

Chapter 6

Reducing and Improving Management of Waste

Reducing waste generation and increasing recycling rates have been considered as central objectives of many sustainable development strategies. This chapter provides data on performance towards these goals and on the associated costs, notably for recycling programmes. It examines which waste disposal options enable to prevent negative effects on the environment at least cost and then presents recommendations drawn from peer reviews on ways to increase the efficiency of strategies to reduce waste-related environmental degradation.

1. Introduction

This chapter provides a synthesis of a series of nine country studies on municipal waste management that have been included in the OECD economic surveys under the heading of sustainable development.¹ The main issues addressed were how to reduce the environmental cost of waste generation and treatment without imposing a high economic cost on society. The reviews did not cover industrial and toxic waste. The discussion below is based on the country reviews but also makes use of information with wider country coverage contained in the accompanying tables.

2. Performance

Since 1990, municipal waste generation has continued to grow in all OECD countries, but it has risen slower than private consumption in about half of them (Table 6.1). Korea, and, to a lesser extent, Poland and Ireland have been notably successful in decoupling waste generation from consumption growth, while Spain, Denmark, Italy and Sweden have recorded significant increases in waste generation per unit of private consumption. Relative to the level of consumption, waste generation around the close of the 1990s was relatively low in Japan and the United States, and relatively high in Turkey and Hungary.

The continued expansion of municipal waste generation was accompanied by a notable shift in treatment practices in many countries, recycling and composting replacing landfilling and incineration. Indeed, recycling and composting have become the dominant means to treat such waste in six European countries (Austria, Belgium, Denmark, Germany, Netherlands and Sweden) and recycling rates have become very high for some materials (Table 6.2). In many of the other countries, although the share of municipal waste going to landfills has fallen over this period, this traditional mode remains the most common means to dispose of waste. Incineration is the most important treatment stream in Denmark, Luxembourg and Japan.

3. Policies

The country reviews generally concluded that neither the mix of waste treatment methods nor policies within individual disposal streams were efficient in reducing the environmental cost of waste at a low cost. The reviews accordingly recommended corrective policy actions, recognising at the same time that countries might want to pursue particular waste policies

Table 6.1. Performance indicators: municipal waste

Period		Waste generation				Initial treatment for waste disposal					Waste disposal costs	
		Relative to population	Relative to population	Relative to consumption	Relative to consumption	Year	Total	Recycling	Composting	Incineration	Landfill	Per cent of GDP
		Kg per capita latest available year	Annual growth, per cent	Kg per USD 1 000, 1995 prices and PPPs	Annual growth, per cent		1 000 tonnes	Per cent				
Australia		..	..	..	..	..	..	..	..	..	0.10 ³	
Austria	1990-1999	563	3.4	46.1	1.4	1999	3 096	37	17	16	31	1.47
Belgium	1990-2000	545	2.9	46.3	1.2	1999	5 473	40	16	27	17	0.83
Canada ¹	1992-1998	328	0.7	25.1	-1.0	1998	9 926	30	11	..	..	0.19 ³
Czech Republic	1996-2000	334	1.9	54.2	0.7	2000	3 434	..	..	..	..	..
Denmark	1995-2000	664	3.3	61.4	2.2	2000	3 546	22	16	52	10	1.08
Finland	1994-1999	465	2.4	49.0	-1.4	1999	2 400	32	0 ²	8	60	0.11
France	1989-1999	524	1.2	46.4	0.2	1999	30 744	10	8	33	48	0.57
Germany	1993-1998	538	0.1	45.1	-0.9	1998	44 094	34	7	21	37	0.85 ⁴
Greece	1990-2001	428	3.4	44.8	1.6	1997	3 900	8	0	0	91	0.38 ³
Hungary	1990-2000	445	-1.6	86.2	-2.2	2000	4 084	0	0	9	91	..
Iceland	1990-2000	704	0.8	52.4	-1.4	2000	192	9	2	9	81	0.26 ³
Ireland	1990-1998	555	0.6	53.0	-3.1	2000	2 302	8	1	0	91	0.10
Italy	1990-2000	507	3.7	39.9	2.1	1997	27 425	7	9	6	78	..
Japan	1990-1999	406	-0.1	34.6	-1.4	1999	51 446	13	0	78	9	0.07 ³
Korea	1990-2000	361	-6.6	50.3	-10.5	2000	16 950	41	0 ²	12	47	0.49
Luxembourg	1992-1999	642	1.8	38.7	0.8	1999	227	0	15	59	26	..
Mexico	1991-2000	316	2.5	63.5	1.3	2000	30 733	2	0	0	98	0.06 ³
Netherlands	1990-2000	609	2.0	53.3	-0.1	2000	9 691	23	24	41	13	0.58
New Zealand ¹	1990-1999	378	1.5	37.7	0.0	1999	1 450	0	0	0	100	..

