report on taxes and charges in the EU indicates that the tax level and the proposals for the tax were widely consulted on before being introduced.¹³ The rates at which the tax was set were:

- Inert Wastes (lower rate tax): approx. €2.50 (£2) per tonne; and
- Active Wastes (standard rate tax): approx. €8.75 (£7) per tonne.

Mixed wastes are taxed as active wastes even if much of the material is 'inert' if certain minimal levels of mixing are exceeded.

A report describes how the tax has evolved as follows:¹⁴

- 1993 – The introduction of the Landfill Tax was preceded by an assessment of the external costs associated with landfill and incineration and by work assessing waste management options in the UK after the introduction of such a tax.¹⁵ A proposal for a tax based on a percentage of disposal costs (an ad valorem tax) emerged, with the order of magnitude of the tax heavily influenced by the external costs study;
- November 1994 – Government makes clear its intention to introduce the Landfill Tax;

¹³ ECOTEC (2001) *Study on the Economic and Environmental Implications of the use of Env. Taxes & Charges in the EU*.

¹⁴ Eunomia et al (2007) *Household Waste Prevention Policy Side Research Programme*, Final Report for Defra

¹⁵ CSERGE, Warren Spring Laboratory and EFTEL (1993) *Externalities for Landfill and Incineration: A Study by CSERGE, Warren Spring Laboratory and EFTEL*. Coopers & Lybrand (1993) *Landfill Costs and Prices: Correcting Possible Market Distortions*.

- March 1995 - a consultation process was undertaken to elicit the views of industry, environmentalists, and local authorities. Its major outcome, as announced in the November 1995 Budget, was a change in the tax design, from a percentage of disposal cost (ad valorem) system, to a weight-based tax. Furthermore, it was intended that there should be no exemptions from the tax; and
- November 1995 – Budget announces the tax will be introduced in October 1996.

At the outset typical disposal fees pre-tax for municipal wastes, or non-inert industrial wastes, were between approx. €11.20-€40.00 (£7-£25) per tonne so that the tax implied an increase in price of between 30-100%. The level of taxation for non-inert wastes (i.e. those that degrade to produce GHGs) was increased by the method of an annual price escalator that was first introduced in 1998. Since then the magnitude of the escalator has increased, from approx. €1.55 (£1) per tonne escalator over five years to the current approx. €12 (£8) per tonne per year over six years. As of April 2009, the tax rate is approx. €50 (£40) per tonne. The tax will rise to a maximum level of pprox. €84 (£72) per tonne in April 2013. The tax rate for inert wastes has remained relatively steady with only a small increase to approx. €2.90 (£2.50) per tonne in 2007.

Implemented through central government via the Chancellor of the Exchequer (HM Treasury) and the annual budget, shows the change in tax levels for active and inert wastes from the implementation of the policy in 1996 to 2014 when the current escalator expires.

The revenues generated from the tax were used to allow for a decrease in the national insurance rate, along with a scheme to fund waste management research and improvement projects around landfills. Those wishing to utilize the funds had to register as environmental bodies under an organization named ENTRUST.

With the end of this scheme some 4-5 years ago the funds are now directed to the Landfill Communities Fund, WRAP, LASU, WIP and various other Defra schemes (which used to be under the umbrella heading of the Business Resource Efficiency and Waste (BREW) programme).

The effects of the tax have been interesting. The tax is structured in two ways:

1. A lower rate, for specific materials which, generally, are non-gassing in landfills, and which are non-hazardous, although there have been discussions about some less obvious candidates for a lower rate tax, such as incinerator bottom ash;
2. A standard rate for all materials which neither qualify for the lower rate, and which are not exempt from tax.

Some materials, as implied by the previous comment, are exempt from tax. Many of these exemptions relate to the use of material in the operation of the landfill itself, or in some necessary access roads to the site.

The two tax rates have increased as shown in **Error! Reference source not found.** below (these are shown both in £ per tonne and € per tonne at the relevant historical exchange rate¹⁶). **Error! Reference source not found.** shows how the quantities of waste landfilled at the standard and lower rates have changed over time. It should be noted that data for the quantity landfilled prior to the

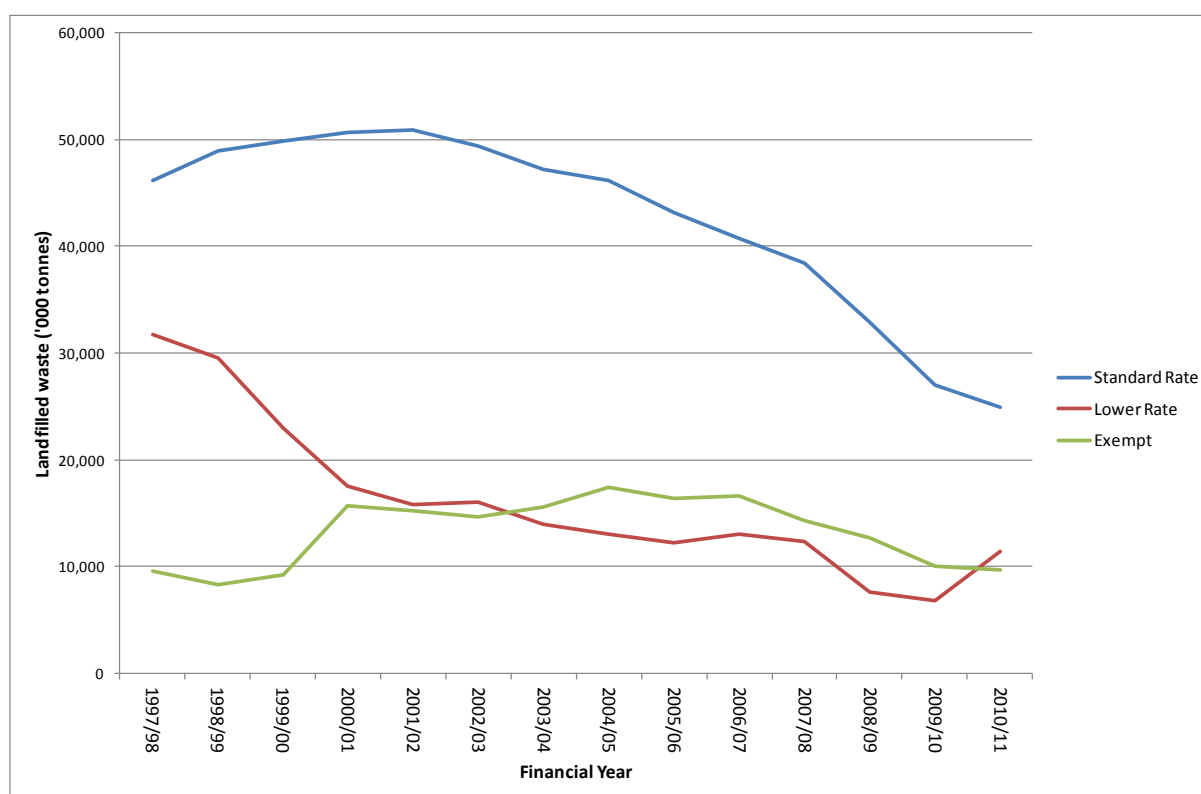
¹⁶ Exchange rates obtained from xe.com Current and Historical Rate Tables: <http://www.xe.com/ict/>

year in which the tax was introduced is very poor so that a ‘before and after’ comparison is not strictly possible. The graphic appears to indicate that because the quantity landfilled at the active rate increased in years following the tax’s introduction, that the tax had no effect. It would be wrong to take this view. Surveys at the time highlighted that industry, in particular, was responding to the tax, even at the low rate which prevailed at the time. The tax probably had the effect of slightly restraining ongoing increases in quantities landfilled, which reflected growth in household and commercial wastes at the time.

Table 1 Development of UK Landfill Tax Rates Over Time

Date of Change	Standard Rate, £ per tonne (€ in brackets)	Lower Rate, £ per tonne (€ in brackets)
01.10.1996	7 (€8.75)	2 (€2.50)
01.04.1999	10 (€14.90)	2 (€2.50)
01.04.2000	11 (€18.40)	2 (€2.50)
01.04.2001	12 (€19.30)	2 (€2.50)
01.04.2002	13 (€21.30)	2 (€2.50)
01.04.2003	14 (€20.30)	2 (€2.50)
01.04.2004	15 (€22.50)	2 (€2.50)
01.04.2005	18 (€26.28)	2 (€2.50)
01.04.2006	21 (€30)	2 (€2.50)
01.04.2007	24 (€35.50)	2 (€2.50)
01.04.2008	32 (€40.60)	2.5 (€2.90)
01.04.2009	40 (€43.60)	2.5 (€2.90)
01.04.2010	48 (€54.20)	2.5 (€2.90)
01.04.2011	56 (€63.30)	2.5 (€2.90)
01.04.2012	64 (€74.50)	2.5 (€2.90)
01.04.2013	72 (€83.90)	2.5 (€2.90)
01.04.2014	80 (€93.20)	2.5 (€2.90)

Figure 4 Quantities of Waste Landfilled ('000 tonnes) at Different Tax Rates



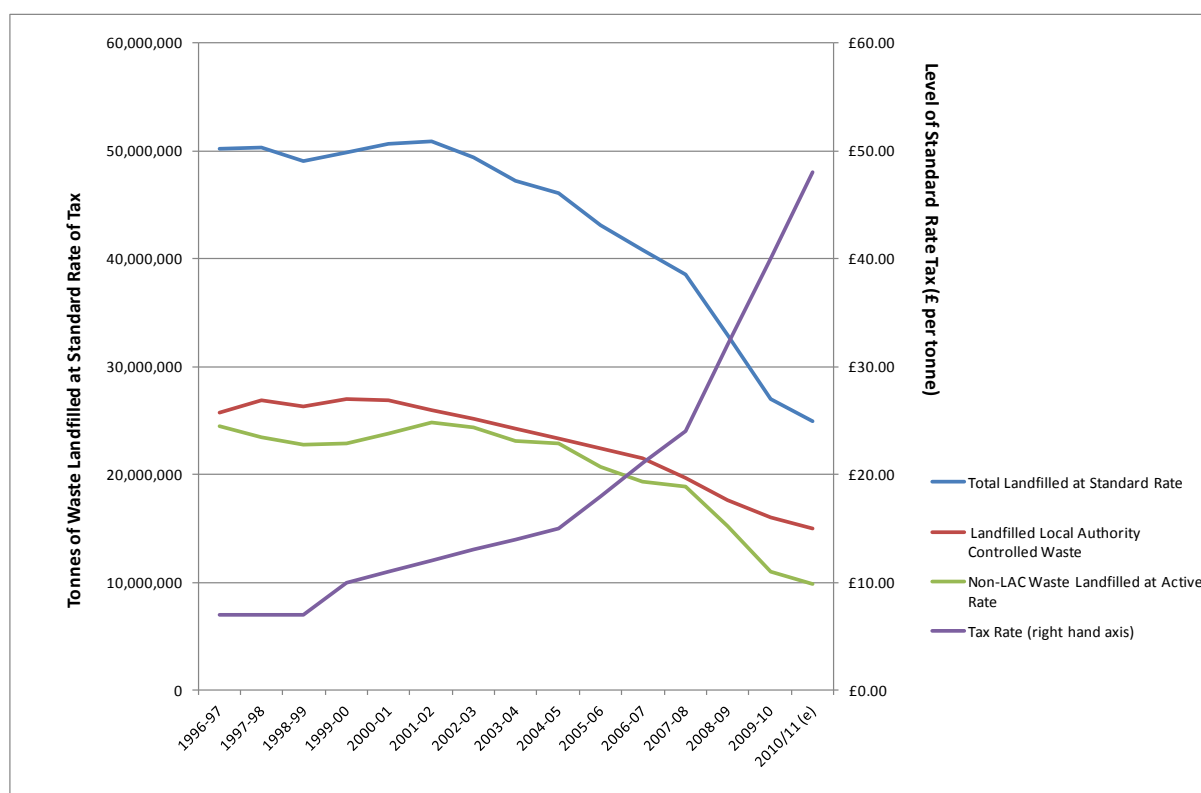
Source: HMRC data

A much stronger effect was observed in the case of the wastes landfilled at the lower rate. The construction and demolition sector found the costs of managing its waste increasing significantly. The response was dramatic, with an increase in resort to recovery activities exempt from waste management permitting, as well as an increase in investment in mobile and static crushing facilities, used to recycle hardcore and rubble into materials suitable for use in civil engineering applications. This activity was given additional impetus by the subsequent introduction (in 2002) of a tax on primary aggregates. Landfill site operators had, until this point, often accepted soils, clays and other inert materials free of charge at their sites. Inert waste landfills (often old quarries) found that it took longer to backfill as a result of an increased scarcity of material. The effect has been much less dramatic in recent years, as the tax has declined in real terms.

As the tax at the standard rate has increased, so the effect on landfilling of waste at the standard rate has become more dramatic. The graphic appears to indicate that the turning point was around 2001/2002. It is important, here, to recognise that wastes landfilled at the standard rate include household waste, and waste from commerce and industry. In the UK, the introduction of recycling targets for local authorities and the Landfill Allowance Schemes (LASs) (the allowances are also tradable in England) had a strong effect on the management of wastes collected by local authorities throughout the 2000s. It therefore becomes important to seek to explain the extent to which the drop in landfilling of 'local authority collected waste' has been the main cause of the drop in waste landfilled at the active rate of tax.

Error! Reference source not found. shows how these two have changed over time. This highlights the fact that the landfilling of local authority collected (LAC) waste has dropped more or less steadily since 2000/2001, when the LASs were introduced. What is perhaps more interesting is the effect on the other (Non-LAC) waste, which has not been subject to recycling targets, nor an equivalent to the LASs. What this appears to show is a response that is much more strongly driven by the level of the tax itself. The greatest reduction have been made in the periods when the landfill tax escalator increased from approx. €1.55 (£1) per tonne per annum to, first of all, approx. €4.50 (£3) per tonne per annum, and then approx. €12 (£8) per tonne per annum.

Figure 5 Waste Landfilled at Standard Rate Split by Local-Authority Collected, and Other Waste



Source: HMRC and estimate for 2010/11

It is also important to note that the vast majority of the reduction in waste landfilled at the standard rate in the UK has been achieved not through a switch from landfilling to incineration. Rather, the vast majority of this massive drop in waste landfilled (broadly speaking, a halving from 50 to 25 million tonnes) has been achieved through waste prevention, reuse, preparation for reuse, and separate collection for recycling / composting / anaerobic digestion. There is some dispute about the extent to which, for the non-LAC waste, the effect has come from waste prevention, or from other activities. Official Defra data indicates, for England and Wales, a massive drop in waste quantities between 2002/3 and 2009. The role of the tax in this is not clear, but it should be recalled that revenue from the tax has been used to support waste prevention and reuse across industry over past years.

Generally, therefore, the tax appears to have had a significant effect, particularly on the landfilling of waste at the lower rate of tax, and on the landfill of commercial and industrial waste at the standard rate of tax.

Main features

According to the regional waste management acts, waste fees must be based on the size of the residual waste bin and the frequency of emptying it. If several households share the same waste bin, the charge usually is allocated according to the floor space (in m²) of the apartments. The kind of charging depends on the municipalities.

In small cities, residual waste is collected every two or every four weeks, in larger cities usually once a week. Some cities have introduced systems using special bags that must be purchased along with stickers. The use of bins, however, is much more common than the use of bags.

In Austria, fees for the collection and treatment of household waste must correspond to the costs of the services rendered, i.e. they must not be profit-oriented. The fee is frequently composed of a system charge (covering costs that cannot be directly allocated to the waste just generated, e.g. the costs of cleaning up of littering) and a treatment charge (covering the costs for the collection and treatment of the picked up waste).

Local authorities exercise the authority bestowed upon them by the constitution and carry out tasks arising from federal and state laws, such as the collection and treatment of municipal waste. The Federal Constitution allows municipalities the option of forming associations among themselves for waste management. In most cases municipalities have followed this route, and delegate the organization of collection and treatment of all fractions of waste to the waste management associations. The responsibility for collecting the packaging wastes rests with the recycling associations established for executing the producer responsibility schemes.

National impacts of PAYT schemes

The waste collection and treatment fees collected by the Austrian municipalities increased from 220 million € in 1995 to 550 million € in 2006 (Denkstatt 2009). On average, the waste fee increased from 28 €/capita in 1995 to 67 €/capita in 2006, or from 72 €/household in 1995 to 155 €/household in 2006. In real terms this is an increase of 75 % from 89 €₂₀₀₆ /household in 1995 to 155 €₂₀₀₆/household in 2006. The increase is caused

- By a 23 % increase of the waste generation per household
- by the conversion of a more landfill based system to a recycling / incineration / biological based system with the separate collection of different household waste types.

The characteristics of Austrian municipalities varies from sparsely populated Alpine areas with home composting to the densely populated Vienna metropolis . Also the waste treatment can either be mechanical-biological waste treatment or waste incineration. Consequently the costs of waste management and the waste management fees vary over a large range between 70 and 320 € per 3 person household.

Figure 1 compares the development of annual municipal solid waste generation in Austria to the development of the annual average waste management fee per household in real terms in Austria. In the period 1996 to 2000 the annual MSW generation grew at a rate of 3.1 %/a. In the period 2005 to 2009 the annual MSW generation actually fell. While part of this change in trend can be attributed to data uncertainty and the economic down turn of the years 2008-2009, the increased waste management fee probably also had an effect.

As, however, the waste management fee mostly is hidden in an annual operation cost bill and as the average monthly waste management fee including tax is still “only” 16 €/household, it is not likely that a big share of the Austrian population really got active in waste prevention in spite of the more than doubled waste management fee.

