

The road from landfilling to recycling: common destination, different routes



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Summary

Achieving effective policy outcomes: the importance of tailoring waste management policies to national conditions

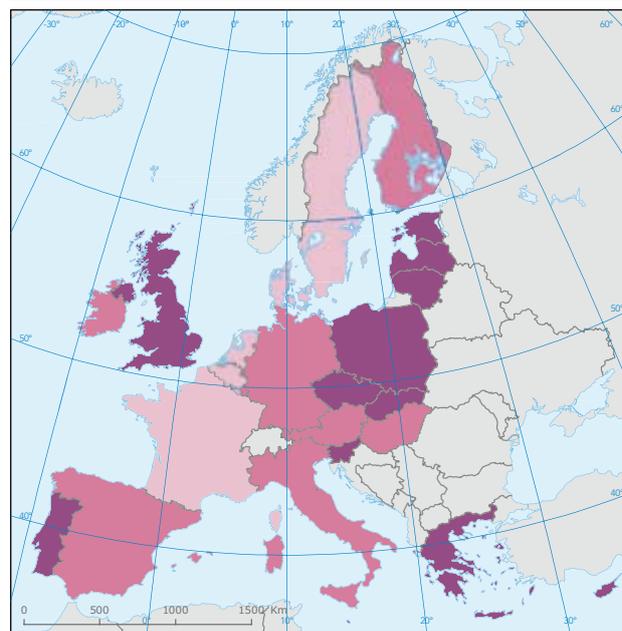
Each country's waste generation profile varies according to numerous factors including economic growth, population density and consumer behaviour. Waste management choices depend on the existing waste management facilities, infrastructure and governance structures. EU waste policy is instrumental for determining the potential outcomes to be achieved, but country-level policies determine the actual outcome. To gain insights into whether a strategic shift in broader waste management has occurred, the EEA is analysing the approaches and combinations of policy instruments that countries are taking in the management of their municipal waste, particularly in the context of the Landfill Directive.

Country factsheets on waste policies and trends across the EU-25: a useful 'one-stop-shop' for information

The EEA and its Topic Centre on Resource and Waste Management has carried out a survey of municipal waste policies and trends across the EU-25, and has consolidated the results into one easily-referenced source: a set of 25 country factsheets, freely available at <http://waste.eionet.europa.eu/etcwmmf/publications/factsheet>. The factsheets contain information about:

- national legislative frameworks on waste;
- national policies, implemented or planned, to shift waste management practices in a less environmentally harmful direction according to the waste hierarchy;
- data on waste generation and management;
- list of tools and instruments, implemented or planned at national or regional level that aim to manage municipal waste and used tyres according to the waste hierarchy.

Three country groupings defined by diversion strategy



Three country groupings defined by diversion strategy

- 1: incineration > 25 % and material recovery > 25 %
- 2: incineration < 25 % and material recovery > 25 %
- 3: incineration < 25 % and material recovery < 25 %
- Outside data coverage

Patterns in approaches to waste management: the emergence of three country groupings

The EEA's country factsheets show that broadly speaking countries can be categorised under three waste management 'groupings', according to the strategies for diversion of municipal waste away from landfill and the relative shares of landfilling, material recovery (mainly recycling and composting) and incineration. The first grouping comprises countries which maintain high levels of both material recovery and incineration, and which have relatively low landfill levels. The second grouping brings together countries with high material recovery rates and medium incineration levels and where there is a medium dependence on landfill. The third grouping contains those countries whose material recovery and incineration levels are both low and whose dependence on landfill is relatively high.

Introduction



There is an important body of EU policy on waste which influences policy actions in the Member States. Increasingly, policy makers — not least the European Parliament — and the public want to know the extent of this influence and its effects. For example, do policy actions in Member States deal effectively with the problems for which the EU policy was designed? If not, is this because the EU policy is flawed or are Member States' policy actions inappropriate? Does it stem from a lack of will to make what has been put in place work? Or are there other reasons?

It is increasingly important to provide answers to these questions because waste volumes in the EU are growing, driven by changing production and

consumption patterns. It is also important because there is a growing interest in sharing best practice and exchanging national-level experience across Europe, with the common goal of achieving more cost-effective solutions to the various problems being faced.

This brochure is a first step by the EEA. It informs discussions on the effects and effectiveness of selected waste policies in Europe by providing a picture of the different approaches taken by countries to tackling growing waste volumes, focusing in particular on municipal waste, and by comparing these to the trends we observe in waste generation and treatment.