Table 6.1. Performance indicators: municipal waste (cont.)

		Waste generation				Initial treatment for waste disposal					Waste disposal costs	
Period		Relative to population	Relative to population	Relative to consumption	Relative to consumption	Year	Total	Recycling	Composting	Incineration	Landfill	Waste disposal costs
		Kg per capita latest available year	Annual growth, per cent	Kg per USD 1 000, 1995 prices and PPPs	Annual growth, per cent		1 000 tonnes	Per cent				Per cent of GDP
Norway	1992-2000	613	2.1	50.8	-0.9	2000	2 755	22	9	15	55	0.26 ³
Poland	1990-2000	316	0.8	64.0	-3.8	2000	12 226	0	2	0	98	0.27
Portugal	1990-2000	443	4.0	51.3	1.2	2000	4 531	6	6	21	67	0.24
Slovakia	1993-2000	316	0.7	58.2	-2.9	2000	1 706	3	6	15	76	..
Spain ¹	1990-2000	518	4.8	51.9	2.6	1999	18 377	5	18	6	72	0.25
Sweden	1990-1998	452	2.4	47.5	2.1	1998	4 000	25	8	35	33	0.37 ³
Switzerland	1990-2000	652	0.7	41.8	0.2	2000	4 681	32	14	48	6	0.30 ³
Turkey	1989-1998	385	0.9	101.4	-2.0	1998	24 945	0	1	0	99	..
United Kingdom	1990-1999	567	2.0	44.8	-0.2	1999	33 200	9	2	8	81	0.40
United States	1990-1999	764	0.3	35.7	-1.9	1999	208 520	22	6	15	57	0.25
OECD average		523	0.5	41.9	-1.2		566 052	17	6	20	57	
EU average		530	1.6	45.9	0.5		193 005	17	9	18	55	

1. Data exclude non-household waste.

2. Included in recycling.

3. For this country no information about business sector costs is available. An estimate based on the average for countries without private specialised enterprises has been added. This estimated correction amounts to 0.03 per cent of GDP.

4. For Germany, no figure for the costs incurred by private specialised waste companies was available. An estimated figure of 0.19 per cent of GDP has been added, based on the cost of the Duales System and estimates of the quantity of non-sales packaging that is recycled.

Table 6.2. **Recycling rates for different categories of raw material**

	Glass packaging	Plastic	Aluminium packaging	Steel Packaging	Paper	Municipal waste
	2000	2000	1999	2001	2000	Recent year
Australia	40	11	67		47	n.a.
Austria	84	19	50	77	66	34
Belgium	87	16	70	88	52	40
Canada		3	63	80	46	30
Denmark	65	7	0	54	48	22
Finland	89	14	95	25	67	32
France	55	8	19	55	50	10
Germany	83	29	72	78	70	34
Greece	27	2	36		35	8
Ireland	35	6	16	66	10	8
Italy	40	11	42	44	37	7
Japan	78	3	73	85	59	13
Korea	67				60	41
Mexico	13				7	2
Netherlands	78	15	70	77	45	23
New Zealand	42				65	n.a.
Norway	85	15	82	56	68	22
Poland						0
Portugal	40	3	20	28	40	6
Slovak Republic						2
Spain	31	14	19	46	48	5
Sweden	86	9	90	71	63	25
Switzerland	91	7	90	70	63	32
Turkey	31				40	n.a.
United Kingdom	34	7	36	37	41	9
United States	23		54	58	42	22

Source: Paper: OECD; Glass: OECD; Steel; Association of European Producers of Steel for Packaging; Plastics: Association of Plastic Manufacturers in Europe; Aluminium: European Aluminium Association.

to attain other objectives. The recommendations are summarised in Table 6.3 and are discussed below.