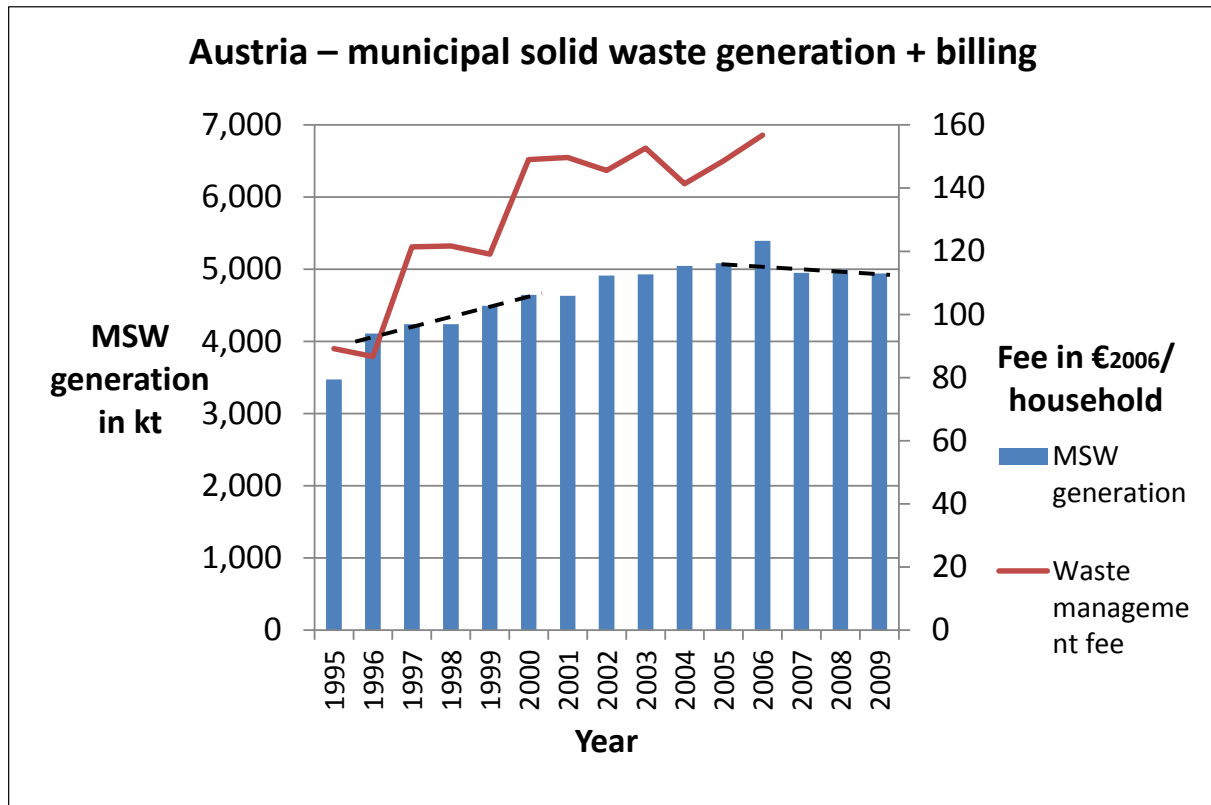


Figure 1: Municipal solid waste generation and development of average household waste management fee (without tax) in year 2006 € in Austria (Eurostat 2011, Denkstatt 2009, Statistik Austria 2011)

Local case study

On the local level the picture is similar to the Austrian average, i.e. that an increased tariff possibly had a dampening effect on waste generation, the data, however, do not provide a proof for it. In the city of Vienna, for example the MSW generation grew at an average rate of 2.1 %/a in the period 1996 to 2000 while levelling off after the year 2004 (see Figure 0-1). The waste management fee for the weekly emptying of a 110 liter bin in real terms decreased in the period 1995 to 2001 (as in this period the fee rate was not adopted to the inflation), while growing thereafter. The real term waste management fee was 15 % higher in 2009 than in 1995.

Again it can be concluded that the increase of the waste management fee likely had a dampening effect on waste generation. However, it was not the only factor which prevented a further increase of waste generation.

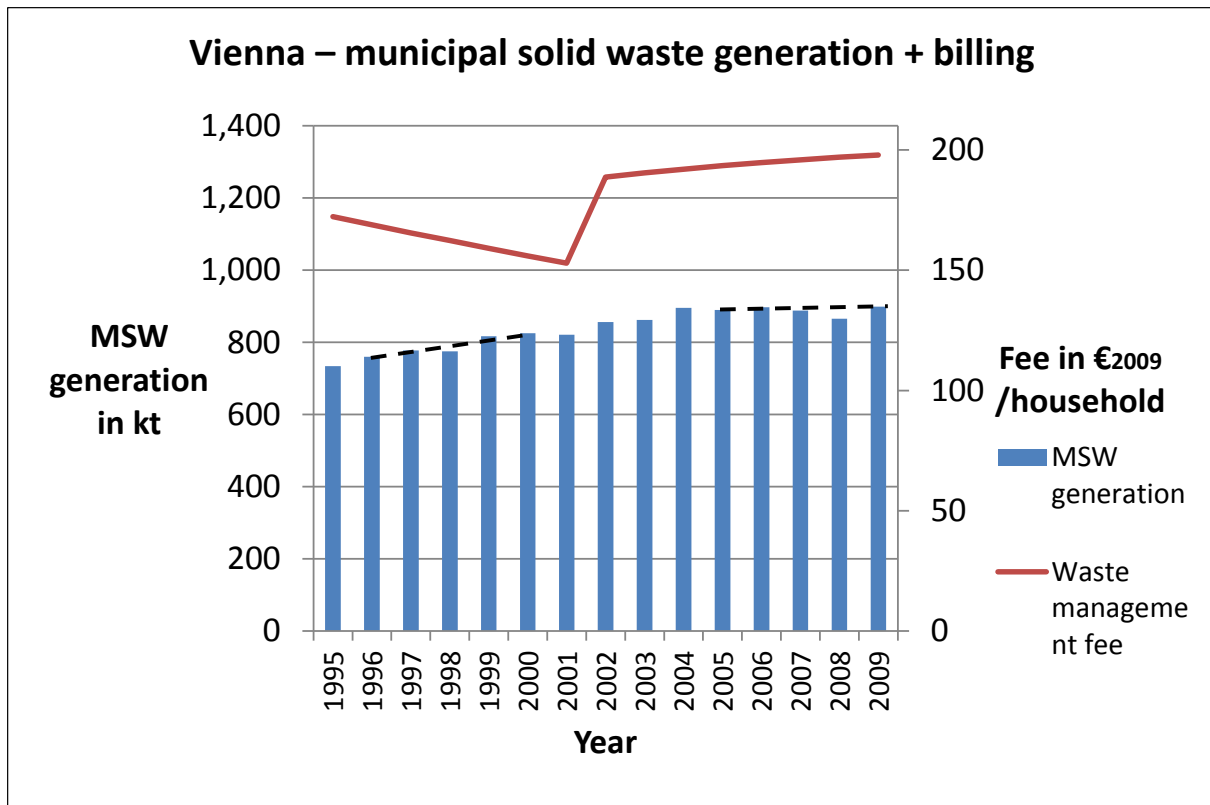


Figure 0-1: Vienna municipal solid waste generation and development of waste management fee (without tax) for the weekly emptying of a 110 liter bin in year 2009 € in Austria (City of Vienna 2011, News 2002)

Strengths and weaknesses

The polluter pays principle is very much appreciated in Austria and the pay as you throw schemes are seen as an important means of applying the polluter pays principle

The pay as you throw schemes are aimed at providing incentive for less waste generation and for collecting recyclable fractions separately. Separate waste collection schemes were introduced for glass, paper, metals, bio-waste and plastics.

The core problem with the waste preventive effect of pay as you throw schemes is, that from the point of view of public acceptance, the waste management fee should be below the threshold where people begin to bother about this fee, while from the waste preventive point of view the fee causes much more effects if its higher than the awareness threshold.

The accounting method and the actual fees vary over a wide range. This shall be depicted by 3 examples:

1. There is only one waste bin size (240 l) – every emptying costs 9.72 €
2. The annual fix price is 22 €, every emptying of a 240 l container costs 1.8 €
3. The annual fix price is 0.29 € per liter of waste bin (69.60 € for a 240 l waste bin), every emptying costs 7.90 €.

As the savings from filling one bin less is quite different, also the motivation for waste prevention is quite different in the three examples.

In addition, the Austrian system provides true pay-as-you throw only for single-family houses. In apartment buildings the costs for waste collection and treatment are allocated to the apartments

according to the m² of the apartment and not according to the actual waste contribution. This limits the effect of the pay as you throw scheme.

In general a cost allocation according to the size of the waste bin and the frequency of emptying is seen as a fair compromise which does not incur excessive costs.

Main features of pay-as-you-throw schemes in Germany

Pay-as-you-throw (PAYT) schemes in particular apply to household waste collection. In Germany, there is a legal obligation for all citizens to use the local waste disposal system in order to get rid of their waste. There is no federal legislation specifying PAYT-schemes. However, some federal states' waste laws lay down that the design of the waste fees should promote waste prevention and recovery (such as § 8 of the Berlin Waste Law or § 6 of the Waste Law in Saxony-Anhalt). PAYT schemes encompass bin volume-based systems, sack volume-based systems, frequency-based systems and weight-based systems. The majority of local disposal systems is based on a bin volume-based system, which imposes a annual fee for waste collection depending on the bin volume and the frequency of collection. The fee levels differ regionally depending on the waste disposal capacities available and the population covered by the local disposal system.¹⁷

For instance, the city of Stuttgart has laid down a fortnightly collection rhythm for residual waste for the tonne types 60l, 120l and 240l (see Table 1), also in estates that do not have a biotonne. For the tonne types 120l and 240l also a weekly collection is possible.

Table 2: Overview of annual fees for household waste collection in Stuttgart (data for 2011)¹⁸

Bin volume (in liters)	Annual fees (in €) for	
	fortnightly collection	weekly collection
60	114.00	-
120	211.80	445.20
240	376.20	790.20

If more waste is produced than can be collected in this modus, the waste holder has to buy an additional waste plastic sack which is collected at the normal waste collection day (€5.50 per additional 70l bag). In addition to residual waste, biowaste and waste paper is collected by the public service. The collection routine can be lowered to weekly, instead of fortnightly for bin size 120 and 240 l upon application from the waste holder.¹⁹

Sack volume-based systems and frequency-based systems are used much less often. Their usage predominates in rural areas, because there the collection routine may be less firm than in urban areas. Weight-based systems are the exception, they exist e.g. in Aschaffenburg (see section 1.3) or in Saarbrücken. In Saarbrücken, a weight-based scheme has been instituted from 1 January 2011. Residual waste and biowaste are weighted when collected. While a fixed basic fee remains inflexible and is calculated according to the collection rhythm and the tonne size, only the variable fee changes

¹⁷ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

¹⁸ See URL <http://www.stuttgart.de/item/show/17183>, in German, accessed 09/09/2011.

¹⁹ Ibid.

according to the waste collected. This applies for residual waste. For biowaste, only the weight collected counts to calculate the waste fees.²⁰

Impacts of PAYT schemes in Germany

Generally, the PAYT schemes establish incentives for households to reduce their amount of waste and thus to lower collection costs. In many cases, especially for residual waste and biowaste there is a basic fee and a variable fee. Due to the variability of parts of the fee, waste prevention and recovery can be incentivised.

However, in order to effectively do so – and thus to stimulate cost savings for households and local authorities - appropriate infrastructure and services need to be established. And in fact, the necessary investment costs for such infrastructure and services are usually redeemed by lowered waste quantities, which eventually lead to savings for operating the disposal system.²¹

Local Case Study²²

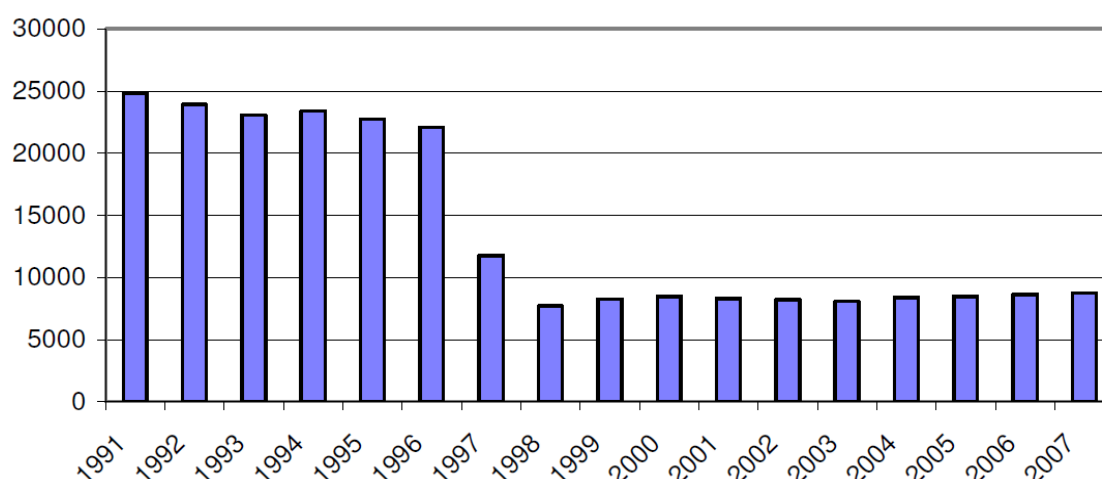
The county of Aschaffenburg introduced a weight-based systems in 1997. The wheeled bins are weighed at the waste collection vehicle. In 1999 this system was expanded to also include bulky waste. Careful separation of waste and recyclable fractions as well as waste prevention are rewarded with lower waste fees. Thus, average annual waste fees for a 4-persons-household decreased slightly from 157,99 € prior to 2003 to 149,45 € in 2007. Hence, it resulted in lower waste fees for most households and thus yielded a significant decline in household waste generation to approximately 8,000 tons in 1998 – a level near which the quantities remained ever since (see Figure 1).

²⁰ See URL http://www.zke-sb.de/de/abfall/informationen_zur_muellverwiegung, in German, accessed 07/09/2011. This information was confirmed via personal communication with Mr. Schütz from the Zentrale Kommunale Entsorgungsbetrieb (ZKE) in Saarbrücken, 11/10/2011.

²¹ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

²² Landratsamt Aschaffenburg (2008): Landkreis Aschaffenburg Umweltschutzbericht 2003 – 2007. Aschaffenburg. See URL http://shop.landkreis-aschaffenburg.de/artikel_28.shtml, accessed 09/09/2011.

Figure 2: Household waste generation from 1991 to 2007 in tonnes



Source: Landratsamt Aschaffenburg (2008): p. 59

Despite significant investment and transformation costs, the weighing system helped to save between 1.53 and 1.79 mio. € per year since then.

It was feared that the weighing system would increase illegal waste dumping. However, data from 1995 to 2007, which was obtained through public waste collection actions as well as from monitoring by the Road Construction Office (Straßenbauamt) and Office in charge of turnpike maintenance (Autobahnmeisterei), show that illegally dumped quantities did not change as a result of the introduction.²³

Strengths / factors for success / weaknesses of the payt schemes

Generally, PAYT schemes in Germany are considered environmentally beneficial, economically efficient as well as socially highly accepted, because they incentivise waste prevention and recycling and because they make the options for cost savings transparent to the citizens.²⁴

Furthermore, in the course of PAYT scheme establishment courts have fostered the legal position of households to be charged fees according to their actual waste formation. There have been court cases where waste holders have complained to be obliged to pay a fee adapted to a 80 liter tonne for residual waste that is collected once a week, where they produce much less waste. The courts have sustained their arguments and thus the municipal statutes have to include the possibility to have a 40 liter ton.

In some places in Germany, illegal dumping of household waste has been reported. However, those cases are deemed individual and occasional and are not seen as reducing the overall PAYT effectiveness for Germany – as has been specified for the county of Aschaffenburg above.⁸

²³ Landratsamt Aschaffenburg (2008): Landkreis Aschaffenburg Umweltschutzbericht 2003 – 2007. Aschaffenburg, p. 61.

²⁴ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

Main Features of Pay-As-You-Throw Schemes in Finland

Under the Finnish Waste Act of 1996, municipalities must provide for the collection and disposal of household waste. As such, municipalities have the authority to levy a waste management charge covering not only the collection of waste, but investments in and the operation of waste treatment facilities. While Pay-As-You-Throw schemes in Finland are not legally mandated, charges for municipal household waste are primarily determined by the quantity and quality of waste being disposed of, as well as the frequency of collection. However, the charge must also be of enough significance to serve as a deterrent to waste production and encourage recycling.

Additional to a weight-based waste charge is an annual fixed fee determined by house type (e.g. single family home vs. block of flats). Residents also have the option of disposing of waste at collection points, though access to these collection points also incur the levying of a fixed fee.

While the collection of paper, packaging, tires, vehicles, WEE and batteries are the responsibility of producers, municipalities provide collection services for these materials on a market basis.



* Municipal waste collected (1000 tonnes): 2,562(cubed)

Impacts of PAYT Schemes in Finland

Due to the autonomy afforded municipalities in the creation of local waste management regulations, and the outsourcing of 99% of waste services to private companies, waste charges throughout Finland are variable. On average, the annual fixed fee for a single family house is €159, with the collection and treatment of a 240 liter bin averaging €6, and a 600 liter bin averaging €9.5. Some

hazardous waste collection and recycling services are provided free of charge, though these are subsidized through other treatment fees.

