Municipal waste management:

an image from local and regional authorities in Europe

ACR+ 2005 survey

Credits: This report was produced and published by the Association of Cities and regions for recycling and Sustainable resource management (ACR+)

Authors :
Doreen Fedrigo
Francis Radermaker

Managing editor:
Jean-Pierre Hannequart – ACR+
Gulledelle, 100
B-1200 Brussels
http://www.acrplus.org

Association of Cities and Regions for Recycling and sustainable Resource management

Presentation

The Association of Cities and Regions for Recycling and Sustainable Resource Management (ACR+) is a network of local and regional authorities with a shared aim of promoting the sustainable management of waste and resources, encouraging prevention at source, reuse, recycling and all forms of recovery.

ACR+ provides a forum for the exchange of information and experience on technical and strategic aspects of waste-products-resources management.

This report presents the analysis of a survey undertaken in 2005, involving mostly ACR+ members.

We would like to thank the following authorities who took precious and pressured time to respond to the survey, providing invaluable information and insight into their authority areas' activities. Without this input and effort, this analysis would not have been possible. In addition, we extend special thanks to the individuals in the authorities who took the time to answer the questionnaire questions, and follow-up questions, explaining their local situations.

Aalborg (Dk), Ancona Province (I), Andalucia Region (E), Barcelona Metropolitan Authority (E), Basel (CH), Brussels Region (B), Catalunya Recycling Centre (E), Chiclana de la Frontera (E), Dublin City (IRL), East Milan (I), Flemish Region (B), Groningen (NL), Hampshire County (UK), IDELUX Inter-communale (B), INTRADEL Inter-communale (B), Leiria (P), Liège (B), Lisbon (P), Mallorca City (E), Nantes (F), Nicosia (Cy), Odense (Dk), Padova Uno (I), Pamplona (E), Mairie de Paris (F), Poitou-Charentes (F), Porto (P), Priula (I), Salzburg (A), Settimo Torinese (I), South Dublin County (IRL), Vienna (A), Walloon Region (B), and Western Macedonia (Gr).

The details we present here need to be seen as a 'snapshot' of the activities of certain local and regional authorities (LRAs) *at a given time*. Many of the figures relate to 2003, and as waste management is evolving considerably, some of the activities will have changed already.

We would want to thank Doreen Fedrigo who has devoted a lot of effort and patience to compile and analyse data's for the realisation of this report. In the view of the multiplicity of approaches and the variety of typologies and data's received, it was a demanding challenge to present the bulk of information received in an harmonised way to allow comparison and benchmarking.

We apologies for any errors that may have been made in our analysis, despite our best efforts to check and control them.

ACR+
Brussels secretariat
Gulledelle 100
1200 Brussels
BELGIUM
Tel: +32 2 775 77 01
Email: acrplus@acrplus.org
Web: www.acrplus.org

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1. Foreword

European waste policy, and waste management practices on-the-ground, are in a period of great change. The EU continues to try to evolve its policies from a focus on 'waste' to one that better addresses the 'waste-products-resources' chain. This is a challenging aspiration, but one that needs to continue and needs to be encouraged in a fast evolving world with growing awareness of scarcity of some resources .

On the ground, municipal waste management is evolving quite fast with more and more emphasis developed towards selective collection, recycling, composting and prevention. However, many challenges remain ahead for local authorities with new obligations as regards the management of specific waste streams such as organic waste, WEEE, batteries.

There is growing awareness that plenty of things remain to be done for improved management of products and resources at the global level and that actions start and take roots at the local level notably by tackling the waste challenge.

A shift from one single waste stream to be disposed of to various waste streams to be prevented and recycled is a challenging objective. Possible strategies and potential instruments at hand are numerous. In any case, the optimal balance between technical, legal, economic or voluntary tools must be adapted to the local physical, economical and cultural context.

This makes it more and more necessary for local authorities to assess their situation and to benchmark their performances in order to improve their strategies. International comparisons allow to encompass a wider variety of approaches and solutions available. However, those international benchmarking exercises too often are based on national averages which blur the multiplicity of approaches and tools adopted at the local and regional level.

Providing an insight in local practical, immediate experiences, exchange innovative ideas and approaches that address waste management issues is the "raison d'être" of ACR+.

This last municipal waste management survey of LRAs aims to give more local-level insight into the implementation of current policy. In this way, we hope to inject more reality into relevant debates, and to provide LRAs with a wider view of the activities, approaches and solutions beyond their national boundaries.