3.1. Targets of waste management policy

The shifts in waste treatment since 1990 have taken place against the background quantitative targets established by governments. At the level of the European Union, this process resulted in the adoption of the 1999 Landfill Directive that specified upper limits on the percentage of biodegradable and inert municipal waste that could be sent to a landfill, and some EU member countries have established more demanding targets in this area. Earlier, the 1994 EU Packaging and Packaging Waste Directive set a minimum total

Table 6.3. **Recommendations on waste management in country surveys: a summary**

	Austria	Belgium	Denmark	Germany	Ireland	Korea	Spain	Sweden	Switzerland
Bring costs in line with benefits in different waste streams		X	X					X	
Base landfill taxes on the externality cost	X		X		X	X			
Better management of landfills							X		
Place a cap on recycling costs	X	X		X		X	X	X	X
Avoid ambitious recycling targets					X				
Lower costs of waste management									
Through increased competition		X		X					X
Through benchmarking		X							
Through trading across municipalities								X	
No discrimination against one-way beverage containers				X					
Establish appropriate waste disposal charges						X		X	X

recycling rate, and recovery and recycling rates for all packaging materials, to be attained in 2001 (Table 6.4). Outside the EU, quantitative targets have been set in Japan and Korea and nearly all US states have indicative recycling targets. In contrast to other countries with high recycling rates, Switzerland does not generally set specific quantitative targets for recycling.

Looking forward, a planned new EU packaging directive will give additional impetus to recycling in member countries. It increases the minimum recycling rate for packaging material in general, to be attained in 2008, to well beyond past recycling targets and how they have been implemented at the national level. It also specifies recycling objectives for five specific materials: glass, paper, plastics, steel and aluminium that are more ambitious than current practice.

3.2. Instruments to discourage landfilling and incineration

To attain the objective of reducing the amount of waste going to landfills and incineration, countries have used a mixture of regulations and taxes. Most member countries have established regulations that ensure the environmental damage from landfills is reduced by capturing landfill gas and by cleaning water that seeps from decomposing waste, and this has raised the private cost of such disposal. The cost of incineration has also increased with tighter regulations on the technology used for burning waste and monitoring emissions. Other types

Table 6.4. Recycling targets in Europe

	All packaging		Any material Minimum recycling rate	Specific materials (recycling rates)					
	Recovery rate	Recycling rate		Glass	Paper	Plastics	Steel	Aluminium	Composite
European Union									
EC Directive: objectives for 2001	50-65	25-45	15						
EU Environment Ministers and European Parliament: objectives for 2008	60	55-80		60	60	22.5		50	
National implementation									
Portugal	50	25	15						
UK	56	50	18						
Spain	50-65	25-45	15						
France	50-65	25-45	15						
Finland	61	42	15	48	53	45	25		
Belgium	80	50	15						
Denmark			15	65	55	15	15		
Austria	50	25	15	93	90	40	95		40
Netherlands	65	65	15	85	35	80			
Sweden			15	70	40 to 65	30	70	70	
Germany	65	45		75	70	60	70	60	60
Ireland	50-65	25-45	15	45	31	10	5	25	
Italy	50-65	25-45	15						
Luxembourg	55	45	15						
Greece	55	45	15						

of regulations used to discourage traditional modes of disposal include the introduction of a total ban on the landfilling of biodegradable waste in several countries in Europe (Austria, Belgium,² Denmark, Finland, France, Netherlands, Sweden³ and Switzerland) (Table 6.5). In these countries, such waste has to be treated before final disposal. Moreover, in Denmark and Sweden (as from 2005), the landfilling of combustible waste is prohibited.

In an effort to divert waste from landfill, some countries have introduced landfill taxes. The taxes vary significantly across countries and may increase the private cost of landfills from just under 20 per cent (in France) to close to, or more than, doubling such costs (Belgium, Denmark and the Netherlands). In the latter cases the tax exceeds the standard estimated externality costs associated with such disposal (Box 6.1) by a large margin.⁴ Two EU countries, the United Kingdom (not reviewed by the EDRC) and Ireland, initially based landfill taxes on estimated externalities but subsequently raised the tax substantially in order to divert waste from such form of disposal. In the United Kingdom, this policy did not achieve the objectives called for by the EU directive, prompting the government to introduce a tradeable quota system for landfill waste as from 2004. This instrument should ensure that the target is met at the lowest cost.