Variability in charges for type of waste disposed of. For example, residents who compost waste at home realize large savings over those who separate their compost from household waste for collection, and those who do not separate compost from household waste.

The imposition of weight-based taxes for waste disposal at municipal landfills (and the passing on of this tax to the public in the form of higher waste charges?) appears to be resulting in the diminishment of the quantity of wastes being sent to landfills for final disposal. While overall consumption is trending upwards, the tax is thought to be having the effect of diverting waste from landfills and increasing recovery rates.

Strengths/Factors for Success/Weaknesses of the PAYT Schemes

Regional cooperation in waste management activities has been emphasized as a means of improving the collection and processing of municipal waste throughout Finland. Currently, there are 30 regional municipal waste treatment organizations in existence, with only some municipalities choosing to individually manage their waste activities. Further regional cooperation would enhance the effectiveness of collection route planning, ease the implementation of *separate* waste collection services (i.e. biowaste, packaging, recyclables, hazardous waste), and would economise overall waste processing. Consumer awareness and advising through increased media coverage, the harmonizing of waste rules and regulations throughout a region, and the broadening of the customer base (so that larger volumes are collected and unit prices reduced) have also been advanced as ways to optimize waste management.

Reliance on the private sector in the provision of services where they have achieved efficiency (i.e. collection and pre-treatment), as well as tendering when competition is expected has also recommended for the optimization of waste management in Finland.

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Municipal Solid Waste Management in Finland (slide presentation)

<http://unstats.un.org/unsd/ENVIRONMENT/wastetreatment.htm>

<http://www.ejkl.ee/content/files/FinnishMSWM.pdf>

<http://www.ejkl.ee/content/files/FinnishMSWM.pdf>

[REPORT: Tietoa jätehuollosta - Vuoden 2009 jätemaksutiedot](#)

Main features of pay-as-you-throw schemes in Germany

Pay-as-you-throw (PAYT) schemes in particular apply to household waste collection. In Germany, there is a legal obligation for all citizens to use the local waste disposal system in order to get rid of their waste. There is no federal legislation specifying PAYT-schemes. However, some federal states' waste laws lay down that the design of the waste fees should promote waste prevention and recovery (such as § 8 of the Berlin Waste Law or § 6 of the Waste Law in Saxony-Anhalt). PAYT schemes encompass bin volume-based systems, sack volume-based systems, frequency-based systems and weight-based systems. The majority of local disposal systems is based on a bin volume-based system, which imposes a annual fee for waste collection depending on the bin volume and the frequency of collection. The fee levels differ regionally depending on the waste disposal capacities available and the population covered by the local disposal system.²⁵

For instance, the city of Stuttgart has laid down a fortnightly collection rhythm for residual waste for the tonne types 60l, 120l and 240l (see Table 1), also in estates that do not have a biotonne. For the tonne types 120l and 240l also a weekly collection is possible.

Table 3: Overview of annual fees for household waste collection in Stuttgart (data for 2011)²⁶

Bin volume (in liters)	Annual fees (in €) for	
	fortnightly collection	weekly collection
60	114.00	-
120	211.80	445.20
240	376.20	790.20

If more waste is produced than can be collected in this modus, the waste holder has to buy an additional waste plastic sack which is collected at the normal waste collection day (€5.50 per additional 70l bag). In addition to residual waste, biowaste and waste paper is collected by the public service. The collection routine can be lowered to weekly, instead of fortnightly for bin size 120 and 240 l upon application from the waste holder.²⁷

Sack volume-based systems and frequency-based systems are used much less often. Their usage predominates in rural areas, because there the collection routine may be less firm than in urban areas. Weight-based systems are the exception, they exist e.g. in Aschaffenburg (see section 1.3) or in Saarbrücken. In Saarbrücken, a weight-based scheme has been instituted from 1 January 2011. Residual waste and biowaste are weighted when collected. While a fixed basic fee remains inflexible and is calculated according to the collection rhythm and the tonne size, only the variable fee changes

²⁵ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

²⁶ See URL <http://www.stuttgart.de/item/show/17183>, in German, accessed 09/09/2011.

²⁷ Ibid.

according to the waste collected. This applies for residual waste. For biowaste, only the weight collected counts to calculate the waste fees.²⁸

Impacts of PAYT schemes in Germany

Generally, the PAYT schemes establish incentives for households to reduce their amount of waste and thus to lower collection costs. In many cases, especially for residual waste and biowaste there is a basic fee and a variable fee. Due to the variability of parts of the fee, waste prevention and recovery can be incentivised.

However, in order to effectively do so – and thus to stimulate cost savings for households and local authorities - appropriate infrastructure and services need to be established. And in fact, the necessary investment costs for such infrastructure and services are usually redeemed by lowered waste quantities, which eventually lead to savings for operating the disposal system.²⁹

Local Case Study³⁰

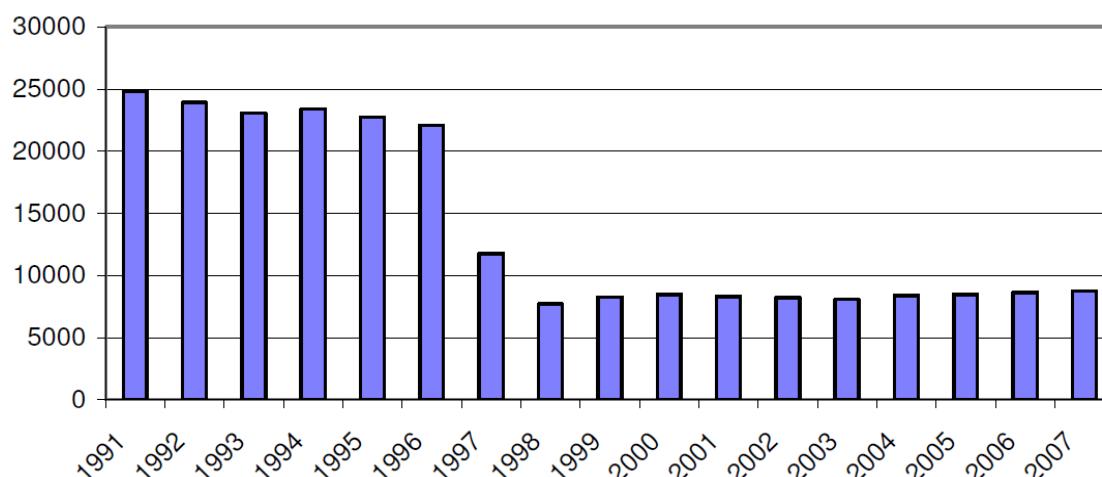
The county of Aschaffenburg introduced a weight-based systems in 1997. The wheeled bins are weighed at the waste collection vehicle. In 1999 this system was expanded to also include bulky waste. Careful separation of waste and recyclable fractions as well as waste prevention are rewarded with lower waste fees. Thus, average annual waste fees for a 4-persons-household decreased slightly from 157,99 € prior to 2003 to 149,45 € in 2007. Hence, it resulted in lower waste fees for most households and thus yielded a significant decline in household waste generation to approximately 8,000 tons in 1998 – a level near which the quantities remained ever since (see Figure 1).

²⁸ See URL http://www.zke-sb.de/de/abfall/informationen_zur_muellverwiegung, in German, accessed 07/09/2011. This information was confirmed via personal communication with Mr. Schütz from the Zentrale Kommunale Entsorgungsbetrieb (ZKE) in Saarbrücken, 11/10/2011.

²⁹ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

³⁰ Landratsamt Aschaffenburg (2008): Landkreis Aschaffenburg Umweltschutzbericht 2003 – 2007. Aschaffenburg. See URL http://shop.landkreis-aschaffenburg.de/artikel_28.shtml, accessed 09/09/2011.

Figure 3: Household waste generation from 1991 to 2007 in tonnes



Source: Landratsamt Aschaffenburg (2008): p. 59

Despite significant investment and transformation costs, the weighing system helped to save between 1.53 and 1.79 mio. € per year since then.

It was feared that the weighing system would increase illegal waste dumping. However, data from 1995 to 2007, which was obtained through public waste collection actions as well as from monitoring by the Road Construction Office (Straßenbauamt) and Office in charge of turnpike maintenance (Autobahnmeisterei), show that illegally dumped quantities did not change as a result of the introduction.³¹

Strengths / factors for success / weaknesses of the PAYT schemes

Generally, PAYT schemes in Germany are considered environmentally beneficial, economically efficient as well as socially highly accepted, because they incentivise waste prevention and recycling and because they make the options for cost savings transparent to the citizens.³²

Furthermore, in the course of PAYT scheme establishment courts have fostered the legal position of households to be charged fees according to their actual waste formation. There have been court cases where waste holders have complained to be obliged to pay a fee adapted to a 80 liter tonne for residual waste that is collected once a week, where they produce much less waste. The courts have sustained their arguments and thus the municipal statutes have to include the possibility to have a 40 liter ton.

In some places in Germany, illegal dumping of household waste has been reported. However, those cases are deemed individual and occasional and are not seen as reducing the overall PAYT effectiveness for Germany – as has been specified for the county of Aschaffenburg above.⁸

³¹ Landratsamt Aschaffenburg (2008): Landkreis Aschaffenburg Umweltschutzbericht 2003 – 2007. Aschaffenburg, p. 61.

³² Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

Main Features of Pay-As-You-Throw Schemes in Ireland

Pay-As-You-Throw (PAYT) schemes are in operation throughout most municipalities in Ireland and apply primarily to household waste disposal. National legislation passed in 2003 mandated the transition from the previous fixed rate waste disposal charge to a weight/volume-based charge by 1st January 2005, with all renewed or new permits for waste collectors after that date adhering to this requirement. Local authorities and waste collectors that have not yet transitioned to PAYT schemes continue to charge a flat-rate for waste disposal services. (EPA doc, 1.3).

Three systems of PAYT or Pay-By-Use (PBU) schemes are currently in operation throughout Ireland: i) volume-based systems, ii) tag-based systems and iii) weight-based systems. Volume based systems require users to participate in a weekly bin collection for which there is an annual charge determined by bin size (a larger bin incurring a higher annual rate). Tag-based systems require users to purchase tags which are affixed to either bags or bins put out for collection, with a charge accruing for each container collected/emptied, and weight-based systems determine disposal charges per kilogram of waste collected (EPA doc, section 1.2). Wide variability between schemes, to include waste disposal practices and charges between and within municipalities, is attributed to the autonomy granted to local authorities and private collectors in the design of PAYT programmes (EPA doc, section 1.1). Also accounting for variability is the deployment of PAYT systems singly, in tandem, or sometimes all three at once within the functional area of local authorities (EPA doc, section 1.3).

Nationwide, collection and disposal charges range between €195 (Fingal) and €440 (Carlow) per annum (Dunne et al., 2831).

Impacts of PAYT Schemes in Ireland

Local authorities without PAYT/PBU schemes in place have witnessed an increase in waste production over time (from 240 kg per person in 2003 to 266 kg per person in 2004), while local authorities that operate PAYT/PBU schemes have seen a decrease in waste production (from 227 kg per person in 2003, to 221 kg in 2004, to 219 kg per person in 2005), with an overall trend of decreasing waste generation as PAYT/PBU schemes are adopted (EPA doc, section 1.5). The reduction in landfill charges per tonne during the 2005-2006 period (from €180 in 2005 to €130 in 2006) indicate a decrease in the amount of waste being deposited for final disposal. (Dunne et al., 2831).

Weight-based PAYT/PBU systems have been observed to bring about greater reductions in household waste production than tag-based systems, with a weight-based PAYT/PBU generating a 49% waste reduction from the year prior to its introduction to the year subsequent to its introduction, while a tag-based PAYT/PBU generated a 23% decrease. Transitioning from a tag-based system to a weight-based system has also realized a decrease in waste generation by a further 8%. The overall indication is that weight-based systems may be more effective in diverting waste from landfills than tag-based systems (EPA doc 2.1).

Recycling rates have also appeared to benefit from PAYT/PBU schemes, with some local authorities reporting up to 46% recycling rates (e.g. Waterford City Council, 2005) (Dunne et al., 2831)). However, causality between PAYT/PBU and increased rates of recycling is difficult to determine as

the latter is often a continuation of a general trend in place before the introduction of a PAYT/PBU scheme, and also occurs in areas where there is no PAYT/PBU system in operation. (EPA doc 3.1.2). Undeniably, kerbside recycling diverts much household waste from landfills.

Local Case Study

A notable example of the successful implementation and operation of a PAYT/PBU is the case of county Monaghan, which in 2003 transitioned from a fixed rate bin charge to a weight-based charge and kerbside recycling. In the first year of the scheme landfill waste fell by 25%, and by 40% in 2005, with the average household generating 740kg of waste. This reduction in waste production has been attributed primarily to an increase in recycling rates (averaging 240kg per household in 2006), and to home composting of organic waste and greater vigilance about bin contents (i.e. better decisions being made about what is landfilled vs. what is recycled or composted). (Dunne et al., 2828)

Strengths/Factors for Success/Weaknesses of the PAYT Schemes

PAYT/PBU schemes in Ireland have generally been well-received with increased recycling and waste to landfill diversion cited as their most positive effects. Also, the clear incentive to reduce waste created by the schemes, particularly weight-based PAYT/PBU systems, has been cited as a particularly effective in reducing household waste generation (EPA doc, section 1.11).

Dissatisfaction with PAYT/PBU schemes has been expressed over the difficulty of their implementation, primarily public resistance to charges, difficulties enforcing the adoption of the scheme, and additional pressure being placed on the resources of local authorities (EPA doc, section 1.10). PAYT/PBU schemes have also been linked to high costs levied by private waste collectors and illegal waste diversion (EPA doc, section 1.11).

Factors contributing to the success of PAYT/PBU schemes in Ireland include the creation of a strong recycling infrastructure, the justification of schemes on environmental grounds with careful selection of terminology, the simplification of administrative processes, plenty of notice before a scheme is implemented, public information campaigns on waste issues, and a thorough review of contractor/local authority responsibilities. Good monitoring and measuring techniques are also imperative if waste policy is to be effective. (Dunne et al., pg 2832)

Principle and main features of the producer responsibility schemes

Introduction

In Belgium, EC Directive 94/62/EC on Packaging and Packaging waste was transposed into national law as a Cooperation Agreement between the three Belgian regions. The law came into force on 5 March 1997. The revised Packaging Directive 2004/12/EC has been transposed in the renewed Cooperation Agreement of 4 November 2008 with effect from 1 January 2009.

Two private “Green dot” organisations are in charge of coordinating and financing the selective collection and end-of-life treatment of packaging waste across the country: Fost Plus and VAL-I-PAC.

Fost Plus was founded in 1994 by major Belgian producers and importers of packaged products or packaging materials, distributors and trade organisations. It is accredited as an officially approved organisation for household packaging waste management. This accreditation is valid up to and including 2013.

VAL-I-PAC was founded in 1997 and is in charge of non municipal packaging waste. It serves more than 8.000 companies. Companies can however choose to take care of their acceptance obligations for packaging waste themselves, and introduce a file proving their compliance of their own at the competent authority IPC (Interregional Packaging Commission).

In this case study, the focus is on household packaging waste and therefore will only refer to the green dot system managed by Fost Plus.

Green dot scheme's functioning

Fost Plus acts as an interface between the various parties involved in the life cycle of packaging: producers, users, distributors, consumers, inter-municipals and local authorities, waste management companies, and recycling businesses.

The actors responsible for placing a product on the domestic market – producers, importers and distributors of private labels – finance the collection, sorting and recycling of the packaging waste. They delegate their legal responsibility to Fost Plus and finance the system via the Green Dot-tariffs, with different tariffs depending on the composition and quantity of the packaging.

The materials streams covered are household glass, paper/cardboard, household drinks cartons, metal and plastic. Table 4 provides an overview of household tariffs applied by material type per year from 2005 to 2010.

Table 4: Green dot tariffs by material stream (excluding VAT), in EUR/tonne³³

Material/ Year	2005	2006	2007	2008	2009	2010
Glass	29,00	28,00	29,00	29,30	21,40	18,40
Paper & cardboard	17,50	17,70	17,40	15,70	9,90	17,60

³³ Source : Fost Plus

Steel	53,70	28,30	23,40	18,80	25,30	37,60
Aluminium	140,0	137,70	150,80	33,90	36,90	137,90
PET	285,40	260,80	229,40	159,40	109,50	199,40
HDPE	285,40	260,80	229,40	159,40	109,50	199,40
Drinks cartons	223,20	256,10	262,20	255,00	229,10	272,80
Other recoverable	367,60	370,90	351,10	316,20	263,20	313,50
Other not recoverable	404,30	408,00	386,20	347,80	362,40	441,70

Green dot tariffs had been historically decreasing due to the increasing value of collected materials and due to a tariff reduction allowed by Fost Plus's financial reserves, in 2007. However, from September 2008 the economic crisis provoked a heavy fall in material prices and created a gap in Fost Plus's budget. To compensate it, green dot tariffs were raised by 26% in comparison with historically low tariffs of 2009. Additionally, Fost Plus had to lower its expenditure by 11% in 2009 to face the impacts of the crisis.

The green dot contribution covers 100% of collection, recycling and recovery costs for paper/cardboard (packaging), glass, plastic bottles and flasks, beverage cartons and metal packaging.

To cover additional costs linked to waste prevention and management, the new 2008 Cooperation agreement imposed an annual tax of 0,50 EUR per inhabitant per year (equating 5 million EUR/year) which has to be paid to the Regions to improve packaging waste management.