Diversion of municipal waste from landfill: a new EEA study

The EEA has undertaken a number of studies on the effects and effectiveness of selected environmental policies in the EU. The approach of these studies — detailed examination of policy actions in place at country level, investigation of the institutional and policy context, elucidation of features that work well — has proved to be a useful one. The Agency's work in this area has underlined an important lesson: for environment policy to deliver effective results, governance is as important as policy design (EEA Reports 2/2005, 3/2005, 1/2006). Building on this work, the EEA is currently evaluating national policies implemented in the context of the existing EU waste policy framework.

The objective of the study is to reach conclusions on whether, and how, this EU policy framework acts as a driver for strategic change in waste management at the national level, with a particular focus on municipal waste.

The vision to bring about strategic change to improve waste management, by choosing policy instruments to encourage more of what works

well and to discourage what's unsustainable, is essential. Drafting national policies in response to the 1999 EU Landfill Directive provided an important opportunity to put such thinking into practice. But has a strategic shift occurred? Have countries and regions succeeded in putting in place systems tailored to reduce waste and increase recycling? With its new study, the EEA seeks insights into these and other questions.

The aim of the evaluation is to assess national waste management policies across the EU in the context of the Landfill Directive and other relevant EU waste policies, and to evaluate the results of these policies in diverting municipal waste from landfill. The study's first step has been to develop the country factsheets, which provide the basis for in-depth evaluation of waste management policy measures in selected countries and regions. The EEA aims to update these factsheets to ensure that they continue to provide a valuable up-to-date source of information; updating will include the addition of Romania and Bulgaria to cover the full EU-27.



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Europe's waste policies: powerful and far-reaching?

As confirmed in the Sixth Environment Action Programme, waste management is one of the key priorities of EU environmental policy and the framework in this area has been progressively put in place since the 1970s. However, as the Commission has made clear, this framework 'is only the backbone of waste management practice. It necessarily needs complementary action by Member States and local authorities' (CEC, 2003). The amended Waste Framework Directive, final adoption of which is expected by the end of 2009, will be an important step towards further coordinating efforts in this area. Nevertheless, most of the decisions on how to realise agreed objectives will continue to be taken at national, regional or local level within each Member State. This allows each Member State to tailor policies to its own particular circumstances: its geography, governance, geology, public opinion and the existing waste management facilities and infrastructure.

Current EU waste policy is based on a concept known as the waste hierarchy. This means that, ideally, waste generation should be prevented or reduced, and that which is generated should be recovered by means of re-use, recycling and other recovery operations, thus reducing disposal operations. This hierarchy is likely to be strengthened by the amended Waste Framework

Directive which is currently under revision, as well as by the Thematic Strategy on the Prevention and Recycling of Waste (CEC, 2005). The waste hierarchy is an environmental concept. Taking into account cost-effectiveness criteria may lead to different implementations of this concept in different countries, when working towards optimal waste management strategies.

In municipal waste management, landfilling of untreated waste is generally the worst option for the environment because of its emissions of methane, its long-term emissions to soils and groundwater as well as the loss of resources it entails. The position of waste incineration with energy recovery in the hierarchy is a subject of intense debate under the process for the review of the Waste Framework Directive. However, it is clear that its position in the hierarchy is more favourable if high energy recovery rates are in place. With regard to emissions, according to legislation strict emissions controls must be met by all countries in any case.

One of the most ambitious and important waste policies in the EU is the Landfill Directive (Directive 1999/31/EC on Landfill of Waste), which aims to prevent or reduce as far as possible negative effects on the environment from the landfilling of waste (Box 1).

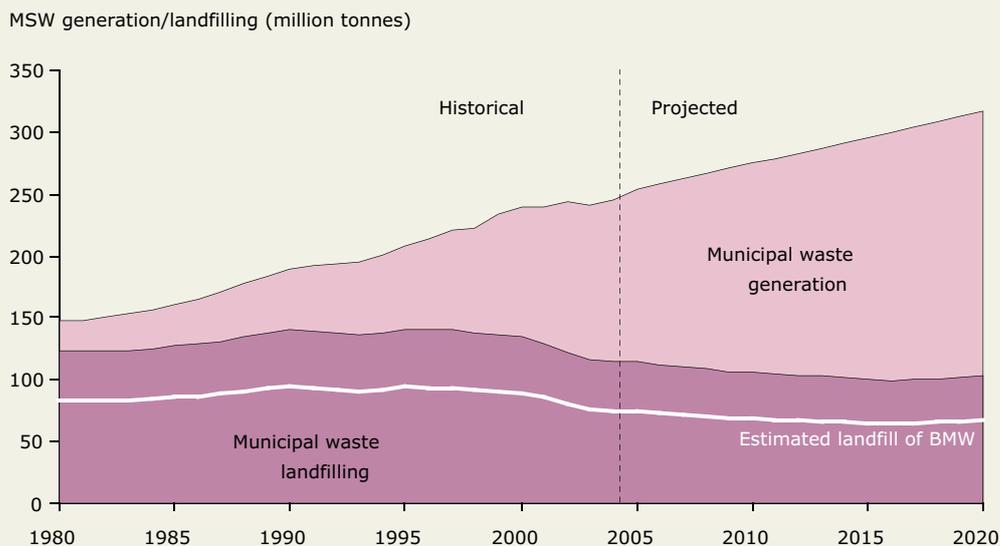
Box 1 The Landfill Directive: a challenge for future European waste policy