The private cost of incineration has also risen with the introduction of taxes on incineration. Such taxes are, however, confined to three countries in the OECD: Belgium,⁵ Denmark and Norway, and may raise the private cost of

Table 6.5. **Waste disposal policy instruments**

	Ban on landfilling of biodegradable municipal waste	Tradeable permits for landfill tonnage	Landfill tax	Incineration tax	Beverage container deposits
			Euro per tonne	Euro per tonne	Euro cent per container
Austria	Yes	No	44	0	40
Belgium (Flanders)	Yes	No	52	13	12 to 24
Canada	No	No	0	0	None
Denmark	Yes	No	50	38	27 to 98
Finland	Yes	No	15	0	11 to 45
France	Yes	No	9	0	None
Germany	No	No	0	0	25
Ireland	No	No	19	0	None
Korea	Yes	No	0	0	None
Netherlands	Yes	No	65	0	16 to 72
Norway	No	No	0	18	16 to 40
Sweden	No	No	31	0	7 to 56
Switzerland	Yes	No	0	0	16 to 40
United Kingdom	No	Yes	19	0	None
United States (10 states)	No	No	0	0	4

Box 6.1. The externality costs of landfills and incineration

Both landfilling and incineration can have damaging side effects for the environment. The main negative externalities connected with landfills comes from gas emissions (notably methane), the seepage of contaminants from decomposing waste into the water system and reduced amenity value of the areas surrounding landfill sites. Similarly, incineration is associated with the emission of toxic gases (principally dioxin) and loss of amenity value. As noted in the country reviews, these traditional modes of waste disposal have at times resulted in large costs on society in terms of contaminated sites (Austria and Spain) and health problems (Spain).

However, a number of studies* have found that, as the result of increased regulation over the past decade, a significant proportion of externalities connected with landfills and incineration have been internalised. The lining of landfills has arrested seepage of contaminated water into the ground, and the capture of the emitted gas has stopped such harmful side effects. Similarly, dioxin emissions from incineration have been significantly reduced by burning techniques and filters. As a result the costs of the remaining externalities from modern landfill and incineration facilities are now reckoned to be quite small even if estimates are still marked by some uncertainty. Studies from the UK and Norway put the cost of these externalities for landfills at between EUR 7 and 20 per tonne, respectively (Davis and Doble, 2004; Martinsen and Vassnes, 2004). As to lost amenity values, a large study of house prices in the United Kingdom found that this externality of a landfill site was equivalent to slightly less than EUR 3 per tonne of waste per year. As the private costs of landfilling appear to be of the order of EUR 50 per tonne, the overall social cost of landfill is between EUR 60 and 80 per tonne of waste. This appears to be well below the social cost of incineration where a Norwegian study put externalities at EUR 40 per tonne of waste, while private costs are around EUR 80 per tonne net of electricity and heat that is sold (Martinsen and Vassnes, 2004).

Despite the moderate externality costs linked to modern landfill and incineration facilities, there is often significant local opposition to the establishment of new sites for such waste treatment purposes. For example, the review of Ireland noted the difficulties for the authorities to find sites for planned facilities and the review of Korea reported the public opposition to new waste treatment sites. This could reflect that the lower externality cost has not yet been recognised by the public at large. It could also mirror that the amenity costs are higher than estimated by the economic effects of these sites due to the importance of non-economic factors.

* ECON (2001), COWI (2000).

incineration by 15 to 50 per cent. Unlike the tax on landfills, the taxes on incineration are probably lower than the cost of the associated externality.

In view of the discrepancy between landfill taxes and the externality costs, the country reviews of Austria, Denmark, Ireland and Korea recommended to bring taxes in line with the environmental damage caused by landfills. More generally, the surveys of Belgium and Sweden argued that costs should be aligned with benefits in all waste treatment streams. It was also recommended to relax the restrictions on waste disposal by landfilling in Spain, where it was suggested that compostable waste should be permitted if landfills had methane recovery, and in Sweden, where the prohibition of combustible waste was called into question. Spain was also encouraged to bring non-conforming landfills into line with minimum standards or close such sites.