The Cooperation Agreement obliges parties responsible for packaging to comply with three legal obligations:

- Take-back obligation, i.e. the obligation to recycle or recover a certain percentage of the packaging brought onto the market. As of 2009, this amounts to 80% recycling and 90% recovery (for household packaging waste).
- Information obligation, i.e. the obligation to inform the IPC of the nature of your packaging and the recycled percentages your company has achieved. Only then have you demonstrated that you have complied with the legal requirements.
- Prevention plan, i.e. the obligation, every three years, to develop a prevention plan which describes the measures taken to reduce the quantity and the harmfulness of packaging and the objectives the company wants to achieve. A company can draw up the prevention plan itself or subscribe to a prevention plan applicable to a particular sector through the professional federation. This obligation only applies to 1) companies annually marketing at least 300 tons of single-use packaging and 2) each company packaging products or having them packaged in Belgium, with at least 100 tons of single-use packaging a year.

Packaging waste collection

Collection of household packaging waste is organised as follows:

- Glass: bottles and jars are collected, colour-sorted, in bottle banks and via container parks.
Coverage:

- 1 site/700 inhabitants, or
- at least 1 site/400 inhabitants in intermunicipals with an average density less than 200 inhabitants per km².
- Paper and cardboard: paper and cardboard packaging are collected door-to-door, together with scrap paper, newspapers and magazines. Collection is also done via container parks
Quantity:
 - paper / cardboard: maximum 1 m³ per collection;
 - with the exception of collections from schools and public collectivities, PMD: maximum 240 litres per collection.
- PMD (plastic bottles and flasks, metallic packaging and drink cartons): collected door-to-door, in a transparent, light blue bags, and via container parks.

On average, 116 kg/inhabitant/year packaging and old paper were collected in 2009 by bottle banks, door-to-door collections and container parks. The totality of inhabitants is covered by the scheme.

Figure 4 gives an overview of the collection rate evolution. Glass is represented in green, paper and cardboard in orange and PMC in blue.

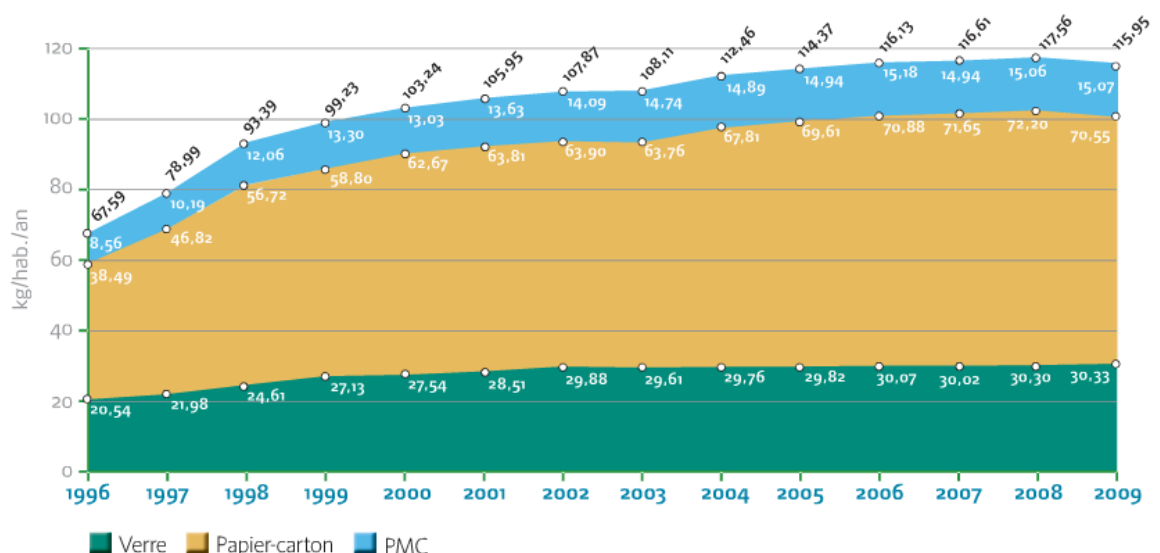


Figure 4: Collection rates from 1996 to 2009³⁴

Collection rates increased regularly since 1996, from around 68 kg/hab/year to more than 115 kg/hab/year in 2009. A slight decrease has been observed in 2009 compared to 2008.

A deposit refund system for drinks containers is also in place in Belgium at Federal level since 1993.

In 2007 a revised ecotax was introduced for both disposable and reusable drinks containers. The tariffs are as follows:

- Reusable drinks containers – 1.41EUR/hectolitre (100l)
- Disposable drinks containers – 9.86EUR/hl

³⁴ Source: Fost Plus

Packaging taxes

Since April 2004, the Federal government introduced various packaging taxes:

- April 2004: single use drinks packaging
- March 2007: reusable drinks packaging
- April 2007: plastic bags, disposable cutlery, plastic cling film, aluminium foil

Drinks packaging are taxed at 0,37184EUR per unit, regardless of the content, volume of the packaging or its material) except if they are reused, are part of a deposit-return system or certain recycling objectives are respected.

Impacts of the scheme

The Cooperation Agreement between the 3 political regions sets the following targets: at least 80% recycling and at least 90% recovery of the materials covered. The following table shows the evolution of recovery and recycling outcomes in %.

Table 5 : Overall targets and recovery and recycling results 2008-2010³⁵

Minimum overall targets	Household %	Industrial %	Results 2008%	Results 2009%	Results 2010% Households
Recycling	80	80	93	93	91.5
Recovery	90	85	96.6	96.5	94.5

In 2010, out of the 755 000 tonnes of household packaging put on the Belgian market by Fost Plus members, 91,5% have been recycled and 94,9% have been recovered. It equals to more than 960 000 tonnes of CO₂ saved.

The Cooperation Agreement also fixes minimum recycling levels by material to be reached for the entire Belgian territory. As from calendar year 2010 this figures are as follows:

Table 6 : Recycling and recovery objectives and results in 2008³⁶

Minimum recycling targets - for the different packaging materials	Household %	Industrial %	Results 2008 %
Glass	60		111.7 ³⁷
Paper/cardboard	60		122.6

³⁵ Source : Fost Plus

³⁶ Source: Fost Plus

³⁷ Calculated based on declaration of Members to Fost Plus. Some results exceed 100%, due to the fact that not all parties responsible for packaging are members of Fost Plus. Moreover, some paper/cardboard packaging cannot be regarded as household packaging according to its strict definition. For glass, the excess is mainly due to private import.

Drinks cartons	60		77.5
Metal	50		98
Plastic	30		36.4
Wood		15	Not applicable

As shown in the both tables, achieved results largely exceed the mandatory targets.

Figure 5 below shows the evolution of the shares of packaging recovered and recycled compared to the total amount of waste generated.

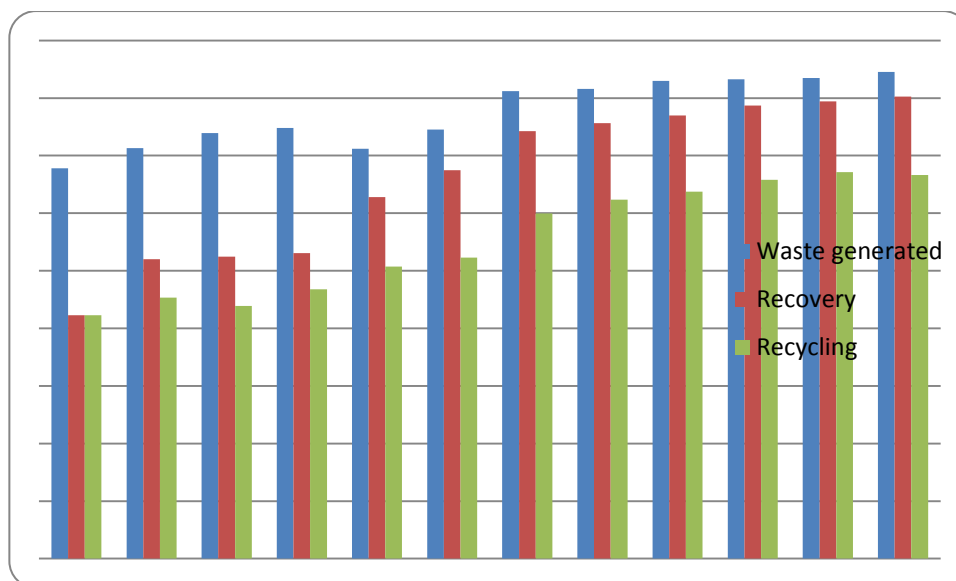


Figure 5 : Evolution of packaging waste recovery and recycling in 1997-2008³⁸

As illustrated by the figure above, recovery and recycling levels have been constantly increasing between 1997 and 2008, which is due to the implementation of the Producer Responsibility scheme for packaging combined with the use of several other instruments (e.g. collection and sorting system, awareness raising campaigns and taxes

Evaluation of the scheme

Strengths and factors for success

The success of the selective collection, sorting and recycling of packaging waste in Belgium is due to close cooperation between the many actors involved and a well thought-out strategy.

Axis of progress

In 2009, there were still 11% for household and 16% for non household packaging waste of “free riders” (in weight of packaging waste) who did not comply with the mandatory payment of a

³⁸ Eurostat data updated on 12/07/2011

contribution when putting packaging on the market. For household packaging waste, the new cooperation agreement of 2008 should considerably limit the number of free riders.³⁹

Fost Plus identifies additional axis of progress:

- Reinforcement of responsibility sharing between operators involved in waste management in order to prevent Fost Plus to concentrate only the financial responsibility while the public authorities would ensure operational responsibilities;
- Simplification of the legal framework ruling the Green dot scheme. Currently this framework lacks clarity as it has become a patchwork of different applicable texts;
- Need for maintaining an interregional approach and a transparent functioning of the IPC;
- Transparent traceability of funds (EUR 5,5 million) allocated every year to regions to improve waste packaging management;
- Increased waste prevention;
- Limitation of Fost plus's expenses and their rationalisation.

Sources

Websites

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³⁹ Communication with IPC

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Fost Plus relance la chasse aux «Free Riders», available at :
[www.uwe.be/uwe/environnement/dernieres-infos-sur-ce-theme/obligation-de-reprise-des-dechets-
d2019emballages-fost-plus-relance-la-chasse-aux-abfree-ridersbb](http://www.uwe.be/uwe/environnement/dernieres-infos-sur-ce-theme/obligation-de-reprise-des-dechets-d2019emballages-fost-plus-relance-la-chasse-aux-abfree-ridersbb)

Communication with IPC on 31/08/2011

Main features of pRODUCER responsibility schemes for Packaging In Germany

The waste packaging ordinance transposes the EU Packaging Waste Directive into German national law. It also specifies producer responsibilities concerning different waste fractions, inter alia beverage packaging (Deposit on beverage packaging scheme) and all sales packaging aimed at private consumers (Green dot scheme).

The waste packaging ordinance (see URL: http://www.bmu.de/english/waste_management/downloads/doc/37115.php, assessed 07/09/2011) was introduced in 1991 and was several times amended (latest version: 2009). It specifies producer responsibilities concerning different waste fractions, mainly 1) beverage packaging (Deposit on beverage packaging scheme) and 2) all sales packaging aimed at private consumers (Green dot scheme).

1) The deposit on beverage packaging scheme came into force in January 2003. A deposit is levied on non-environmentally friendly one-way beverage packaging for mineral water, beer, alcoholic mix-drinks, refreshment drinks (0,1 -3 liters). The deposit amounts to 25 cents for all packaging specified above. It is paid by the consumer with the purchase of the drink and is being refunded when the packaging is returned. Until 2012 the deposit is not levied on such packaging that are made of biodegradable synthetics consisting to a minimum of 75% of renewable substances if the producer/retailer of this packaging takes part in the dual system, the German collection/treatment system for overall packaging.⁴⁰

2) The Green dot scheme, introduced in 1990 by the Duales System Deutschland GmbH, covers all packaging that is subject to German waste law and that is aimed at private consumers. Under this scheme, manufacturers and fillers of such waste are obliged to take part in one of the 9 existing compliance systems for their sales packaging. This is to be documented by a Certification of Compliance covering the entire quantity of packaging involved and certifying participation in a dual compliance system for packaging recycling.

Optimised sorting and recovery technologies have decreased the overall costs for the system of packaging recycling in Germany. The collection, sorting and recycling of used sales packaging is financed via participation payments paid to the dual systems by trade and industry manufacturers and distributors. But the costs are passed on the product prices to end consumers. Payment is only made for packaging placed on the market in Germany.

The respective payment is based entirely on the material used and the weight of packaging. The participation fee (licence fee for using the green dot trademark "Der grüne Punkt") in a compliance system is calculated by material and weight of the packaging (for instance, as of 2011, 7.4 cents per kg for glass, 17.5 cents per kg for paper/cardboard and 129.6 cents per kg for plastics). The fees may be reduced for specific packaging (e.g. larg packaging or transparent PET bottles) or product groups (e.g. medical products, office supplies, furniture).⁴¹

⁴⁰ See URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/pfandpflicht_faq_de_bf.pdf, accessed 07/09/2011.

⁴¹ PRO EUROPE (2011): Participation Costs Overview 2011.

According to the waste packaging ordinance, for packaging of consumer goods, the following targets have to be achieved by 31 Dec 2008:

- 65 weight% have to be recovered,
- 55 weight% have to be recycled.

Further specific recycling targets apply to different materials:

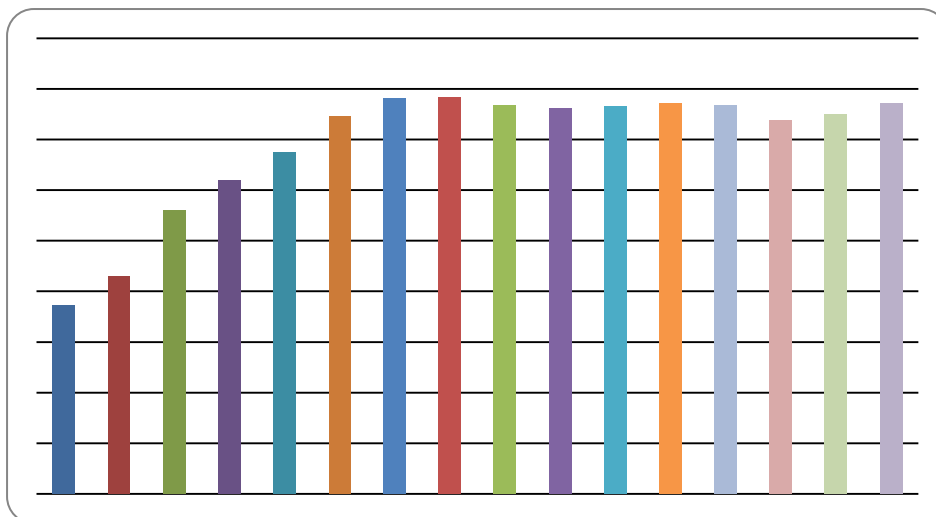
- Wood 15 %,
- plastics 22,5 %,
- metals 50 %
- and glass/paper/cardboard 60 %.

Though based on a government legal basis, the scheme, however, is operated by industry.

Impacts of producer responsibility schemes for Packaging In Germany

For several years Germany has had the highest share of recycled plastic packaging in the EU with 47% in 2008. The share of recovered waste of the total generated packaging waste increased between 1991 and 1997 . Since then the share remained more and less stable between 73 and 78 %.

Table 7: Recycled packaging waste in Germany



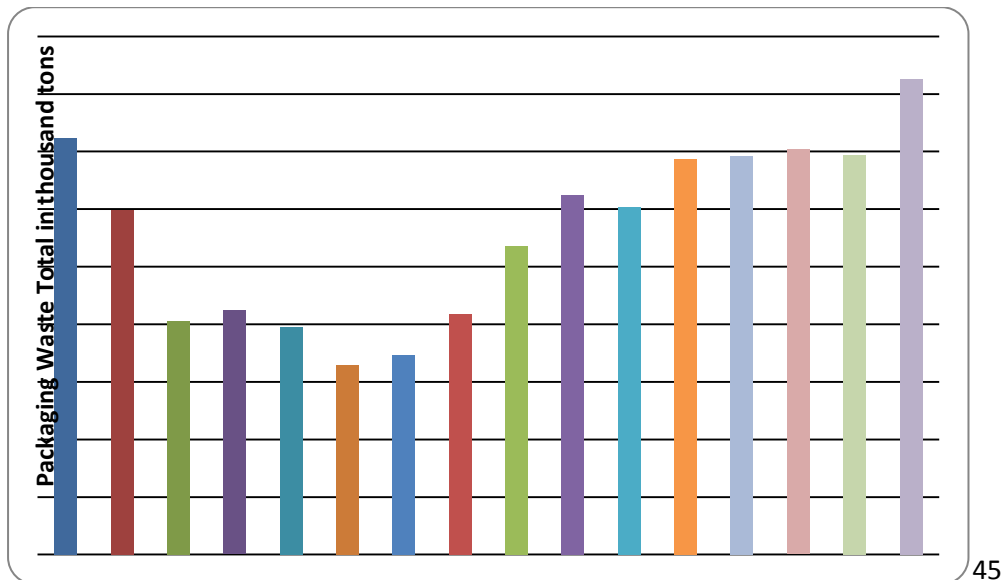
Source: UBA (2008)⁴²

According to data from the German Federal Environmental Agency, the total amount of packaging waste generated in Germany has declined from 1991 and 1996. Afterwards it increased again, which can be explained with increasing consumption of convenience products and accordingly a higher

⁴² UBA (2008): Verwertung von Verkaufsverpackungen - Private Endverbraucher.
<http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeId=2315>

amount of packaging waste generated.⁴³ At the beginning of the green dot scheme in 1991 the amount of glass packaging declined and compensated the rising amount of plastic-, paper- and wood-packaging⁴⁴.