This is our latest contribution to achieving the extended management chain that will help to achieve more sustainable consumption and production.

JP Hannnequart
President, ACR+

August 2006

2. Executive Summary

This report provides a snapshot of waste management performance and strategies of some European local or regional authorities (LRAs), most of whom are members of ACR+. In so doing, we hope to contribute to the continuing policy debate through the provision of better local and regional data.

This report is based upon a detailed questionnaire, sent to all local and regional authority members of ACR+ in Spring 2005. It is the third such exercise undertaken by ACR+, the previous being delivered in 1996 and in 2000. This survey encompasses data's from 35 local or regional authorities. On some issues, we make reference to the 2000 survey, but not necessarily as a direct comparison to this survey especially as the participating authorities are different.

Waste production and composition

In ACR+'s earlier survey, the annual *per capita* production of household and municipal waste was recorded for 39 LRAs. *Household waste* arisings averaged 422 kg, while average annual per capita *municipal waste* arisings were 637 kg. In the 2005 survey, for the 35 LRA's analysed, per inhabitant household waste arisings averages 451 kg pa, and municipal waste arisings 548 kg pa. Making a comparison between those two surveys however make little sense since surveyed local authorities are different.

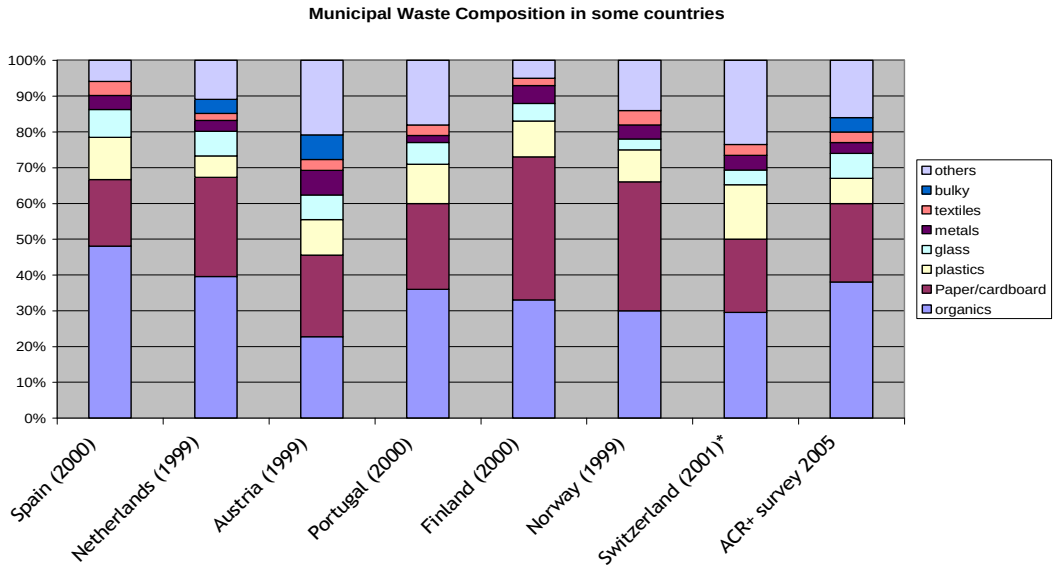
The proportion of household waste as an element of municipal waste range from 59% to 96%, with an average of 77%.

Municipalities reported differing evolutions over time with a noticeable increase in most cases for both municipal and household waste. Between 1995 and 2005, this growth averaged 20% for municipal waste and nearly 30% for household waste.

Waste analyses inevitably bring significant uncertainty, over issues such as scope of municipal waste management activities, origin and nature of waste analysed as well as representativeness of the samples, seasonal variations, catchment areas and the inclusion (or not) or separately collected materials.

This study pays its shares of analysis and provides a compositional picture of municipal waste based on **local and regional data's** provided and makes a comparison with statistics available at European and national level (see figure 1 below).