The Landfill Directive pursues two approaches: firstly to introduce stringent technical requirements for landfills; and secondly, to divert biodegradable municipal waste (BMW) from landfills by setting targets for the landfill of BMW in 2006, 2009 and 2016 (see also Figure 6). Even more ambitious targets for the post-2016 period have recently been proposed by the European Parliament.

The targets are based on the quantity generated in 1995, and the main implication of this approach is that there is an absolute limit placed on the quantity of biodegradable municipal waste (in tonnes) that can be landfilled by the specific target dates. Thus, if

BMW quantities continue to grow, increasing quantities will need to be diverted from landfill. The amount of municipal waste in the EU-25 is projected to grow by 25 percent between 2005 and 2020 (Figure 1). If the share of biodegradable waste in municipal waste remains constant, the amount of BMW will also grow by 25 percent. It will therefore be a big challenge for EU Member States to meet the targets, and based on current policies it is estimated that the EU-25 will not achieve them. Thus, more efforts are required if targets are to be met. One option is policies to promote waste prevention, but the effects of current waste prevention policies are not yet evident in the available data.

Figure 1 Projected generation and landfilling of municipal waste in the EU-25



Note: Figures from 1980–2004 are data from Eurostat. Figures from 2005–2020 are projections.

Source: ETC/RWM (2007).

Patterns in national approaches to municipal waste management: insights from the factsheets

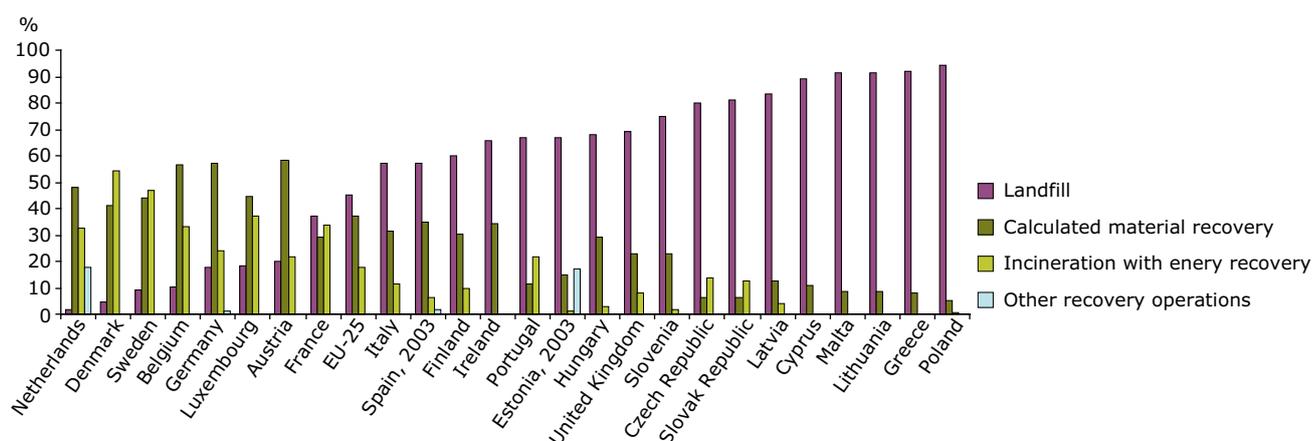
Overall, landfilling is still the predominant treatment option for the EU's municipal waste. In 2004, about 45 percent of the total municipal waste was landfilled while 18 percent was incinerated. However, there are significant differences in how dependent countries are on landfilling. Figure 2 clearly shows that several countries — the Netherlands, Denmark, Sweden and Belgium — have already arrived at very low landfilling rates. Those countries not only have a substantial level of incineration; they also have a high level of material recovery. In general, there seem to be two strategies for diverting municipal waste from landfill: to aim for high material recovery combined with incineration, or to aim for material recovery which includes recycling, composting and mechanical biological treatment (MBT). In 2002/2003 (the most recent years for which Eurostat data on recycling and composting are available), recycling and composting accounted for 18 percent and 10 percent respectively across Europe (EU-25

except Luxembourg, Cyprus, Lithuania, Malta and Finland for composting).