Table 8: Packaging waste total (in thousand tons)



Source: UBA (2008)

Strengths / factors for success / weaknesses of the pRODUCER responsibility schemes for Packaging In Germany

Although the „Green Dot“ is shown at the relevant packaging the system has an impact on other fractions of household waste. Especially other goods are placed in the take-back container, which are not packaging materials but are plastic or metals. Products like plastic cups or spoons were thrown in the Green Dot container and not in the regular waste bin.⁴⁶

The implementation costs of the system lay in the first years at 1.5 billion Euro (3 billion German Mark). The costs peaked in 1997 with 2.1 billion Euro and decreased after this to 1.5 billion Euro in

⁴³ EU Commission (2000): European Packaging Waste Management Systems. Final Report. Brussels.

⁴⁴ UBA (2008): Entwicklung des Verpackungsaufkommens. <http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeId=2315>.

⁴⁵ UBA (2008): Entwicklung des Verpackungsaufkommens. <http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeId=2315>.

⁴⁶ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

2000. But the opinions about the cost/benefit ratio of the system differ. For example one report of a German research institute states that the system is a burden for the German economy compared to a system based on incineration and landfills.⁴⁷ Another report says that alternative systems of waste treatments can not bring the significant external benefits of the “Green Dot” Scheme.⁴⁸

A strength of the system is the motivation for industry to think about product design and to reduce the generated packaging in this way. Due to the full responsibility for covering all costs of the system by industry and the high tariffs per packaging waste the industry is motivated to reduce product packaging or to make it lighter. Furthermore a high-efficient collection system is necessary, at the introduction of the system the contractors which are responsible for the collection are paid on the basis of the collected quantity. The motivation for a high collection rate was low. Later the payments were changed to a material specific prices for the sorting output quantities per inhabitant of the respective area, so with an higher output per inhabitant also the collector’s payments increased and an incentive to collect a high amount of packaging was established.⁴⁹

At the time of introduction of the system the social acceptance of the new system and the need of waste separation was controversially discussed. But results of opinion polls show that 10 years after implementation of the system almost 90 percent of the people see the system positive.⁵⁰

⁴⁷ Prognos AG (2002): Assessment of Sustainability and the Perspectives of the DSD, Duesseldorf, June 2002.

⁴⁸ Öko-Institut (2002): Advantage of the Green Dot for the Environment, Duesseldorf, March 2002.

⁴⁹ EU Commission (2000): European Packaging Waste Management Systems. Final Report. Brussels.

⁵⁰ See: forsa, Gesellschaft für Sozialforschung und statistische Analysen mbH, Verbraucherbefragung zum Thema Umweltbewusstsein, 25. April.

Main features of pRODUCER responsibility schemes for Packaging In Netherlands

The Netherlands have a long tradition in waste policies and were one of the first EU countries, which brought regulations on packaging waste into force.

The national law, based on the European Directive 94/62/EC and the revised Packaging Directive 2004/12/EC was implemented in 2005 and is named as the Packaging Decree. The Packaging Decree defines that Dutch producers and importers of packaged products are responsible for the separate collection and recycling of packaging waste and also for waste prevention. The packaging regulation includes packaging from plastics, paper and cardboard, metals, type of woods, types of textile, glass.⁵¹

The producer or importer shall ensure that, 70 per cent of the total quantity of packagings by weight is put to good use, 65 per cent by weight is re-used as a material. From 2010: the targets are 75 per cent of the total quantity of packagings by weight be put to good use, 70 per cent by weight is re-used as a material. As “good use” in relation to packagings is understood the re-use as a material, primary use as a fuel or primary use for another means of generating power.

Furthermore, individual recycling percentages per material have been defined:

- plastic drinks packagings (larger than 500 ml) - at least 95% is collected separately and re-used as a material;
- plastic drinks packagings (smaller than 500 ml) - at least 55% is collected separately and re-used as a material;
- the remaining plastic packagings, at least 45% will be put to good use and at least 27 percent by weight will be re-used as a material;
- other material types, at least the following percentages by weight will be put to good use through their re-use as materials:
 - 90 percent by weight of glass packagings,
 - 75 percent by weight of paper and card packagings,
 - 85 percent by weight of metal packagings,
 - 25 percent by weight of wooden packagings.

According to the Decree, producers and importers of packaged products have the choice to either achieve the targets on an individual basis or to join a collective organization, i.e. Nedvang.

In 2008 a packaging tax was introduced by the Dutch Environment Ministry. Companies that bring more than 15.000 kg of packaging onto the Dutch market have to pay this tax. The tax is levied for packaging material (excluding logistics tools such as pellets, trolleys or large crates). Last-minute packaging, like bags and fast food containers, are exempt. In this case, the tax is paid by the manufacturer or importer of this (empty) packaging. It was introduced in January 2008, but was

⁵¹ Oosterhuis, F. H. (2009): Economic instruments and waste policies in the Netherlands. Inventory and options for extended use.

http://www.recyclingnetwerk.org/andere_themas/2009/09/statiegeld.php, assessed 09/09/2011,

See URL: <http://www.verpakkingsmanagement.nl/thema's/duurzaamheid/42-statiegeld+voor+pet+niet+eco-effici%C3%ABnt.html>, assessed 09/09/2011

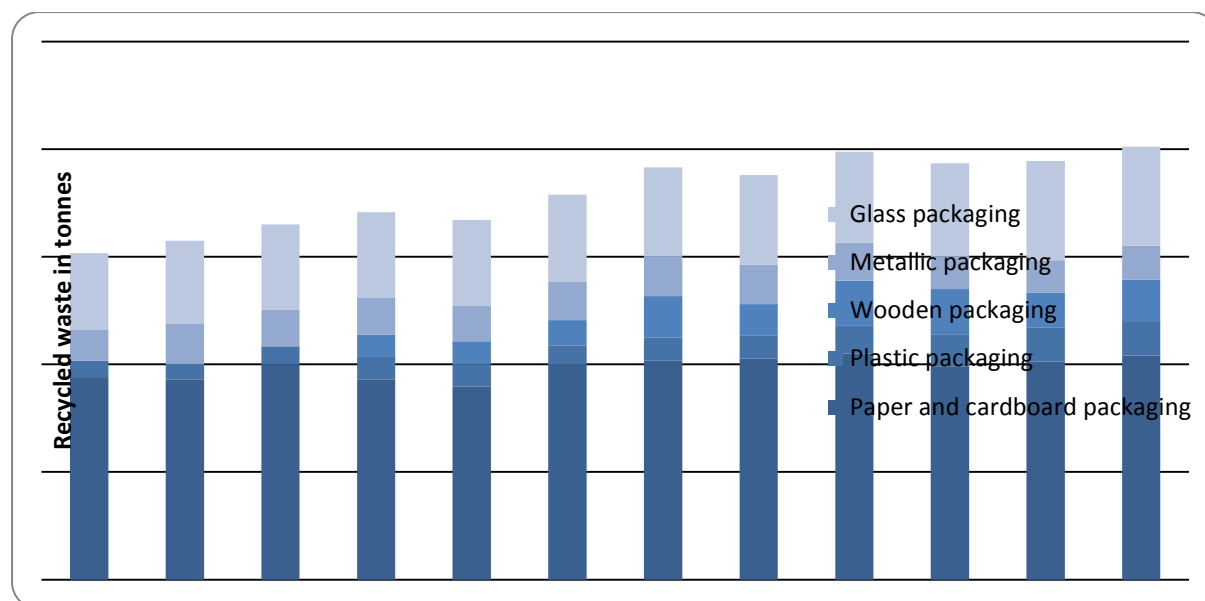
subsequently simplified in August 2008 to facilitate wider compliance and make planning payments easier. Focus has also been shifted from companies that specialize in packaging or that undertake packaging activities to those that supply packaging materials. The tax finances a Waste Fund, which is to be used to assist in the provision, at municipality level, of a separate collection of plastic packaging material from households. This means that the packaging tax both provides a financial incentive to reduce packaging waste generation, but also funds increased plastic packaging waste recycling by improving collection. The tax was expected to generate 365 million Euros in 2009. By funding a waste fund, the total amount of € 115 million is spent to remunerate waste collectors, sorters and recyclers for their efforts, to prevent the creation of packaging waste and the organisation of the infrastructure.

The overall objective of the carbon-based packaging tax is to meet national targets to recycle 32% of plastic packaging by 2009, 38% by 2010 and increasing to 42% by 2012. This is in line with the targets set for the Netherlands in order to fulfil the EU Packaging Directive.

Impacts of producer responsibility schemes for Packaging In Netherlands

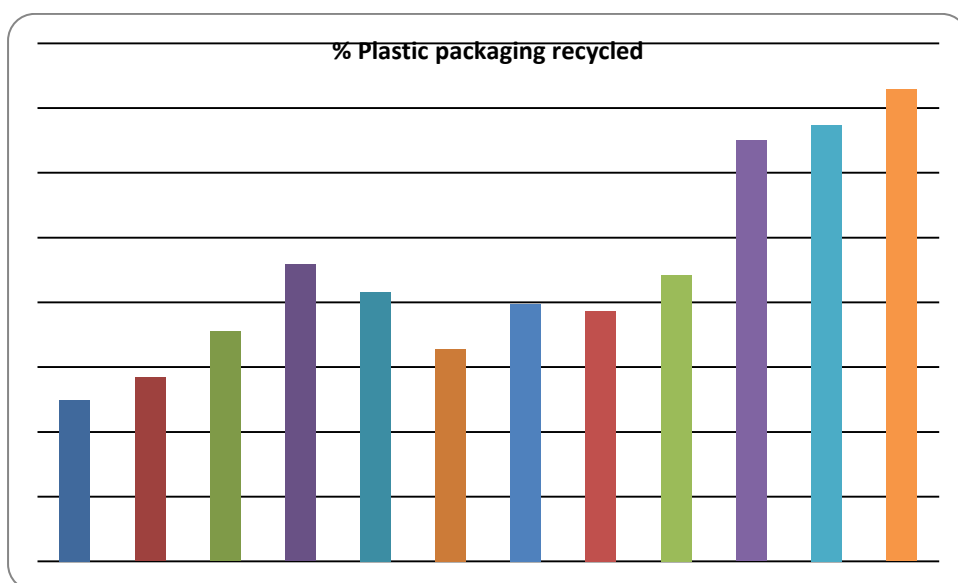
Data from Eurostat shows that the different recycled waste packages increased between 1997 and 2008. The waste stream: plastic packages shows the highest difference between 1997 and 2008, with a three times higher amount of recycled packaging. The recycled wooden packaging doubled almost between 2000 and 2008.

Table 9: Recycled packaging waste in Netherlands)



(Source: Eurostat)

Table 10: Recycled plastic packaging as percentage of total plastic packaging waste (Netherlands)



(Source: Eurostat)

From the above table points out that the percentage of recycled plastic packaging increased since the beginning of 2000s. 2002 it was 12%, 2008 36 % were recycled.

The statistical data shows that the Dutch regulation led already to increased recycling level for packaging waste.

Unfortunately, for the evaluation of the packaging tax data availability since 2008 is very weak. Pro Europe writes that through the packaging tax the individual material recycling percentages have not been changed in Netherlands. But the total recovery percentage has been adapted to 75% in 2010.⁵²

Strengths / factors for success / weaknesses of the PRODUCER responsibility schemes for Packaging In Netherlands

Half a year after the introduction of the packaging tax (in beginning of 2008) the tax was simplified to lower the regulation burden for industry and trade. ⁵³ The number of rates was halved from sixteen to eight. The different rates for primary and secondary/tertiary packaging do not exist anymore. And a lower rate was implemented for bottles of water, beer or soft drinks with a deposit scheme.

Tailor-made agreements with the Tax and Customs Administration for sectors and individual companies were introduced. For example, it is possible to conclude made-to-measure agreements in a covenant or a settlement agreement on the application of the packaging tax. These can contain

⁵² See URL http://pro-e.org/Legal_Basis_Netherlands.html, assessed 09/09/2011

⁵³ Ministry of Finance, Netherlands, See URL http://english.minfin.nl/News/Newsreleases/2008/07/Simplification_of_packaging_tax, assessed 09/09/2011

agreements on determining a fixed sum for the kilos of packaging to be reported. Different sectors have already concluded agreements, i.e. the wine sector, the vegetables and fruits sector. Also a fixed sum for importers was established.

Additionally, the definition of packaging became less broad. Logistic tools, such as pallets, trolleys or large crates, are not anymore seen as packaging. In addition, it is possible to classify the components of packaging as main packaging. As a result, it is not longer necessary to list the various packaging components in the administration, i.e. labels and staples.

Furthermore, the liability for tax moved to the companies subcontracting this job.

These changes show that it was necessary to adjust the packaging tax to the situation in practice. One objective was to decrease the administrative burden, i.e. through less different rates the administration of the system is unburdened. Also sector agreements were introduced to simplify the practical implementation of the regulation. With the adjustment of the rates for packaging which is already included in deposit funds, it can be pointed out that other existing regulations have to be integrated in the packaging tax.

PACKAGING TAXES

This section provides an overview of the existence and main features of packaging taxes in place in the EU MS.

Federal legislation introduced packaging taxes to the **Belgian** regions in 2004. The tax covers single use drinks packaging, reusable drinks packaging, plastic bags, disposable cutlery, plastic cling film, and aluminium foil. With the exception of recycled containers/containers bearing the 'green dot', beverage containers incur a tax of €0.37184 per unit, regardless of content, volume of the packaging or its material composition. Other exemptions from the tax are beverage packaging made of wood, sandstone, porcelain or crystal, due to the difficulty involved in the recycling of these materials.

Product packaging taxes were introduced in **Bulgaria** in 2004, the revenues of which are used to fund the recovery and treatment of packaging waste. The tax is levied upon any person/entity which places products on the market that result in the generation of widespread waste. Tax exemptions are granted to those who are able to prove to the Minister of Environment and Water that they are able to fulfil their obligations to recover and treat the waste resulting from their market presence. Compliance is achieved either by individually arranging for the recovery and treatment of packaging waste, or through subscription to a collective compliance scheme, which carries out collection, recycling and waste disposal obligations.

Introduced in 2006, packaging taxes in **Cyprus** oblige producers of packaging or packaged products (household and commercial) to pay waste management fees according to the material composition of the packaging, and proportionate to their annual market share (€/t). The fee schedule for differing material streams is as follows: glass €29.06/t; paper €47.14/t; ferrous metal €95.39/t; non-ferrous metal €21.38/t; plastic (PET, HDPE) €105.89/t; Tetrapack €122.75/t; others €131.05/t. Revenue generated by the tax has been used to establish and fund a collective waste packaging management scheme. Producers who place less than 5 tonnes per year of packaging waste on the market are exempted from the obligation to participate in a collective or individual waste packaging management scheme.

Packaging taxes in **Denmark**, the first of which was introduced in 1978, cover a range of waste packaging categories. These include: volume-based tax on new beverage packaging; weight-based levy on paper and plastic carrier bags; weight-based taxes for 13 types of material and packaging (e.g. soap and detergents, lubricants, perfume and margarine, non-carbonated soft drinks, vinegar and edible oils, plastic-foil foodstuff packaging manufactured from soft PVC); as well as taxes on PVC and phthalates. Denmark is the only member state that has chosen to internalise its waste packaging management costs, as opposed to establishing a collective, industry-run waste packaging management system. Packaging is not separated from household waste, and the costs of managing these waste streams are included in the budgets of local authorities. Packaging taxes apply to the following: beverage containers not subject to the deposit system; packaging of specified chemicals and manufactured consumer products; non-reusable paper and plastic carrier bags, single-use tableware and vending cups, and specified PVC film packaging. Waste packaging taxes are levied

directly on households and collected local authorities. Waste packaging taxes have yielded around 170 million DKK (23 million Euros) in revenue that has been used to fund many environmental projects. The tax is also reported to have cut plastic bag usage by 66%.

Packaging taxes in **Estonia** was established in 1997 under the Packaging Excise Duty Act, which applies to the packaging of goods put on the market in Estonia or acquired in another European Union member state and imported to Estonia. The tax establishes a special packaging fee for sales packaging if the required reuse or recovery rate is not achieved. Tax rates under the packaging excise duty are as follows: glass and ceramics €0.64/kg; plastic €2.56/kg; metal - €2.56/kg; paper and cardboard, including composite cardboard €1.28/kg; other packaging €1.28/kg.

In **Finland**, taxation on drink containers was established in 1994 with the aim of encouraging fillers and importers to participate in a recognised deposit return scheme for drink containers. The tax is applicable to all beverage containers, with the exception of those taking part in a recognised deposit return scheme, and is currently set at €0.51 per litre. Exemption from this tax is possible if the filler or importer of the beverage sets up a collection system or to join a recognised collection system.

Packaging taxes in **Hungary** were first introduced in 1995 and revised in 2008, with taxable packaging falling into two categories: beverage packaging and carrier bags, and basic materials (excluding beverage packaging and carrier bags). Materials covered under the former are: glass; layered beverage packaging; metal; other composite packaging; other packaging materials; plastic packaging (except for plastic carrier bags); and plastic carrier bags. Materials covered under the latter are: aluminium packaging; combined materials packaging; glass packaging; other metal packaging; packaging of other types; paper, wood and textile packaging; plastic packaging.

Packaging taxes were introduced to **Ireland** in 2007 with the purpose of internalising the environmental externalities associated with packaging use. The tax schedule for packaging materials is as follows: paper €40/t; card €40/t; aluminium €400/t; steel €120/t; glass €30/t; plastics €90/t; and wood €10/t.