3.3. Instruments to encourage recycling

A wide range of different policies have been introduced to reach recycling targets in addition to policies diverting waste from landfills and incineration. The principal approach in most countries has been to establish a system of extended producer responsibility and mandate packaging producers to recycle their products directly or indirectly. Alternatively, countries have sought to impose taxes on packaging material in order to attain recycling targets. For beverage containers in particular, many countries have also sought to stimulate recycling and reuse with mandatory deposit systems.

3.3.1. Mandated recycling and recycling organisations

In countries that have adopted relatively low recycling targets (e.g. Ireland, Portugal and Spain), the basic system is that business users of packaging (retailers, manufacturers and producers) are given the responsibility to recycle their own waste.⁶ However, this liability can be transferred to a collective organisation that subsequently takes responsibility for ensuring that packaging waste is recycled in exchange for a cost-based fee that differs according to the packaging material (a “green-dot” system). In other countries, the obligation of businesses is extended to include taking back household packaging, but once again the obligation can be transferred to a central organisation in exchange for a fee. In turn this requires obligatory sorting of refuse by households. Costs are particularly high in countries (such as Germany and Austria) where the central recycling organisation collects sorted waste. They tend to be relatively low when municipalities are responsible for collecting household packaging waste, with recycling organisation reimbursing them for the cost incurred.

The unit cost of recycling is very high relative to that for alternative means of waste disposal in some countries (Table 6.6). Thus, the average recycling fee per tonne of materials in Austria, Germany and Japan is several

Table 6.6. **Recycling of packaging material: fees and operational characteristics**

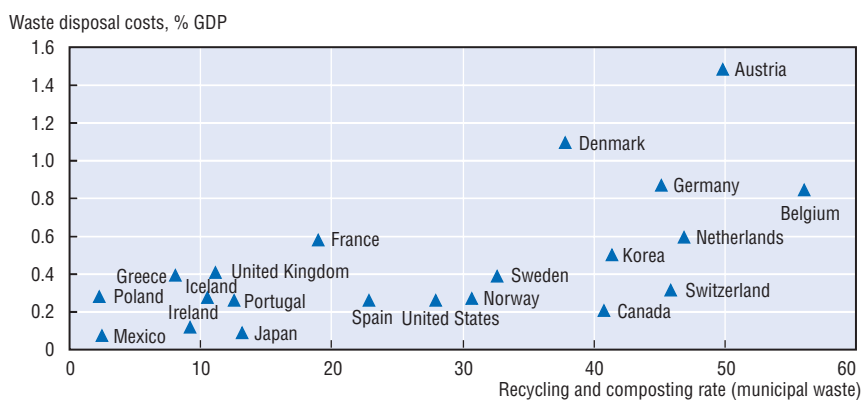
	Fees by material					All materials	Characteristics of recycling operations			
	Glass	Plastic	Aluminium	Steel	Cardboard	Weighted average	Recycling company collects	Commercial and industrial packaging covered	Household packaging covered	Kerbside collection
	Euro per tonne					Euro per tonne				
Producer recycling fee										
Austria	87	1 097	494	399	203	238	Yes	Yes	Yes	Yes
Belgium	19	348	171	58	38	50	No	No	Yes	Yes
Finland	10	20	20	20	3	4	No	Yes	Yes	No
France	2	116	32	14	74	56	No	No	Yes	Yes
Germany	81	1 504	975	387	191	254	Yes	No	Yes	Yes
Luxembourg	17	286	143	41	31	44	No	No	Yes	Yes
Portugal	1	40	37	17	10	11	No	Yes	Yes	No
Spain	7	118	54	31	15	16	No	No	Yes	No
Sweden	86	166	166	166	61	73	No	No	Yes	No
Japan	47	592			331	298				
Ireland	6	58	57	63	14	25	No	No	No	No
<i>Memorandum items:</i>										
Traded recycling allowance										
United Kingdom	17	8	18	14	9	10		Yes	No	No
Packaging tax										
Denmark	250	1 000	4 440	1 230	130	515				

times higher than the estimated social costs of landfilling of EUR 60-80 per tonne of waste or incineration of EUR 120 per tonne of waste. The cost differential is even more striking for some specific materials. For example, recycling fees for plastic and aluminium in Germany are more than ten and eight times, respectively, the cost associated with alternative disposal methods. The unit cost of recycling is even higher in countries where households are mandated to sort their refuse. For example, one Swedish study estimated the cost to households of the time spent for separation and transport at EUR 180 per tonne (Radetzki, 1999).