Increases in recycling were widely observed between 1998/1999 and 2002/2003: most countries increased recycling rates by at least 5 percentage points, and some — Latvia and Germany — exceeded this increase (Figure 3). Ireland has increased recycling from 8 percent to 17 percent since 1998. In the same period of time composting only increased slightly and in many countries it was stable (Figure 4). The increased recycling may have been driven by the implementation of the Packaging Waste Directive, whereas targets on landfilling of BMW in the Landfill Directive and national policies to meet those targets had not yet had an effect in 2002/2003.

Incineration is widely used in Denmark, Sweden, Luxembourg, the Netherlands, Belgium and France. In addition, some countries are extending incineration in order to comply with landfill bans

Figure 2 Use of landfilling, incineration and material recovery as treatment options in 2004



Note: To provide an estimate of material recovery, the above figure uses the residual of municipal waste generated minus municipal waste landfilled and incinerated (with minor adjustments). Thus defined, material recovery covers recycling, composting and other types of recovery operations (except incineration with energy recovery). The category 'other' covers sorting operations for the Netherlands, and differences between Eurostat data and national statistics for Germany, Spain and Estonia.

Source: Eurostat Structural Indicators on municipal waste generated, incinerated and landfilled, supplemented with national statistics: Statistisches Bundesamt (2006), Centraal Bureau voor de Statistiek (2007), Ministerio de Medio Ambiente (2005), EEIC (2005).

(Figure 5). Between 2000 and 2005, Austria and Sweden both increased their incineration by 12 percentage points to 23 percent and 50 percent

respectively. In comparison, Luxembourg, Slovakia, Hungary and Finland reduced their incineration by 1–7 percentage points.

Figure 3 Trends in recycling of municipal waste, latest available five years



Note: The trends in recycling of municipal waste are calculated as changes in the percent municipal waste recycled, preferably over five years, and represented in percentage points. The map is based on the most recent available data e.g. in Latvia the recycling rate has increased by 7 percentage points from 2 % in 2001 to 9 % in 2003.

1998 to 2002: DE, ES, FR, IE, IT, SE, SI, and UK
 1999 to 2003: AT, BE, CZ, DK, GR, NL, PL, and PT
 2000 to 2003: EE
 2001 to 2003: LV.

Source: Eurostat: Municipal waste recycled. Supplemented with national Austrian data (Umweltbundesamt).

Figure 4 Trends in composting of municipal waste, latest available five years

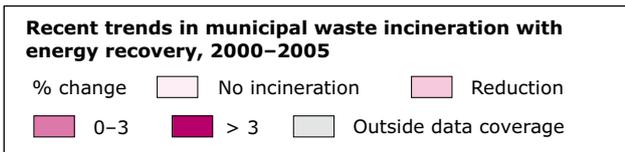
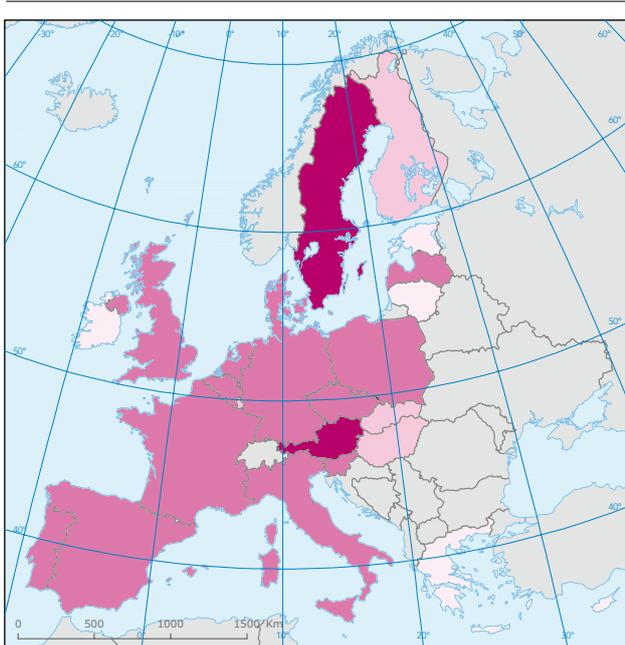


Note: The trends in composting of municipal waste are calculated as the changes in the percent municipal waste composted, preferably over five years, and represented in percentage points, based on the most recent available data, e.g. in Latvia the composting rate has increased by 3 percentage points from 2 % in 2001 to 5 % in 2003.

1998 to 2002: DE, FR, IE, SE, and SI
 1999 to 2003: AT, BE, DK, EE, GR, IT, NL, PL, and PT
 2001 to 2003: LV; 2000 to 2002: UK and ES.