Figure 1: Municipal Waste Composition in some countries



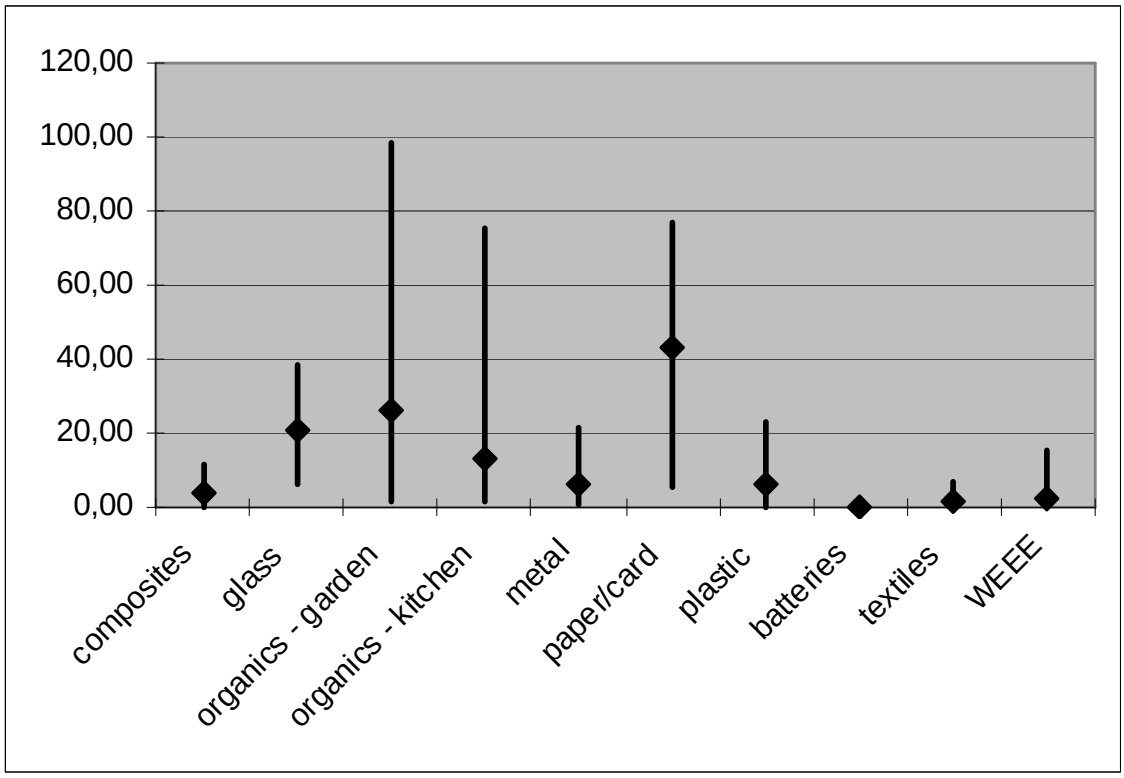
Averaged across the respondents, one sees a municipal waste composed of materials which are potentially highly recyclable.

Waste selective collection

In recent years, absolute and *per capita* capture rates for all materials collected have increased. The survey indicates a substantial variation, with overall capture rates varying between 16 and more than 360 kg/inh/year.

Average and maximum amounts of waste collected selectively for various materials are presented in the graph below (in kg/inh/year). For 'dry' recyclables, paper/card and glass make up 80% by weight of the materials collected.

Figure 2: Average and maximum amounts of waste collected selectively for various materials



Selective collection performance depends upon the organisation of the collection system, for materials collected are not necessarily recovered. Sometimes, when materials are collected together, authorities are unable to identify specific tonnages for each material.

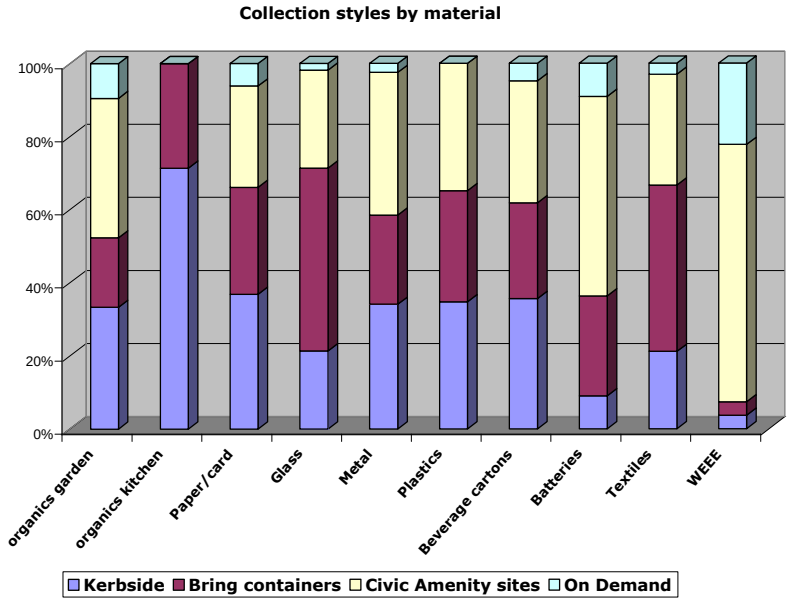
Table 1: Material recycling - general collection trends