The high unit costs of recycling could be related to inefficient organisation of such activities, but is also likely to reflect intrinsic high marginal costs of recycling. As noted in the review of Germany, the monopoly granted to one organisation to administer the recycling system is unlikely to result in efficient outcomes. Greater competition in waste management, along the lines in Ireland, where packaging producers can shop around for the lowest-cost recycling option, could help to bring costs down. Also, the country survey of Belgium drew attention to the vast differences in unit costs of waste treatment and recycling across different municipalities within the country and the benefits that could be obtained by attaining country-wide the cost levels in the most efficient local authorities. However, the positive correlation between recycling activity and unit costs of recycling suggest that recycling activity is subject to high marginal costs. The Belgian experience also suggests that raising the recycling rate by 50 per cent will double recycling costs. In Germany, one estimate put the average marginal cost of recycling for the principal waste streams at over EUR 2 000 per tonne (Staudt and Schroll, 1999), which is more than ten times higher than the social costs of landfill and incineration.

The combination of relatively high unit costs of recycling and high recycling activity has meant high outlays in macroeconomic terms: the countries with the highest recycling rates have spent more than half a percentage more of GDP on waste management than other countries (Figure 6.1). With recycling targets becoming more ambitious in many countries that currently have low recycling rates, the cost of waste management is likely to increase appreciably in the coming years.

Against the background of the high costs, the country reviews noted that it would seem to be difficult to justify high recycling rates on economic grounds. An economic rationale advanced for recycling at a higher cost than in alternative waste treatment options after pricing the associated externalities is that recycled material provides a substitute for the extra production of the raw material and so reduces the adverse environmental impact of the production of this material. However, the primary externalities generated by the production of raw materials relate to the emission of

Figure 6.1. **Waste disposal costs and recycling rates**

greenhouse gases, small particles and other polluting gases. All of these emissions are, or will be, regulated or subject to taxes and emission permits (see Annexes 3 and 4), implying that the externality is already incorporated into prices to some extent. To the extent that externality costs are not fully covered, the increasing of charges or tightening of quantitative limits on emissions represents the first best solution to reducing pollution from the production of the raw materials used in packaging. Indeed, a policy that internalise pollution costs will favour recycling, as the price of recycled material should increase relative raises the price of recycled materials. However, studies from the EC and the UK suggest that internalising GHG costs would only have a small impact on the economics of recycling in general (AEA Technology, 2001 and Davis et al., 2004).

In the light of the high costs and low environmental benefits, the EDRC recommended in all the nine country reviews on waste recommended that recycling costs should be capped or that recycling should be scaled back. Ireland was warned against adopting ambitious recycling targets, while for the other countries (Austria, Belgium, Denmark, Germany, Korea, Spain, Sweden and Switzerland) it was recommended to put a ceiling on recycling costs, typically at the level of the costs (including taxes and fees to account for negative externalities) of incineration or landfill. However, in some reviews (including those for Austria and Belgium) it was recognised that countries could pursue ambitious recycling objectives in their own right. A few countries were also encouraged to take measures to lower unit costs of recycling through increased competition in waste treatment (Germany), the benchmarking of recycling costs in municipalities on the least costly one (Belgium) and greater trade in recycling services across municipalities (Sweden).

3.3.2. Taxes on packaging material

A few countries have introduced taxes on packaging materials in order to encourage the recycling of such waste, using the proceeds to finance the recycling of such products. However, Finland and Sweden abolished these taxes when packaging levies were introduced. Instead of establishing a green-dot system to stimulate recycling, Denmark has continued with its packaging tax, with particularly high rates on plastics and aluminium. The calculations that lay behind the establishment of this Danish tax were not based on a monetisation of environmental externalities and this would appear to have led to an over-estimate of the environmental damages. For example, an EC study⁷ put the externalities of aluminium at about EUR 1 000 per tonne (mainly due to particulate and heavy metal emissions), equivalent to around EUR 0.01 per aluminium can. However, the Danish tax is set at EUR 0.06 per can. Other countries have put a tax on specific packaging materials to discourage their use rather than increasing recycling. For example, Ireland introduced a Plastic Shopping Bag Levy to reduce litter that resulted in a 95 per cent reduction in the use of such sacks.