Source: Eurostat: Municipal waste composted, except Italy where national data have been used (APAT, 2007).

Figure 5 Recent trends in municipal waste incineration with energy recovery, 2000–2005

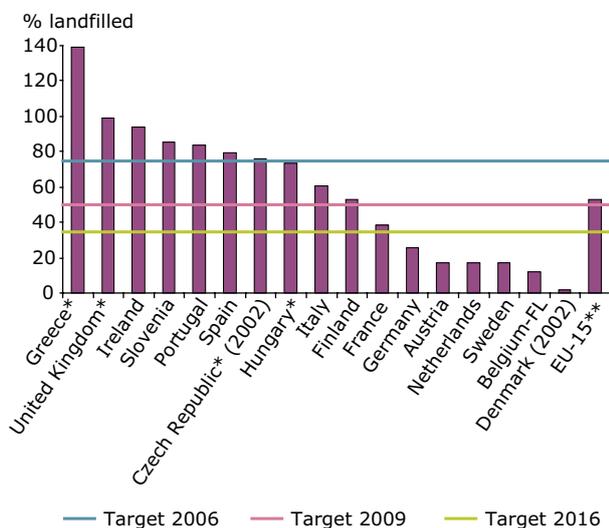


Austria, the Netherlands, Belgium, Sweden, Denmark and Germany have already met the Landfill Directive's BMW reduction target for 2016 (Figure 6). France has reached its target for 2009, and Italy and Finland have reached the target for 2006. Greece, the United Kingdom and the EU-10 have until 2010 to meet the first reduction target, because countries which landfilled more than 80 percent of the BMW generated in 1995 can obtain a 4-year derogation. Hungary has already met its first 2010 target. It is clear that rising waste generation is likely to make it even more difficult for some Member States to meet the targets.

Note: The trends in municipal waste incinerated are calculated as the changes in the percent municipal waste incinerated from 2000 to 2005, and represented in percentage points e.g. in Sweden the incineration rate has increased by 12 percentage points from 38 % in 2000 to 50 % in 2005.

Source: Eurostat Structural Indicators, Municipal waste incinerated.

Figure 6 Biodegradable Municipal Waste landfilled in 2003 compared to generation in 1995



Note: * Marks countries with different target years (2010, 2013, 2020). The figure shows BMW landfilled in 2003 as a percentage of BMW generation in 1995, which is the reference year for the reduction targets set in the Landfill Directive. Most EU-10 countries are not represented in the graph due to lack of recent data.
** Excluding Luxembourg and the Belgium regions Wallonia and Brussels.

Source: CEC, 2006.

The emergence of three country groupings

There is a lot of variation between countries in how waste is managed, and the optimal waste management strategy may differ due to varying national conditions. Member States can be categorised into three waste management 'groupings', according to their strategies for diversion of waste from landfill, current situation and recent trends:

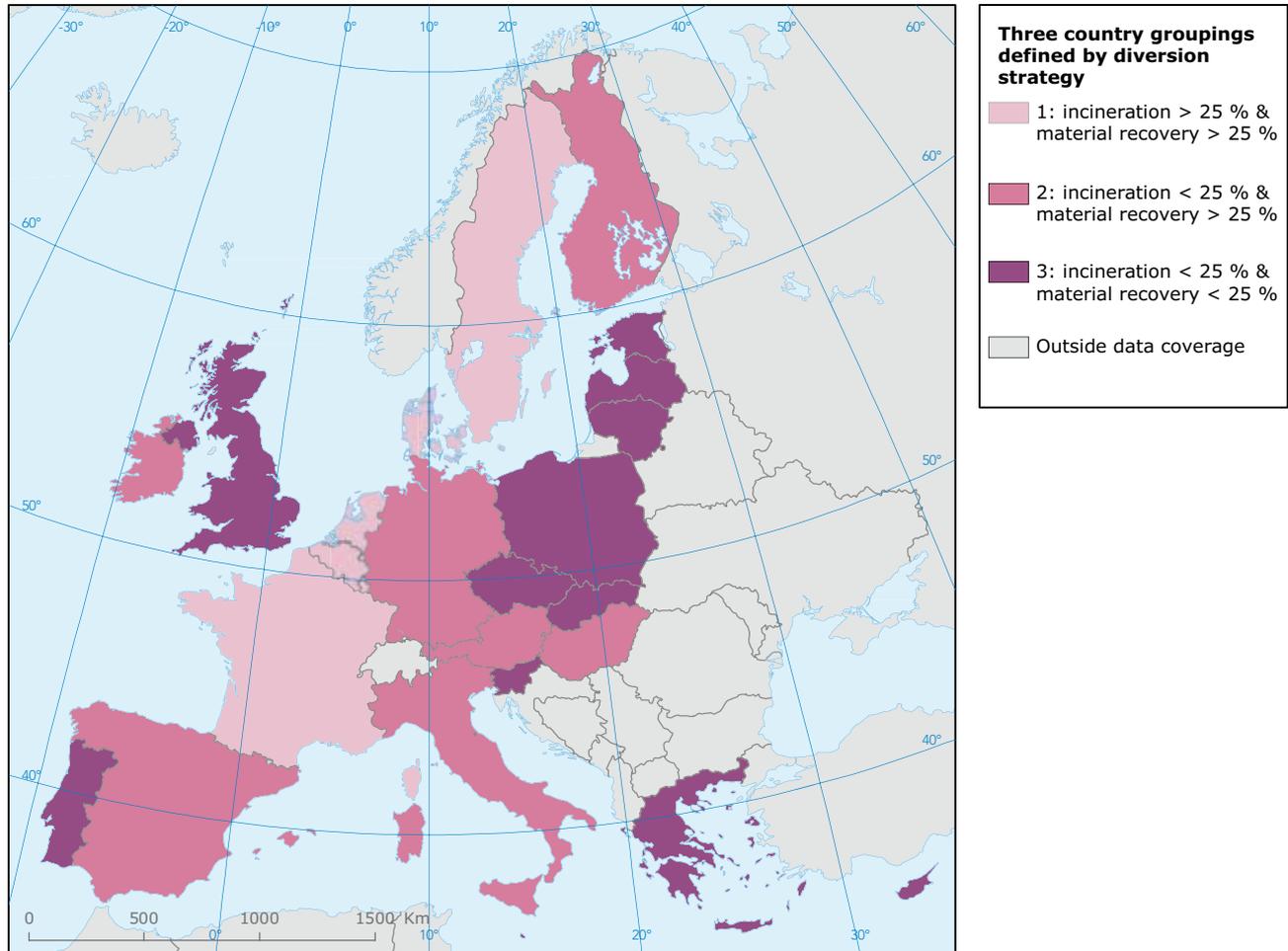
1. High material recovery and high incineration: Incineration and material recovery rates each represent more than 25 percent of municipal waste generated.

2. High material recovery, low incineration: Material recovery is more than 25 percent and incineration is under 25 percent of municipal waste.

3. Low material recovery and incineration: Neither incineration or material recovery rates exceed 25 percent of municipal waste generated.

The three country groupings are presented in Figure 7.

Figure 7 Three country groupings defined by diversion strategy



Countries with high material recovery and high incineration

Characteristics for this group of countries are that several policy instruments were introduced early, often before the Packaging Directive and the Landfill Directive. All countries except Luxembourg have introduced a landfill tax and a ban on landfill of biodegradable wastes. These bans strongly favour the use of incineration to manage the diverted biodegradable waste. The separate collection of organic waste and paper is also favoured.

Denmark and Sweden are the countries with the highest share of municipal waste incinerated. Whereas Denmark has a long history of incinerating municipal waste, Sweden has increased incineration

levels more recently. The policy instruments in place to divert waste away from landfills are similar in both countries, although they were generally implemented later in Sweden. Producer responsibility, on the other hand, has been much more extensively applied in Sweden.

The Netherlands and the Flanders region of Belgium employ similar instruments. In the Netherlands local authorities were obliged to introduce separate collection of organic household waste from 1994, and the same year Flanders set up financial support schemes for local authorities to meet per capita targets for the amount of managed residual waste.

Denmark: the development of incineration

Incineration of municipal waste has a long history in Denmark. The first waste incinerator was built in 1903 to supply the local hospital with energy. Much later, in 1993, it was decided that waste should be preferred to other fuels when producing heat as a by-product of electric power generation. Landfilling of waste suitable for incineration was banned in 1997. In 2005, waste incineration, producing heat and electricity, supplied 4 % of the total energy consumption in Denmark.

Table 1 Factsheet extract: policy instruments in countries with high material recovery and incineration rates

Country	Market based instruments			Administrative instruments				
	Landfill tax	Tax, other	Charge for collection of municipal waste	Deposit refund schemes	Landfill ban	Packaging collection systems	Separate collection of other municipal waste	Other
Belgium-Flanders	1990		x		2005	1990s/1994	1990s	
Belgium-Wallonia	x		x		2004-2010	x	2002-2003	
Denmark	1987	1978/1998: Packaging	x	1981	1997	Glass: 1990	2004	
France	1992		1993		2002	1992	1999	
Luxembourg			x				x	
Netherlands	1996		x		1996	1997	1994	1993/1994: Inventory of waste prevention projects. 2001: Information on waste prevention
Sweden	2000		x	1982/1991	2002	1994	1994	Local WMP. 1996/2002: Investment programmes

■ Early (before 2000)

■ Intermediate (2000-2003)

■ Recently (after 2003)

Note 1: The information is not exhaustive. In federal states and countries with a high degree of regional autonomy in particular, important instruments may be in place at regional level, even though they do not appear in the factsheets or in this table.