Material type	Collection trend
Glass	most authorities collect glass from neighbourhood banks, while many others also collect from kerbside and civic amenity sites.
Paper	shares many selective collection characteristics with glass. It is a material collected by all responding authorities, and forms a considerable element of typical 'dry' or 'dry'/'wet' collection systems – 54% and 37% respectively. The market for paper is well developed. Neighbourhood banks and civic amenity sites are slightly less popular.
Metals	most frequently collected at civic amenity sites, and at kerbside, usually commingled with other packaging materials. Slightly fewer collect from neighbourhood banks and one collects on demand.
Plastics	where specified separately from the light packaging fraction, there is little

	variation between kerbside, neighbourhood banks and civic amenity sites.
Beverage cartons	a roughly equal number of incidences were reported for kerbside and civic amenity site collections, followed closely by neighbourhood banks
Organics	make up a considerable proportion of municipal waste (anywhere from 20% to over 60%). The large majority of garden organics (66%) are collected at civic amenity sites, and the second most popular collection style – kerbside – is considerably less (25%). These two collection styles, however, make up more than 90% of the collection systems provided by the responding authorities. On the contrary, kitchen organics are only collected by kerbside (97%) or neighbourhood banks (3%).
WEEE	Waste electrical & electronic equipment (WEEE) has been addressed by many local authorities before the entry into force of the related Directive with –where specific collection schemes exist- significant collection results averaging more than 50% of the collection targets fixed in the Directive. Not surprisingly, civic amenity sites is the main collection method used.
Batteries	a number of authorities collect batteries, although this does not mean that they are recycled
Textiles	a traditional material collected for recycling, however not always by the authorities themselves.
Sundry materials	collected - mostly at civic amenity sites. These include: Cooking and motor oil; Corks; Flat glass; Medicines; Plastic bags; Polystyrene; Tyres; Wood

The figure 3 here below illustrates the distribution of collection styles by material