3.3.3. Mandatory deposit systems for beverage containers

A number of governments have introduced mandatory deposit systems for beverage containers both as a way to increase recycling and to increase reuse. Deposit rates vary considerably between countries (Table 6.3), as well as between the types of beverage containers. The incentives for users to bring back such containers is particularly high in Denmark and the Netherlands, while the container deposit is low in the ten US states that have a mandatory system. In several countries (including Denmark, Finland, Germany, the Netherlands and part of Canada), various restrictions have been placed on the use of one-way containers to encourage reuse.

Mandatory deposit systems have proved to be an expensive form to encourage recycling. The systems are expensive to administer, costing at least 2 cents per container across the United States and Europe. For aluminium cans (the most valuable form of used containers), such costs are higher than the scrap value of the cans when delivered in bulk to a recycling centre. For countries such as Denmark and Germany that already have high recycling rates for aluminium, the schemes represent a high administrative cost for very little recycling gains. Indeed in the ten US states that have mandatory deposits, the extra net cost of administering the programmes relative to states where there was voluntary recycling was estimated at almost USD 900 per tonne. In Germany, the government introduced mandatory deposits on beverage containers in 2003, but the scheme has proved difficult to operate, as retailers are reluctant to assume the administrative costs and have stopped

selling carbonated drinks in cans and one-way bottles (un-carbonated drinks sold in cans are not subject to the deposit regulation).⁸

The prime objective of mandatory deposit schemes in some countries is to reduce litter rather than to encourage recycling and reuse. Thus, in the Netherlands, the advance deposit system was expected to reduce the number of littered drink containers by 20 per cent, equivalent to 2 per cent of overall litter, at a cost of about 3 euro cents per can. Apart from the high cost of such systems, their effectiveness in reducing litter is uncertain. For example, in the Netherlands no estimates were made of the cost of alternative clean-up strategies when the deposit scheme was initiated.

3.4. Instruments to discourage municipal waste generation

With the aim of reducing the generation of municipal waste, the practice of weight or volume charging has gained ground in recent years. In the countries reviewed for this exercise, it was used in parts of Belgium, Denmark and Switzerland, while it will be introduced in Ireland in 2005. In the United States, quantity-related waste charges were paid by about 10 per cent of the population in 1998. In Korea, the simultaneous introduction of volume-related charging and free collection for selected recyclable materials led to a doubling of recycling, with landfilling being halved. The review of Sweden recommended that consideration should be given to introducing quantity-based pricing of waste, and the Korean authorities were encouraged to increase cost-recovery in waste. However, concerns that high charges were resulting in illegal disposal of waste, especially backyard burning, led to a recommendation in the review of Switzerland to reduce volume-based waste charges.

Notes

1. The countries covered were Austria, Belgium, Denmark, Germany, Ireland, Korea, Spain, Sweden and Switzerland.
2. Refers to the region of Flanders.
3. As from 2005.
4. The high tax in Austria was officially estimated to be close to the externality costs, but the latter was based on exceptionally high assumed costs of greenhouse gas emissions from landfills and on risks of contamination caused by, for example, leaky liners.
5. In the region of Flanders.
6. One country not surveyed with low targets (United Kingdom) has a markedly different system in which there is a market in recycling certificates, with each business responsible for delivering an appropriate quantity of certificates rather than actual ensuring its waste is recycled.
7. RDC PIRA (2003).

8. The scheme forces consumers to return the containers to the same shop where they were bought and to provide a receipt as proof of purchase. By October 2003, 80 per cent of deposits were unclaimed, amounting to unclaimed balance of EUR 450 million.

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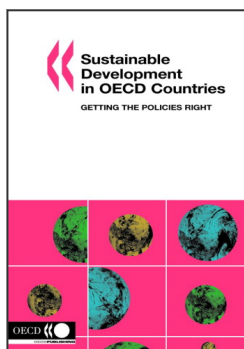
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