Note 2: Where instruments are known to exist and the year of introduction is unknown this is marked with x.

Note 3: Separate collection of other municipal waste is mainly, but not exclusively, paper, food and garden waste.

Source: The table is based on information which can be found in the factsheets.

Countries with high material recovery and low incineration

A general characteristic for this group of countries is that policy instruments were introduced after the adoption of the Packaging Directive in 1994 and the Landfill Directive in 1999. The German and Austrian packaging waste management systems were set up in the early 1990s and became drivers for the rest of Europe to follow and adopt the Packaging Directive. All countries except Spain have introduced landfill bans, and mechanical biological treatment has recently emerged as an alternative option to incineration in these countries.

Recent increases in incineration levels mean that Austria and Germany are about to enter the first group (material recovery and incinerating rates above 25 percent); a trend likely to be reinforced by landfill bans on biodegradable waste in both countries effective from 2004 and 2005 respectively. Composting and recycling levels have remained consistently high in both countries and

material recovery rates are the highest in the EU. In Germany the main material recovery operation is recycling, whereas for many years Austria has had by far the largest composting rates in Europe, with levels stabilising at around 40 percent since the late 1990s.

Italy and Spain are experiencing increases in recycling, composting and incineration levels. In both countries the development is encouraged by policy instruments targeted particularly at BMW recovery relying on a combination of composting, recycling and incineration to further divert BMW away from landfill. Ireland is the only country in this group not currently incinerating municipal waste. The Irish strategy for diverting municipal waste and BMW away from landfills is recycling and biological treatment, and the Irish National Strategy on Biodegradable Waste (DoEHLG, 2006) sets ambitious targets for biological treatment capacity to be developed by 2013.

Austria: the EU's highest material recovery rates

In Austria separate collection of biodegradable waste was introduced by law in 1995 (monitoring and sanctioning). This approach to separate collection has resulted in the EU's highest recycling and composting rates. In particular, municipal waste composted far exceeds composting levels of other countries. The ban on landfilling of untreated BMW strongly encourages this, and has also led to an increase in incineration.

Table 2 Factsheet extracts: policy instruments in countries with high material recovery and low incineration rates

Country	Market based instruments			Administrative instruments				
	Landfill tax	Tax, other	Charge for collection of municipal waste	Deposit refund schemes	Landfill ban	Packaging collection systems	Separate collection of other municipal waste	Other
Austria	1989		x		2004	1990/1992	1995	
Finland	1996			1997	2005	1995/1997	1998	
Germany			x	1998	2001	1991		1998: BMW treatment 2005: Prevention of sham recovery
Hungary		1995: Product fee (packaging, printed paper)	x	2005	2002	2001	2001	1993: Ecolabel
Italy	1996		2000		2003/2007	1998	1997	
Ireland	2002	2001: Plastic bags	2005			1997		1999/2002/2003: Awareness raising
Spain						1997		

■ Early (before 2000)

■ Intermediate (2000–2003)

■ Recently (after 2003)

Note 1: The information is not exhaustive. In federal states and countries with a high degree of regional autonomy in particular, important instruments may be in place at regional level, even though they do not appear in the factsheets and in this table.

Note 2: Where instruments are known to exist and the year of introduction is unknown this is marked with x.

Note 3: Separate collection of other municipal waste is mainly, but not exclusively, paper, food and garden waste.

Source: The table is based on information which can be found in the Factsheets.

Countries with low material recovery and incineration

This group mainly consists of new Member States in the process of implementing EU regulations and of Member States with a 4-year derogation from the Landfill Directive (United Kingdom and Greece). Portugal and Greece also have a 4-year derogation from the Packaging Directive.

The United Kingdom and several of the new Member States have implemented market-based instruments. The Baltic countries and Slovakia have product fees, principally for packaging, while the Czech Republic, Estonia and Slovakia have charges for landfilling.

With material recovery rates of 23 percent in 2004 (Figure 2), the United Kingdom and Slovenia are close to joining the Group 2 (material recycling rates above 25 percent and incineration rates below 25 percent). In fact, the latest figures show that England recycled 27 percent of municipal waste in 2005/2006 (Defra, 2006). Portugal seems to have chosen incineration as its predominant treatment option, but it remains below 25 percent.