The Natural Resources Tax of 1997 introduced the concept of waste packaging fees to **Latvia**. The purpose of the tax was to reduce the manufacturing and sale of environment polluting substances and includes packaging composed from all kinds of materials. The tax schedule for 2009 is as follows (in LVL per kg): glass source materials 0.25/kg; plastic (polymer) source materials, except bioplastic and oxiplastic and polystirol source materials 0.65/kg; metal source materials 0.70/kg; wood, paper and cardboard or other natural fibre and bioplastic source materials 0.15/kg; oxiplastic source materials 0.45/kg; polystirol source materials 0.90/kg. In 2008 a special tax rate was introduced for plastic bags which are higher than those covering other plastic packaging. The tax rate for plastic bags manufactured from bioplastics or oxy-degradable plastics is the same as for any packaging manufactured from these materials. Exemptions from the tax for packaging or disposable tableware and accessories if the producer or filler individually fulfils waste packaging management responsibilities as specified by regulation, or participates in a compliance system which is registered with the Environment State Bureau.

Taxation on packaging was introduced to **Lithuania** in 2006 and covers glass, plastic, PET, combined, metal, paper or cardboard, and other types of packaging, to include wood. A sample fee schedule for packaging is as follows (in LTL per kg): paper or cardboard 0.1/kg (€0.03); glass and other 0.2/kg

(€0.06); plastic 1.8/kg (€0.46); PET and combined materials 2.0/kg (€0.60); and metal 2.6/kg (€0.75). Exemption from this tax possible if a producer or importer can prove that they are meeting national targets for packaging waste recovery or recycling.

Packaging taxes were introduced to **the Netherlands** in 2008 with the aim of meeting national targets to recycle 32% of plastic packaging by 2009, 38% by 2010 and 42% by 2012. These targets align with the obligations faced by the Netherlands in fulfilling the EU Packaging Directive. The tax is levied upon packaging material and finances the Waste Fund, which provides waste management support to municipalities, including the separate collection of plastic packaging material from households. The tax provides both a financial incentive to reduce packaging waste generation, but also funds increased plastic packaging waste recycling by improving collection.

Packaging taxes were introduced to **Poland** in 2001 with the aim of preventing the generation of waste packaging by reducing the weight, volume and hazards of packaging and chemical substances. The tax applies to any object designed to hold, protect, handle, deliver or possibly present all manner of products (from materials to end goods). An example of the Polish packaging tax schedule is as follows: plastic packaging €0.6/kg; aluminium packaging €0.3/kg; paper €0.15/kg; glass €0.04/kg; wood or natural textiles €0.08/kg; mixed material €0.68/kg.

PACKAGING DEPOSIT-REFUND SCHEMES

This section provides an overview of the existence and main features of deposit-refund schemes in place in the EU MS.

Deposit refunds schemes in **Austria**, which began in the 1970s, are adopted by the beverage industry and retail sector on a voluntary basis. Deposit refunds are dispensed for reusable glass and PET beverage containers (bottles) and their boxes at collection points.

Deposit refund obligations in **Belgium** were first introduced at the federal level in 1997, with deposits for reusable drinks containers being set at €1.41/hectolitre (100l), and €9.86/hl for disposable drinks containers.

The **Danish** Dansk Retursystem (DRS), established in 1984 at the behest of the Danish EPA to manage the deposit scheme on beverage containers, is a privately owned non-profit company that is responsible for the deposit and return system. Importers and producers (domestic and external) must pay to register with Dansk Retursystem in order to place beverages on the market. Registration fees also include costs to cover the collection of containers and other logistics of the management scheme. There are three categories of packaging eligible for deposit refunds upon delivery to a participating retailer or collection point. These are: cans, glass and plastic bottles under 1 litre: DKK 1.00 (€0.13); plastic bottles of 0.5 litres: DKK 1.50 (€0.20); cans, glass and plastic bottles of 1 litre and over: DKK 3.00 (€0.40). The Dansk Retursystem (DRS) system has achieved a return rate of 99% for reusable containers of beers and carbonated soft drinks.

The **Estonian** Packaging Act of 2004 established recovery targets for all packaging placed on the market and a deposit system for single-use and recyclable packaging of beer, alcoholic beverages with low ethanol content and soft drinks in glass, plastic and metal containers. The recovery target for 2010 was 60% of these containers. Recovering of packaging by producers or importers of alcoholic and non-alcoholic beverages is mandated the Packaging Excise Duty Act. If these fail to set

up waste collection or recovery system that achieves the 60% collection target of their market share, they are charged excise duty. Deposit rates for containers are as follows: glass, plastic (PET) less than 0.5 litres: €0.06; metal cans, plastic up to 0.5 litres: €0.03.

The **Finnish** deposit refund system for bottles is implemented via the Waste Act (1072/1993), with targets for all drink containers covered by the Act (180/2005). The aim of the deposit return scheme is achieve a rate of at least 90% recovery and recycling of drink containers. For fillers or importers to take part in the deposit return scheme, they can either join a recognised collection system or set up a collection system of their own. Together, the tax and the deposit system have achieved drink container return rates as high as 98%.

In **Germany**, a 2003 Ordinance on Packaging established the levying of a deposit on non-environmentally friendly single-use beverage packaging for mineral water, beer, alcoholic mix-drinks, soft drinks (0.1-3 liters). The deposit is included in the purchase price of the drink and refunded when returned to a collection point. The system is producer and retailer-led and funded.

Deposit refunds on packaging came into effect in **Ireland** with the passage of the 1997 Law on Packaging Recovery. The law established a minimum return rate of 85% of all beverage containers, to include all glass, metal and PET beverage containers, with the exception of wine and milk bottles. Fillers of packaging pay for the operation and logistics required to run the deposit refund system through paid participation in a central scheme. The central scheme compensates those retail outlets which receive returned packaging, as well as sets the deposit rate at a level believed to encourage maximum take-back of containers. The participation fee in the central scheme is determined on the quantity of packaging placed on the market by fillers as well as the material composition of the packaging. The fee schedule for material is as follows: paper €10/t; card €10/t; aluminium €45/t; steel €80/t; glass €30/t; plastics €200/t; and wood €10/t. The scheme is industry led and was established by fillers in order to meet the government targets for recovery and recycling. Municipalities play no role in the scheme; all costs are covered by the packaging producers.

In **Latvia**, the Packaging Law and Regulations of Cabinet of Ministers No. 414, adopted in 2003, established voluntary national targets for waste packaging recycling and recovery to be met by producers and/or importers. The targets apply to reusable glass bottles with volume 0.33 and 0.5 litres, colourless and brown, plastic bottle crates, green (capacity – 20 bottles with volume 0.5 litres) and (blue) plastic bottle crates (capacity - 24 bottles with volume 0.33 litres). While participating producers or importers set the deposit rate for packaging, these must be submitted to state institutions for approval and verification. Retailers and merchants serving as collection points are compensated by producers and/or importers for the costs of the deposit refund as well as for other expenditures relating to the receipt of waste packaging from consumers, as well as the inventory, storage, and loading of this packaging.

Deposit refund for waste packaging was established in **Lithuania** in the 2003 Law on Packaging and Packaging with the target of 85% for waste packaging returns from 2010-2012. The deposit refund applies primarily to refillable glass beverage packaging with a capacity of 0.5 litres or more. Producers and/or importers of beverages contained in refillable glass packaging must declare the amount of waste packaging they place on the market to the Lithuanian Ministry of Environment. Producers and/or importers are obliged to collect and compensate distributors for any empty packaging received on their behalf and deposit refunds dispensed. Producers and/or importers must also to compensate the distributor for that costs associated with providing this service. Distributors

are obliged to receive the waste packaging of products they sell and to dispense deposit refunds when empties are returned. They must also include the deposit rate in the price of the product and provide the consumers with information about how empty packaging covered with deposit system should be returned.

The Netherlands has a voluntary deposit refund scheme on large single use polyethylene terephthalate (PET) bottles, glass beer bottles and corresponding plastic crates. The deposit rate for large single use PET bottle is €0.25; €0.10 for glass beer bottles; and €1.50 for plastic crates. PET deposit bottles have achieved a return rate of 95% for 2010 (26.6 kton), while the return rate for non-deposit PET bottles have is 66% (11.3 kton). 2009 figures indicate that the return rate for deposit glass bottles is around 90% (2,160 million).

A deposit-refund system for glass and plastic bottles was established in **Poland** in 1990 with the aim of encouraging the application of multiple use packaging (refillable) as opposed to single use.

Deposit refunds for packaging waste was established in **Spain** in 2003 with the target of recovering 50%-65% of applicable packaging of which 25%-45% is to be recycled. Producers and/or importers of have the choice of either independently fulfilling deposit refunds obligations, to include collection and recycling, or joining a compliance scheme.

Deposit refunds in **Sweden** were established for single use aluminium beverage containers in 1984 and for PET beverage packaging in 1994. The deposit refund scheme of 1984 was a voluntary industry initiative launched in response to the threat of a government ban on aluminium cans unless a 90% recycling rate was achieved. Along with aluminium beverage containers and PET, deposit refund schemes are in place for glass and steel can. Swedish legislation requires that consumption-ready beverages must be packaged in containers that are part of an authorised container deposit system. This rule applies to both refillable and one-way containers. Exceptions to this requirement are beverages consisting primarily of dairy products or vegetable, fruit, or berry juice. Several compliance schemes exist to help producers fulfil their obligations under the deposit system (e.g. Ab Svenska Returpack-Pet, Svenska Returglas 50-Cl Ab and Ab Svenska Returpack). The following deposit fee schedule is in place for refillable and disposable beverage packaging: cans €0.04; 0.33 litre glass bottle €0.05; 0.50 litre glass bottle €0.08; ≤ 1 litre non-refillable PET bottle €0.09; and > 1 litre non-refillable PET bottle €0.18.

In order to identify some of the features of some of the most successful packaging producer responsibility schemes, and due to the lack of fully comparable data for the EU-27, a small number of case studies were developed for the MS demonstrating some of the best performances with regards to packaging recycling and recovery (Belgium, Germany and the Netherlands). These are presented below.

Introduction

Prior to the introduction of Directive 2002/96 EC on waste electrical and electronic equipment (WEEE), Denmark, as with a number of other environmentally conscious/active MS, had already established national legislation mandating the collection and recycling of e-waste. This legislation placed responsibility for the recovery and treatment of waste electronic and electrical equipment with local authorities, the costs of which were covered through taxation and/or collection fees. Transposition of the WEEE Directive into Danish law has not seen a diminishment of government involvement in meeting WEEE targets, which are 75% of equipment falling under Annex 1B categories 1 and 10, and 65% of equipment falling under the categories 3 and 4. Within the WEEE administrative framework established by the Danish Environmental Protection Agency, local authorities remain responsible for the collection and sorting of WEEE from private households, while responsibility for supplying collection equipment and treating WEEE has shifted to producers. The framework also stipulates that all producers of EEE and portable batteries must register with and submit annual reports to Danish Producer Responsibility (DPA), a non-profit organization which monitors producer compliance, among other tasks, and is funded through annual fixed fees charged to producers. As of 2007, 1036 had registered with the DPA.

Producer responsibility is determined annually on an individual basis via DPA-system calculations, which allocates responsibility according to producer market share of household WEEE and/or waste portable batteries, and delineates the geographical area from which WEEE and/or waste portable batteries must be collected. As opposed to fulfilling DPA obligations individually, producers may subscribe to a compliance scheme which assumes registration, reporting, and WEEE collection/treatment activities on behalf of its members. There are currently four DPA-registered compliance schemes in operation throughout Denmark, with the average annual subscription costs per producer averaging €649.

El-Retur is the largest compliance scheme operating in Denmark, and consequently collects the largest amount of WEEE. While it operates on a non-profit basis, a fixed annual membership fee of DKK 3,000 is levied upon members. Additional to this is a variable environmental fee determined by quantities of WEEE placed on the market by an individual member. This fee covers the costs of collection and treatment of WEEE, with rates highly dependent upon the raw materials market. In a favourable market, fees will be lower in the next year and vice versa.

Impacts

DPA statistics reveal that rates of EEE being put on the Danish market appear to be trending downwards, while WEEE collection is on the increase. The electrical and electronic equipment included in the DPA survey are: large household appliances; small household appliances; IT and telecommunications equipment; consumer equipment; lighting equipment-luminaries; lighting equipment – light sources, electrical and electronic tools; toys, leisure and sports equipment; medical devices, monitoring and control instruments, and automatic dispensers.

	EEE put on the market (tonnes)	WEEE collected
2009	146.649	84.268
2008	154.952	76.417
2007	165.821	78.793
2006	153.053	52.893 (9 months only)

Strengths/factors for success/weaknesses of WEEE in Denmark

A core weakness of the Danish transposition of the WEEE Directive is the virtual removal of individual producer responsibility for EEE placed on the market after 13 August 2005 (i.e. 'New' WEEE). Instead of requiring individual producer responsibility for future products, the Danish WEEE system holds producers jointly responsible for these products. Allocation of financial responsibility for new WEEE is determined by a current market share when costs are incurred, as in the historical WEEE financing mechanism.

References

Electronic waste management (Ronald E. Hester, Roy M. Harrison)

Stemming the Tide of Patchwork Policies – The Case of E-Waste

The Producer Responsibility Principle of the WEEE Directive

Distribution of responsibilities between DPA-System, Producers and Collective Schemes

Principle and main features of Producer responsibility schemes concerning WEEE in Germany

The center piece policy and legislation concerning waste electrical and electronic equipment is the Elektro- und Elektronikgerätegesetz (ElektroG, Electrical and Electronic Equipment Act, see URL http://www.bmu.de/files/pdfs/allgemein/application/pdf/elektrog_uk.pdf, accessed 07/09/2011), which entered into force in 2005 in order to transpose the European Union WEEE Directive into German national law.⁵⁴ This act obliges producers of electrical and electronic equipment to establish a take-back system for waste equipment either for reuse, recycling or disposal according to environmental standards. Thus, it aims to reduce WEEE generation and also the release of hazardous substances into the environment.⁵⁵

The ElektroG distinguishes legal obligation depending on whether WEEE originates from the commercial sector⁵⁶ (B2B) or by private households (B2C)..

Concerning B2B producers of electronic and electric equipment placed on the market after 13 August 2005 are obliged to dispose of those WEEE, while the commercial end-users are responsible for disposal of the equipment placed on the market before the above-mentioned date. Disposal responsibility in both cases encompass reuse of WEEE, its treatment or disposal according to the ElektroG provisions and also bearing the respective costs. However, B2B equipment must not be disposed of using the public collection sites available for private household WEEE and producers are not obliged to collect B2B WEEE.² The municipal collection services are responsible for the collection of WEEE from private households and similar sources (B2C WEEE). Producers, however, have to provide adequate containers for collection at certain collection points and must ensure timely collection of these containers according to the filling level of different WEEE streams (large household appliances, refrigerating appliances, IT and telecommunications equipment, gas discharge lights and small household appliances).² Citizens are obliged to separate WEEE from other waste and bring it to the designed collection points – WEEE disposal with residual waste has been banned. A few month after enacting the ElektroG, in March 2006, the free of charge collection of WEEE from private households entered into force.²

The “Stiftung Elektro-Altgeräte Register” (stiftung EAR) registers the producers of electrical and electronic equipment, monitors the collection of WEEE and coordinates the provision of collection points for WEEE. The EAR also calculates the mass of WEEE for which a single producer has to finance and organize the treatment (recycling/recovery).

⁵⁴ See URL, http://www.koord.hs-mannheim.de/horizonte/h32_Schmidt.pdf, accessed 07/09/2011.

⁵⁵ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.environ.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

⁵⁶ To be commercial WEEE, the equipment requires to be exclusively used by businesses and be characteristic for business use, e.g. as regards the equipment's place of use or the qualification of the personnel using it. L.C.

The producers are responsible to have the WEEE they sell collected from the municipal collection sites and properly treated. The contracts are negotiated with waste managers e.g. by the different sectors of the industry. WEEE Producers have to pay a fee to register with the EAR, the system charged with running the WEEE recycling/treatment system. The level of payment for the collection and treatment per producer varies according to the contracts with waste management firms.

Impact of the Producer responsibility schemes in Germany

Prior to the introduction of the ElektroG, WEEE was collected in individual collection systems in different municipalities across Germany. Those systems varied as to the types of WEEE collected and the fees for collection. Altogether, the rate of WEEE in fact collected and recycled amounted only to 10 %, while the large remainder was landfilled or incinerated.⁵⁷

The ElektroG also lays down monitoring obligations for producers, for instance concerning the amount of products they introduced to the market, the annual recovery from collection sites as well as the volumes collected, recycled, reused and recovered.³

Monitoring data, which are therefore largely available, indicate that since the introduction of the ElektroG the amount of WEEE going to landfill was reduced. The ElektroG prescribes the collection of 4 kg of WEEE per year and person. According to the Federal Environment Agency in 2006 the amount of WEEE collected per capita amounted to 8 kg and therefore was twice the amount prescribed.⁵⁸

The increase in WEEE returned to the producers also forced them to take into account their products' environmental impacts already in the design phase, because they have to bear the costs for their recycling. This has caused many producers to reduce or substitute hazardous substances, thus eventually decreasing pollutant release.