The United Kingdom: innovative Landfill Allowance Trading Scheme

The United Kingdom introduced the Landfill Allowance Trading Scheme (LATS) in 2005. It aims to give local authorities flexibility in meeting tough Landfill Directive targets on biodegradable municipal waste (BMW). The Government has given local authorities allowances for the amount of BMW they can landfill for every year of the scheme until 2020. The allowances have been allocated to constrain the total amount of BMW landfilled in Landfill Directive target years, 2010, 2013 and 2020. Local authorities can trade allowances with each other, sell allowances if they have diverted more waste from landfill (e.g. recycling) or buy more if they are likely to exceed their own allocation. Local authorities can also bank unused allowances or borrow from their future allocations, depending on the scheme year.

Table 3 Factsheet extracts: policy instruments in countries with low material recovery and incineration rates

Country	Market based instruments			Administrative instruments				
	Landfill tax	Tax, other	Charge for collection of municipal waste	Deposit refund schemes	Landfill ban	Packaging collection systems	Separate collection of other municipal waste	Other
Cyprus						2005	2000	
Czech Republic	1991: Fee on landfilling		1990	2001	1997: Paper 2004: BMW	1999	1999	1993: Ecolabel
Estonia	1990: Pollution charge for MW disposal	1997: Product charge (packaging)	1991		2008	2004		
Greece						2001		
Latvia		1996/2002: Product charge (packaging)	x			2003/2005	2006–2012	
Lithuania		2003: Product charge (packaging)		2003				
Malta								
Poland						2002		Upgrade existing landfills
Portugal						1998		
Slovakia	1992: Charge for landfilling	2001: Contribution to recycling fund	2002			1998		2002: Ecolabelling 2004: Environmental subsidies
Slovenia	2001		x		2001	2001	2001	
United Kingdom*	1996	2005: LATS				1997	2003	Awareness, e.g. 2000: Envirowise

■ Early (before 2000)

■ Intermediate (2000–2003)

■ Recently (after 2003)

Note 1: The information is not exhaustive. In federal states and countries with a high degree of regional autonomy in particular, important instruments may be in place at regional level, even though they do not appear in the factsheets or in this table.

Note 2: Where instruments are known to exist and the year of introduction is unknown this is marked with x.

Note 3: Separate collection of other municipal waste is mainly, but not exclusively, paper, food and garden waste.

Note * Mainly for England.

Source: The table is based on information which can be found in the factsheets.

Final reflections: success factors for effectiveness

Notwithstanding their widely varying waste management facilities, infrastructure, public opinion and consumption patterns, the Member States of the EU must find their way towards meeting common waste management goals. National strategies must of necessity combine different instruments in a tailored package that takes account of these factors. With its country factsheets, the EEA intends to map out the use of different waste management policies, and is linking these to waste management trends to identify the success factors that make for an effective strategy.

It is too early to judge the effects of recently-introduced measures with certainty, but some of these potential success factors are already emerging from the work: some measures led to a decrease in landfilling of waste after the very first year of their introduction.

In countries with high levels of material recovery it appears that a ban on the landfilling of waste with organic content has been an effective measure in reducing the amount of municipal waste going to landfill. Germany, Sweden and Austria all experienced a reduction in landfilled waste the first year after such bans were put in place. A similar albeit slower response was observed in Denmark. In all four countries, this diversion is supported by other measures: separate collection systems for packaging waste and landfill tax. In Hungary a package of measures comprising a landfill ban and separate

collection systems for packaging waste seems to be producing results, while in the Netherlands and Slovenia a combination of landfill bans, landfill taxes and separate collection systems for packaging waste seems to be diverting waste successfully.

In countries with low material recovery and incineration, the introduction of separate collection systems for packaging waste successfully decreased landfilled waste in the first year, as observed in the Czech Republic, Poland and Latvia. In England, the requirement to collect at least two types of recyclable waste from all households, combined with the landfill allowance trading scheme, also seems to decrease landfilling.

Previous studies suggest that if they are relatively high, landfill taxes can be effective in diverting waste from landfill and improving recovery of heavier waste streams in particular, although they tend to be less effective when it comes to waste prevention (Bartelings *et al.*, 2005; Andersen *et al.*, 1997). Most countries that have a landfill tax introduced it before 1995, so further analysis is necessary to assess their true impacts. The EEA's study of diversion of municipal waste from landfill now continues with an in-depth evaluation of waste policies in selected countries and regions. This work aims to answer this and many other questions to assess whether EU policies have stimulated a strategic shift in national waste management.

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