Strengths / factors for success / weaknesses of the schemes

By 2008, more than 10,000 producers were already registered with EAR, not least because the Federal Environmental Agency prosecutes and fines "free-riders" (e.g. 50,000 € for a producer not registering with EAR).^{3,4} Despite the increase in WEEE collected and in producers registered with EAR, doubt has been cast on the achievement of the overall aims of the ElektroG to prevent WEEE and to promote reuse, recycling and recovery. Most importantly, a large fraction of WEEE returned to collection point was damaged during the process of collection, handling or transport thus severely impacting their reusability.⁵⁹

⁵⁷ Eunomia Research & Consulting *et al.* (2009): International Review of Waste Management Policy: Annexes to Main Report. Bristol, UK. See URL <http://www.envron.ie/en/Publications/Environment/Waste/WasteManagement/FileDownload,21598,en.pdf>, accessed 09/09/2011.

⁵⁸ See URL <http://umweltbundesamt.de/uba-info-presse/2008/pd08-019.htm>, accessed 09/09/2011.

⁵⁹ SRU (2008): Umweltgutachten 2008. Berlin. See URL http://www.umweltrat.de/SharedDocs/Downloads/DE/01_Umweltgutachten/2008_Umweltgutachten_BT.D.pdf?__blob=publicationFile, accessed 09/09/2011.

Furthermore, since WEEE reuse is prioritised over its recycling and disposal, WEEE export to other countries ensued, in particular to Africa. Not least from an environmental perspective this is a serious issue, because on the one hand, the equipment available for recycling and thus contributing to resource efficiency is reduced. And on the other hand, though increasing the availability of affordable equipment also benefits social well-being (e.g. employment creation in equipment trade and repair as well as IT-based education) in the importing countries, the standards in the receiving countries for further handling of WEEE are often poor resulting in environmental and health impacts.^{60,61}

⁶⁰ Hermann, A. und Stahl, H. 2009. „Lebensabend in Afrika“ – Export gebrauchter Güter und die Folgen. In: Altner, G. et al. (Hrsg). Jahrbuch Ökologie 2010. Umwälzung der Erde. S. Hirzel Verlag, Stuttgart, S. 105 – 111.

⁶¹ SRU (2008): Umweltgutachten 2008. Berlin.

Introduction

The Directive 2002/96 EC on waste electrical and electronic equipment (WEEE) came into effect in August 2004 with the primary objective of diverting complex flows of e-waste from landfills by placing responsibility for the final disposal of products in the hands of producers. The Directive also obliges producers to declare the amount of EEE they place on the market and the amount of WEEE reused without treatment, treated, reused after treatment, and recycled on an annual basis. While the directive was an overdue introduction to the concept of e-waste management for a number of MS, at Sweden had long since been considered a leader in this field, having passed producer responsibility legislation in 2000, and having had in place a national compliance scheme for seven years. The structure of WEEE in Sweden today retains the emphasis on producer responsibility originally contained in national law, while the adoption of the “Extended Producer Responsibility” (EPR) paradigm into Swedish e-waste management schemes formalizes producer responsibility through the post-consumer stage of a product’s life. EPR, which is closely aligned with the Polluter-pays Principle, in essence finances e-waste treatment and final disposal by incorporating the costs of these services into a product’s retail price. By doing so, responsibility for waste processing has been transferred from municipalities to producers.

Sweden, like several other MS with pre-existing e-waste legislation, operates a single national compliance system which obliges producers to join a not-for-profit Producer Responsibility Organization (PRO). These PROs facilitate the collection and treatment of household and commercial WEEE usually through the outsourcing of e-waste collection and treatment activities, and generally assumes the responsibility of ensuring that members meet their EPR commitments. EEE producers also have the option of facilitating the collection and recycling of products themselves (i.e. by contracting out waste management activities). However, as service costs are charged at market prices, and as prices vary according to market conditions the expense embodied in individual fulfilment as contrasted with the costs of subscribing to collective schemes makes this an unviable option for many companies.

Producers are also required to fulfil old-for-new equipment responsibilities, in that when supplying a new product to consumers, they must take back a similar product for disposal. Where such take-back schemes are not in operation, municipalities shoulder the costs of WEEE collection and processing as part of municipal solid waste management activities. Responsibility for historical WEEE, or WEEE placed on the market before 13 August 2005, is a collective responsibility, with management costs determined by a producer’s market share of household products on the Swedish market.

Impacts

The PRO El-Kresten, the predominant WEEE collective to which Swedish producers subscribe, has achieved the highest WEEE collection rates in Europe at 15.8kg per capita/per year. El-Kresten is owned jointly by 20 business associations and has agreements with 1300 affiliated companies for electrical/electronic products recycling, and with 700 for battery recycling. Membership dues for affiliated companies are comprised of a fixed entry fee, an annual membership fee, and a fee based

on product type and the subscribing company's market share. The recycling system, "el-retur" is in operation throughout all municipalities in Sweden and includes access to over 1000 manned collection sites for the public and businesses, the public incurring no charge for their e-waste deposits, Some municipalities offer kerbside pickup for large household appliances as part of their waste management programme.

Since operations began in 2001 El-Kresten has recycled 1 million tonnes of WEEE (as of 2010) and has witnessed a steady increase in WEEE collection from 5.7kg per person in 2001 to 15.8kg per person in 2006. In 2010, collection and recycling rates had increased by 1.4% upon the 2009 rate of 150,400 tonnes of WEEE.

Table 62: Collection Results El-Kretsen 2002-2006 (*The Producer Responsibility Principle of the WEEE Directive*)

	2002	2003	2004	2005	2006
Large White Goods	30 800	32 800	36 600	36 300*	45 500
Other Household Appliances, Hand Tools, Garden Tools	9 800	8 900	10 200	12 300	11 900
IT, Office Equipment, Telecom	11 500	14 000	17 700	22 700	27 600
TV, Video, Audio	16 800	16 600	15 700	21 000	26 300
Camera, Watches, Toys	200	200	200	300	300
Light Sources	5 600	5 800	5 800	6 700	7 900
Other	100	300	900	2 200	2 400
Fridges and Freezers (El-Kretsen)	0	0	0	10 500	28 000
Total (El Kretsen)	74 800	78 600	87 100	112 000	149 000
kg/capita/year	5,7	9,0	9,8	12,2	15,8
Fridges and Freezers (Municipalities)	21 100	23 500	21 840	14 500	0
Total (El-Kretsen and Municipalities)	95 900	102 100	108 940	126 500	149 000
kg/capita/year	10,7	11,4	12,1	14,0	15,8

*Total white goods collected increased by 5% between 2004-2005 however decrease in tonnages was due to an adjustment in average product weight.

Strengths/factors for success/weaknesses of WEEE in Sweden

The success of the WEEE Directive in Sweden can be attributed to a number of factors. The existence of producer responsibility legislation and a national compliance scheme before the introduction of the WEEE Directive undoubtedly made transposition and the meeting of objectives much easier than in MS with no prior experience with e-waste management. In terms of the success realized by El-Kresten, they believe that high levels of cooperation between partners, municipalities and contractors, along with good rates of public participation were paramount to achieving the highest WEEE collection and recycling rates in Europe. Some also credit the dominance of the El-Kresten PRO with simplifying the coordination and collection of WEEE, as well as the monitoring of producer

compliance. However, others view their dominance as a monopoly, and that a lack of competition has resulted in high recycling costs.

References

Global perspectives on e-waste (Rolf Widmeran, Heidi Oswald-Krapf, Deepali Sinha-Khetriwalb, Max Schnellmann, Heinz Böni)

Producer responsibility for WEEE as a driver of ecodesign: case studies of business responses to producer responsibility charges (Annika Gottberg)

Electronic waste management (Ronald E. Hester, Roy M. Harrison)

Principle and main features

The Austrian Ordinance on End-of-life Vehicles stipulates that producers and importers of cars must take back end-of-life vehicles from the brand they market. The average distance to a take back point must not be larger than the average distance to a selling point. Mostly selling points are also take back points. The take back points are identified on the website of the Ministry of Environment.

The bringing back of end-of life vehicles (ELVs) has to be without any cost for the last holder or owner. However, the holder/owner may be charged when waste has been added to the vehicle. In addition, in the most recent amendment of the Ordinance it was clarified that the last holder or owner may be charged where parts of the vehicle which determine the value of the end-of life vehicle (as source for recycling material) are missing.

The producers and importers of cars are responsible for the treatment of the end-of-life vehicles. They have the obligation to take care that those parts which can be re-used are re-used and those materials which can be recycled are recycled so that **85 %** (from 2015, the figure is 95 %) of the end-of-life vehicle **is recovered, recycled or re-used**.

For the most part, the take back and treatment of the end-of-life vehicles is organized by each brand separately. However there is one organization, the ÖCAR Automobilrecycling GmbH, which is registered as the responsible collection and treatment system for end-of-life vehicles of 15 different brands.

Impacts

The free of charge take back obligation together with the commercial value of the car material has the effect that all old cars are collected and treated properly when they have no further commercial value. As can be seen in **Table 1** about **96 %** of the end-of-life vehicles brought back to car producers and importers for waste treatment **were actually recovered, recycled or re-used** in the year 2008. The majority of this was recycled. Nearly 84 % of the cars collected for treatment were recycled or reused.

Table 1: Treatment of end-of-life vehicle (ELV) in Austria (Eurostat 2011b)

	Unit	Year		
		2006	2007	2008
ELV for treatment	Number of cars	87,277	62,042	63,975
	Tonnes	69,329	50,805	52,202
ELV recovered and reused	Tonnes	59,471	43,769	50,182
Share of recovered + reused	%	85.8	86.2	96.1
ELV recycled	Tonnes	52,628	37,932	41,255
ELV reused	Tonnes	2,722	2,430	2,413
Share of recycled + reused	%	79.8	79.4	83.7

However, as can be seen in **Table 2** only 25 % of the deregistered old cars are treated as end of life vehicles, 15 % are exported officially as second hand cars while the destiny of the remaining 60 % of the cars is unknown. It can be assumed that almost all of the missing 60 % is exported without documentation as second-hand-cars, mainly to Eastern Europe.

Table 2: Destiny of deregistered passenger cars in Austria (European Parliament 2010)

Year	De-registered passenger cars <small>Error! Bookmark not defined.</small>	Treated as end-of-life vehicle ⁶²	Commercial export of used cars ⁶³	De-registered passenger cars not reported as being treated or exported commercially	
				Number	% in relation to the overall de-registered passenger cars
2006	260.368	87.277	43.530	129.561	50 %
2007	257.568	62.042	39.019	156.507	61 %
2008	254.361	63.975	37.629	152.757	60 %

Strengths and weaknesses

Legally the take back system works very well. However, the incentive to sell old cars for being used abroad seems to be higher than for collecting and treating the end-of-life vehicles within the country.

Only 25 % of the de-registered old cars are actually brought back by the owners to the producers and importers for being treated as waste. Thus it has to be assumed that 3 out of 4 old vehicles are sold into foreign countries instead of being collected and treated within Austria.

In compliance with the waste hierarchy it is beneficial for the environment that cars stay in use as long as they are safe, meet the EU emission limits and are treated according to EU standards after their use. There are considerations to introduce control mechanisms for assuring that used-cars may be only exported if the environmental standards in the receiving country comply with EU regulations.

A deposit refund system for used-cars as incentive for keeping the used cars in the country is currently not envisaged in Austria.

⁶² <http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastestreams/elvs>

⁶³ Eurostat's COMEXT Database (<http://www.fiw.ac.at/index.php?id=367&L=3>)

Introduction

Waste management in Belgium falls under regional jurisdiction. The governments of the three Belgian regions, together with the concerned industries (e.g. automotive federations, dismantlers, shredders, etc.) adopted the first environmental conventions on ELV in 1999.

In 2004, the second Environmental Convention was adopted. This agreement defined the environmental guidelines of the management plan for a period of five years which took effect on 2004. This management plan is based on the following basic principles:

- Only accredited centers are allowed to dismantle ELVs;
- Only authorized bodies can issue certificates of destruction;
- The acceptance of ELVs is guaranteed to the owners when specific conditions are met.

In 2010, ministers of the Environment of the 3 Belgian regions signed a new agreement on ELV management. This agreement sets a rate of 95% of recovery, as a binding target to be met by 2015. This target is regarded as challenging, since in Belgium there are not sufficient energy recovery facilities that can incinerate the fluff (shredder residues) of ELVs. The option of energy recovery is set for materials that are difficult to reuse or recycle. However, a certain limit is imposed so that the overall treatment of ELV is in line with the waste hierarchy which promotes mainly the reuse and recycling of materials.

Scope and targets

The scheme aims at the following activities:

- Coordination: creation of an annual management plan in collaboration with the regions, including annual budgets and regional authority information;
- Monitoring: creation of a monitoring system on waste levels in order that authorities and the industry sector can verify the meeting of the annual management plan objectives;
- Certification: creation of reporting procedures for participating bodies in collaboration with the regions and approved centres;
- Awareness-raising: communication with members on treatment problems relating to ELVs; information campaign on the take-back obligation;
- Prevention: with the aim of reducing the use of hazardous substances and products in order to increase the recyclability of vehicles, a study on 'ecodesign' of vehicles was undertaken;
- Social: to organise and follow prevention and overall management of ELVs.

The scheme was created to deliver the objectives of the ELV Directive. The target set for 2006 (in accordance with the European legislation) was 85% of useful application with a minimum of 80% of reuse / recycling and a maximum of 5% energy recovery. For 2015, the target has been set to 95% recovery (minimum 85% recycling or reuse and maximum 10% energy recovery).

Each regional authority is required to:

- promote uniform regulations with the other regional and federal authorities to minimise possible environmental impacts and prevent negative economic effects at a national level;
- ensure that only authorised centers can process and export of ELVs;

- remove any administrative burdens;
- control the "environmental performance of the scheme.

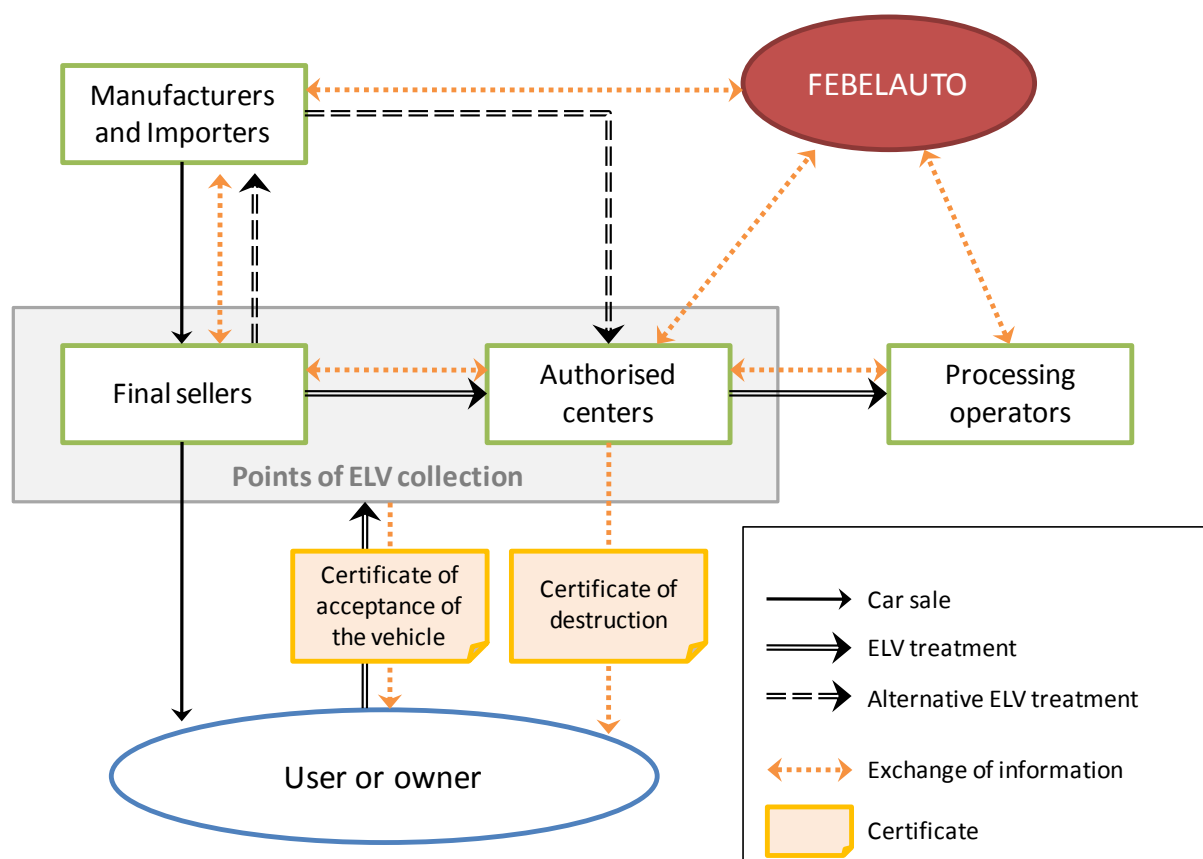
A take-back obligation is included in the Flemish VLAREA executive decision which is based on the Flemish environmental policy agreement (MBO) on ELV (established in 1999, last updated in 2010). Febelauto, the organisation that monitors the scheme, reports annually its performance. OVAM (Public Waste Agency of Flanders) evaluates this report every year and in turn reports the results to the Flemish Parliament.

Operation of the scheme

The accredited operator of the ELV scheme in Belgium is Febelauto. Febelauto is responsible for developing and running the monitoring of the scheme. The operator represents the federation of car producers, the federation of authorised treatment facilities and other industrial stakeholders. The operation of the scheme (collection and recycling of ELVs) is driven solely by the market (e.g. manufacturers, shredders and post-shredder facilities). Essentially the scheme is meant to support the creation of a financial viable material market. The cost of treatment is offset by the market value of ELV. A minimum level of state intervention is required and at the same time innovation is promoted, the efforts of the market to improve the efficiency of the shredding technologies.

The operation of the scheme is illustrated in Figure 6. The seller is obliged to take back one ELV for each new vehicle sold and to provide a certificate of acceptance to the last owner. No fee is charged to the owner if specific preconditions are met (e.g. the ELV is till operative). Manufacturers and importers are obliged to set an adequate number of collection points throughout the regional territory. At least one point per region is indicated by the manufacturer or importer. Normally for 90% of the population, there is at least one collection point at a maximum distance of 30km.

Figure 6 Organisation of the ELV scheme in Belgium⁶⁴



In order to monitor and evaluate the whole system of treatment of life vehicles, Febelauto has set up an EMS monitoring system ('End-of-life vehicles Monitoring System). After treatment, data from the central bank for the identification of vehicles (ELV stream) is transmitted to the DIV (Department of Vehicle Registration). Once this has been done, the re-registration of a destroyed vehicle is not possible.

In 2010 Febelauto collected and analysed data for 170.565 ELVs processed by 107 authorized centers.

Information on payments and costs

The scheme is producer-led and funded. Each year since the beginning of its introduction, the scheme has run a financial surplus. Table -1 shows the annual results from 2006 to 2010 of the accredited operator, Febelauto (information for 2008 was not found).

1.1 ⁶⁴ BIO Intelligence Service (2010), *Etude de la gestion de la filière de collecte et de valorisation des Véhicules Hors d'Usage dans certains pays de l'UE*

Table -1 Annual results of Febelauto between 2006 and 2010^{65 66}

Costs/ incomes	2006	2007	2008	2009	2010
Incomes	326.885	343.924	355.797	349.843	1.444.793
Costs	279.085	307.924	294.669	300.409	1.415.800
Net position	47.800	36.000	61.128	49.434	28.993

This cost includes mainly staff costs, rents, depreciations and maintenance costs of the monitoring system. It is covered by the members (federations) that pay a fixed membership fee and an annual contribution. Specifically the annual contribution covers approximately 90% of the operator's budget, whereas the remaining 10% is covered by a fixed membership fee. The later is determined according to the market share of each member. It averages 0,50 Euros per vehicle that enters the market. In total the contributions and membership fees reached 335.795 Euros in 2007, whereas in 2010, the total contribution slightly increased to 351.676 Euros. As mentioned above, the collection, recycling and recovery of ELV is market- driven and the costs are covered by the value of parts and materials.

The large increase in the incomes and cost on 2010 are due to the integration of the collection of used tires in the ELV scheme. Specifically, 1.088.616 Euros represents the income of the collection of tires whereas the cost is estimated at 1.086.272 Euros. For tires, the collection fee is on average 1,50 Euros per vehicle. It is higher than the fees on ELVs because it also includes the payment of the collection facilities, since this scheme is not self-sustained as in ELVs.

In Wallonia, there are discussions on imposing a tax on ELV residues and on ELV waste for which recycling targets are not met. This tax was set at 150 Euros per tonne of residue, but to this date it has not been implemented.

Impacts

A report⁶⁷ was conducted in 2008 by OVAM, to calculate the recycling percentages for the ELVs treated in 2006 for each shredder company in Belgium individually. According to the results of this report, the levels of recycling and energetic valorization in Belgium ranged between 78% and 93%, in 2006. According to OVAM, in 2006, Belgium achieved a recycling rate of 87% and a total recovery percentage of 90%.

Eurostat provides data on the amount of ELV recovered and recycled for the period between 2006 and 2009. The analysis of this data suggests that in this period, the performance of the scheme was practically stable (Figure 7). These figures seem to be consistent with the results of the study, conducted from OVAM (as regards 2006).

⁶⁵ FEBELAUTO, RAPPORT ANNUEL 2007, AVAILABLE AT: [HTTP://WWW.FEBELAUTO.BE/FILES/FEBELAUTO_2007_FR.PDF](http://www.febelauto.be/files/febelauto_2007_fr.pdf) (ASSESSED ON 24/08/11)

⁶⁶ FEBELAUTO, RAPPORT ANNUEL 2010

⁶⁷ OVM (2008), VALIDATION OF THE RECYCLING PERCENTAGES FOR END-OF-LIFE VEHICLES AT SHREDDER COMPANIES AND FLOTATION UNITS, AVAILABLE AT [HTTP://WWW.OVAM.BE/JAHIA/JAHIA/CACHE/OFFONCE/PID/176?ACTIONREQ=ACTIONPUBDETAIL&FILEITEM=1740](http://www.ovam.be/jahia/jahia/cache/offonce/pid/176?ACTIONREQ=ACTIONPUBDETAIL&FILEITEM=1740) (ASSESSED ON 24/08/11)

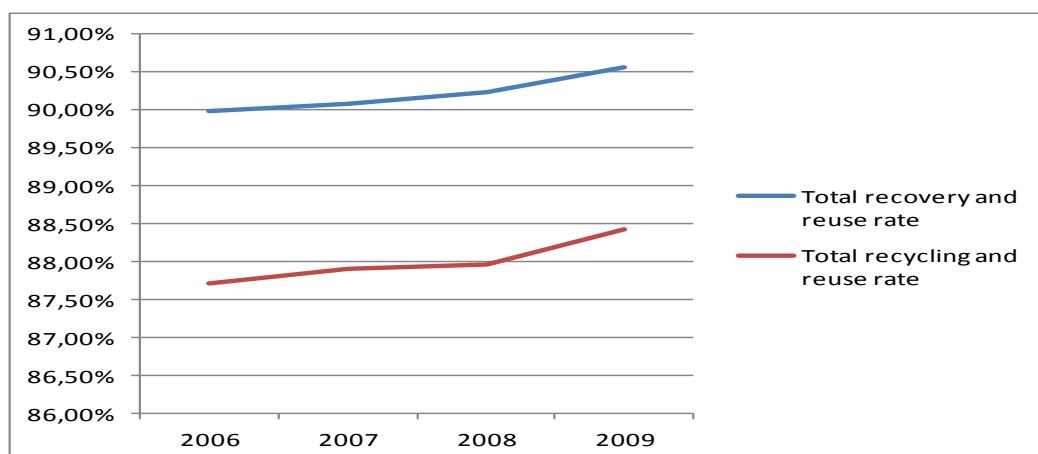


Figure 7 Total recovery and recycling/reuse rates on ELV between 2006 and 2008 ⁶⁸

Strengths

In Belgium, the data collection and monitoring process on ELVs is being performed on a daily basis through a dynamic system. This allows estimating almost in real time what percentages can be reached and not only at the end of each year. In addition, this enables a proactive approach to the choice of the different processing centers according to the type of ELVs, which can eventually lead to higher recycling rates. In addition a dynamic monitoring system might lead to commercial advantages, since a real-time estimation process of the recycling rates allows better management and planning.

An OVAM officer⁶⁹ highlighted the fact that the success of the scheme relies on its self-sustaining nature since each year the annual financial balance is positive. These positive results have been achieved even during the financial crisis of the last years.

The operator of Febelauto⁷⁰ believes that the fact that the scheme is driven by the market with strong consensus that exists between the operator, the members and the shredder operators ensures a harmonised operation of the scheme. The good relations between the different actors together with the good level of understanding of the market have made possible a minimum level of government interference. When problems are encountered, new regulation can adjust the scheme and impose improvements. For example, the low performance on the collection of tires made it necessary to integrate the collection of tires in the ELV scheme, in 2010.

According to Febelauto, an important factor of success of the scheme was that fact that Belgium has established strong R&D activities in the field of post- shredder technologies. R&D activities, have been developed by the private sector and have resulted in good levels of material reuse and recovery.

⁶⁸ EUROSTAT, DATABASE "END-OF-LIFE VEHICLES: REUSE, RECYCLING AND RECOVERY, TOTALS (ENV_WASELVT)", AVAILABLE AT [HTTP://EPP.EUROSTAT.EC.EUROPA.EU/PORTAL/PAGE/PORTAL/ENVIRONMENT/DATA/DATABASE](http://EPP.EUROSTAT.EC.EUROPA.EU/PORTAL/PAGE/PORTAL/ENVIRONMENT/DATA/DATABASE), (ASSESSED ON 24/08/11)

⁶⁹PHONE INTERVIEW PERFORMED ON 30/08/2011

⁷⁰ PHONE INTERVIEW PERFORMED ON 30/08/2011

Finally according to the operator, the high costs of waste disposal has acted as a motivating factor to the industry to reduce the amount of waste by achieving better levels of reuse and recovery.

Weaknesses

The OVAM report on the validation of recycling rates of ELVs, identified the following weaknesses that affect the reliability of the monitoring system:

- Shredders in Belgium process a mixed input that derives both from ELVs and WEEE as well as from other metal appliances. This makes it difficult to monitor the material streams and their origin. The classification of product streams is well known however it is difficult to monitor the exact composition of materials;
- The composition of certain type of cars might be considerably different from the average composition;
- Some facilities proceed to a complete sorting of the material streams, whereas others sell a mixed stream to other companies for further sorting;
- Part of the stream is exported and this creates difficulties as it is difficult to monitor the efficiency of foreign companies.

Febelauto argues that a general consensus needs to be reached on the taxation of ELV shredder residues not only in Belgium, but also across Europe. High levels of such taxes would probably act as a driver to the improvement of the level of ELV recycling and reuse, since the development of more efficient technologies would become more cost-effective. However, the idea that some countries would set up an administrative system to establish a tax on shredder residual where no other taxes are in place seems fanciful.

Finally, there still seems to be a considerable rate of ELV shredded in non-certified facilities. This practice imposes unfair competition for the certified companies and might also lead to environmental impacts as the process of vehicles is not monitored. As mentioned above, certificates of destruction can be issued only by certified facilities. However, these certifications are not required for the last owners for the deregistration of ELVs. For this reason, the Federal Public Service for Mobility (Service Public Fédéral pour la Mobilité) has launched a registration system, called MOBIVIS, to keep track of vehicles. Any sale, change of property or destruction shall be registered in this database. The law that establishes the legal basis of this obligation was adopted in 2010 and imposed a fine between 150 and 500 Euros for any violation. However, to this date this system has yet to be implemented.

Main features of producer responsibility schemes for End-of-life vehicles In Germany

The Regulation, which is relevant in the context of end-of-life vehicles in Germany, is the *Altfahrzeuggesetz* (End-of-Life Vehicle Act, see URL <http://www.bmu.de/files/pdfs/allgemein/application/pdf/vehicles.pdf>, accessed 07/09/2011). The End-of-Life vehicle Act transposes the ELV Directive into German national law.

The End-of-Life Vehicles Ordinance was passed in 1998 and amended in 2002 in order to transpose the ELV Directive into German national law.⁷¹

The 2002 ordinance covered M1 (vehicles for passenger transport with a maximum of 8 seats, not including the driver's seat) and N1 (vehicles for goods transport with a maximum permissible weight of up to 3.5 tons) vehicles but contrary to the European ELV Directive limited the scope of the ordinance for vehicles designed for special use to vehicles with a maximum weight of 3.5 tonnes (see § 1 para. 3 ELV Ordinance 2002). Upon complaints by the European Commission, the German Government extended the scope of the ordinance to all M1 vehicles making use of the clause in Art. 3 No. 4 of the ELV Directive, which says "Special purpose vehicles as defined in the second indent of Art. 4(1)(a) of Directive 70/156/EEC shall be excluded from the provision of Article 7 of this Directive". The German 2002 ordinance made a free take-back system obligatory only for cars registered according to the German registering procedure. In addition, free take-back could be denied if the German car documents ("Fahrzeugbrief") were not handed over. The EU Commission regarded this restriction as incompatible with EU law and principles. Upon complaints by the European Commission, the amendment to the ELV Ordinance extended the obligation to take back ELVs on a cost-free basis to cars registered in the European Union. The free take-back of an ELV can be denied if the car documents (German document or EU Document) have not been handed in.

The German ELV-ordinance foresees a take-back obligation (§3 para.1) in line with the requirements of the ELV Directive. Car producers have to take back all the vehicles of their brand in an authorised permitted collection facility or an authorised dismantling facility designated by the car producer. At the collection or dismantling facility, the owner is given a certificate of destruction. The take-back system for end-of life cars is explicitly required to be cost free. The German ordinance also requires the installation of a "sufficiently comprehensive network of authorised collection facilities or authorised dismantling facilities".

For 2006 and 2015 recycling, recovery and reuse targets have been specified.

- 2006: recovery and reuse - at least 85 %, and recycling and reuse - 80 %
- 2015: recovery and reuse – at least 95 %, recycling and reuse – 85 %

On the basis of data from the statistical federal office and calculations from the Umweltbundesamt the following recycling levels have been identified for End-of-life vehicles (in 2008)⁷².

⁷¹ Information on the ELV ordinance have been taken from http://www.europarl.europa.eu/comparl/envi/pdf/externalexpertise/end_of_life_vehicles.pdf, accessed 07/09/2011 as well as from <http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeId=2304>, accessed 07/09/2011.

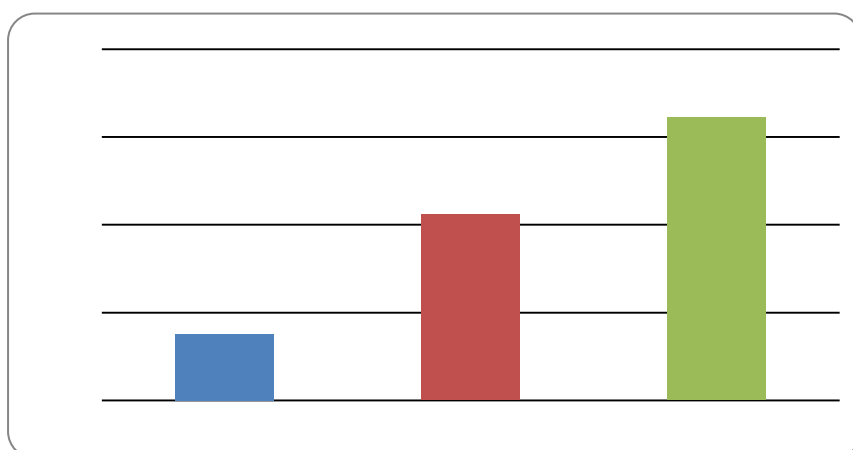
⁷² UBA (2008): *Altfahrzeugaufkommen und -verwertung*. <http://www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeId=2304#f1>

- 89,2 % for recycling and reuse
- 92,9 % for recovery and reuse

That shows that both 2006 targets have been achieved. impacts of pRODUCER responsibility schemes for End-of-life vehicles In Germany

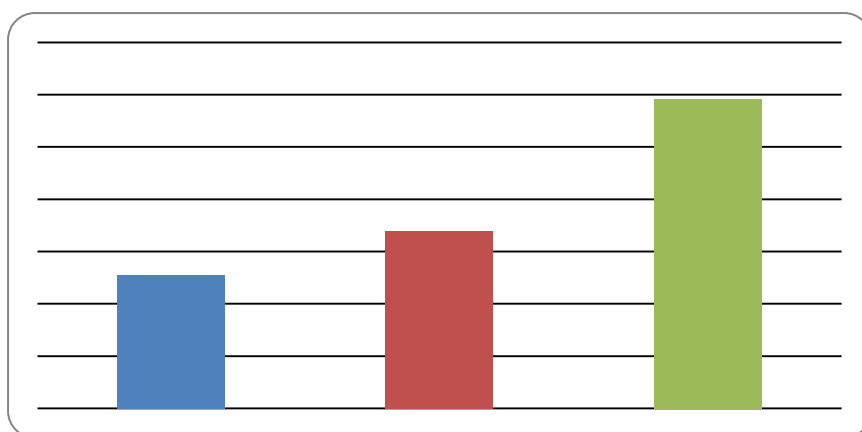
The objectives for recycling and reuse and recovery and reuse are already attained in Germany (see following tables).

Table 2: Recycling and reuse of ELV in Germany



Source: Eurostat

Table 3: Recovery and reuse of ELV in Germany



Source: Eurostat

Strengths / factors for success / weaknesses of the producer responsibility schemes for End-of-life vehicles In Germany

No practical problems with the cost-free take-back system have been reported. The take-back system overall works effectively. Dismantling facilities even report the problem of the decreasing

number of ELVs being presented for dismantling (problem: illegal waste shipment), which makes it hard for them to fill their capacities. In effect the car manufacturers have to bear the costs of the take-back system. However, some occasional enforcement problems of the ELV-Ordinance by the local authorities were reported. For example, the submission of a certificate of deconstruction in line with the ELV ordinance as a precondition of car deregistration is not always respected.

Further objectives of the regulation is the optimization of product design and environmentally friendly recovery. It is discussed if these targets are reached because the statistics of end-of-life vehicles have a lack of data, and do not include data on product design. Furthermore the export of old vehicles is problematic. On the one hand a further use of vehicles can be seen positively from a resource perspective. On the other hand the responsibility for recovery and recycling ends at the EU borders, if the countries have no own regulation on End-of-life-vehicles. If an ELV is exported to non-EU countries, which have no regulation on ELV, the legal obligation does not exist anymore, so there are temptations to export a high share of ELV in order to by-pass costly take-back. In this context requirements for exported vehicles are discussed, regarding their usability or CO₂-emissions.⁷³

⁷³ SRU (2008): Umweltgutachten 2008. Berlin. See URL http://www.umweltrat.de/SharedDocs/Downloads/DE/01_Umweltgutachten/2008_Umweltgutachten_BT.D.pdf?__blob=publicationFile, accessed 09/09/2011.