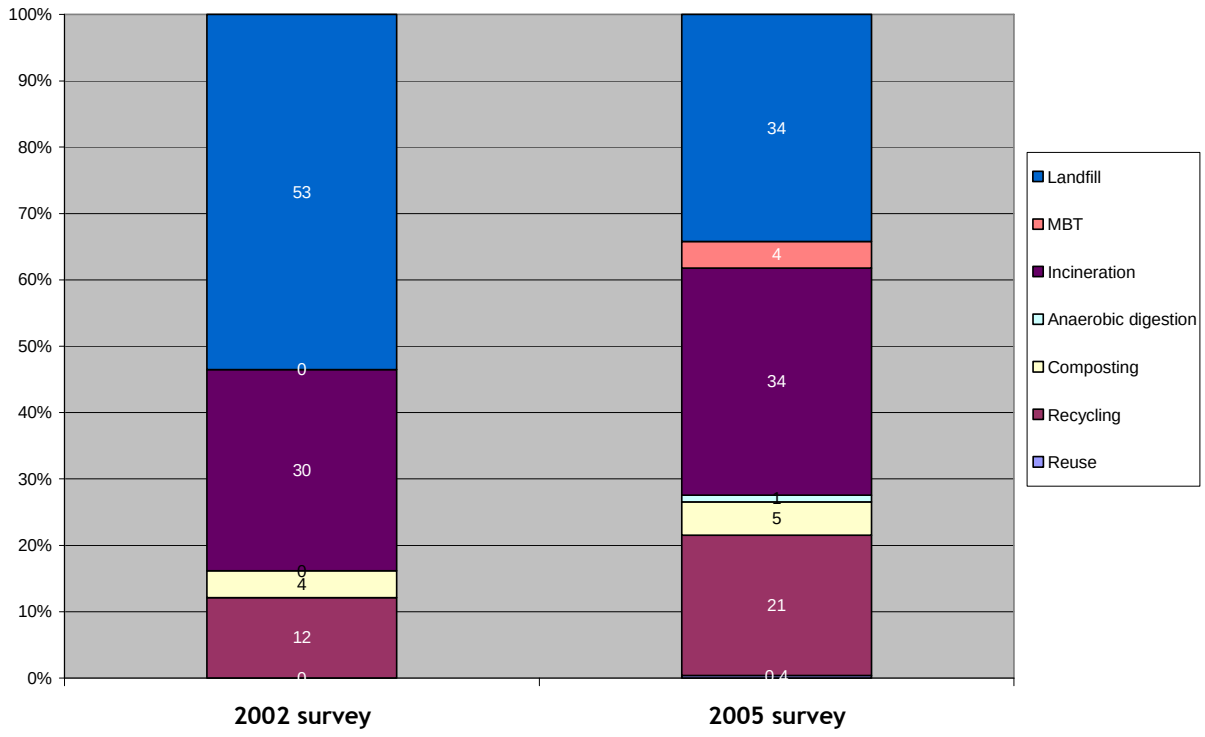
Figure 3: Collection styles by material



Treatment

In the few years since previous ACR+ survey, the proportion of recycling and composting has grown. It attains nearly 27% of treatment options for municipalities considered. Landfilling of untreated waste has declined significantly with a drop of nearly 20% . It represents nowadays only a third of treatment options . Treatment types have diversified, with more recent developments seen in mechanical-biological treatment (MBT) and anaerobic digestion (AD).

Figure 4: Waste treatment & recovery options (per cent)



Mechanical-biological treatment (MBT) has developed as a treatment technique for mixed waste, primarily as a step in the final disposal process. There is growing controversy over the appropriateness of MBT as a recycling/composting process. With no guaranteed market for the end-product, the residua can end up being landfilled or incinerated.

Financial elements

Charging

Charging structures for waste management vary greatly between authorities, with some not making clear to their residents how much they pay in local taxes for waste management. Increasingly, some charge for waste management according to the volume collected or the number of collections. Some examples tend to demonstrate that when the public is required to pay directly for the waste they produce, participation in selective collection schemes increases as does behaviour towards waste prevention (such as participation to home composting).

The survey suggested that households usually bear an annual standing charge which range from EUR60 to almost EUR300.To this is added a variable charge which may range from a few cents per bag, through several EUR per collection. There are many different permutations applied by different authorities to different communities.

Waste Prevention

The ACR+ 2005 survey does not seek to address waste prevention directly, but sought information on it and on initiatives concerning awareness of the impacts of lifestyles, supporting lifestyle changes, and encouraging change in consumption behaviour. Indeed, prevention is not the core objective of this report and has been addressed in more details in other ACR+ reports[1].

The survey shows that waste prevention activities in one form of another are more and more widespread among local and regional authorities. It is the promotion of home composting which is the most frequent before campaigns addressing citizens consumption.

Readers interested in learning about the range of waste prevention activities already being undertaken by authorities are encouraged to read a report published by ACR+ and the Brussels Region environment organisation, IBGE-BIM in 2005. *Voluntary actions supported by local authorities to encourage waste prevention in Europe*, it provides examples of activities such as those mentioned in the report (http://www.acrplus.org/index.asp?page=252)

[1] More specifically in "Voluntary actions supported by local authorities to encourage waste prevention in Europe" - November 2004 and in "Waste prevention in regional waste management plans " (August 2006)

3. Introduction

This report provides a snapshot of waste management performance of some European LRAs, most of whom are members of ACR +. It is not representative of all EU countries, despite various attempts at encouraging involvement from authorities in most EU countries. However, given that waste management is subject to the same type of physical, financial and organisational restrictions, there is something in the report which can interest and benefit LRAs everywhere.

Waste management information of the type found in this report is usually provided at national or international level, with questionable accuracy given the wide variations possible in service provision, and data collection and presentation at local level. This is not to say that analysis using data at national and international levels is impossible or pointless, rather that it needs to be supplemented by information from the local level, and that the local level detail needs much more attention.

It is the aims of this report to add more details to waste policy debate, to illustrate the diversity of approaches and strategies, to discover trends end evolution and to identify good performers. In short the objective is to provide more detailed information, allowing actors to get information more accurate than usually available at international level. We hope that it will give a truthful image of the diversity of existing solutions and that it will provide food for thought for practitioners in this multifaceted problematic that is municipal waste management.

Cities concerned by the survey

Aalborg (Dk), Ancona Province (I), Andalucia Region (E), Barcelona Metropolitan Authority (E), Basel (CH), Brussels Region (B), Catalunya Recycling Centre (E), Chiclana de la Frontera (E), Dublin City (IRL), East Milan (I), Flemish Region (B), Groningen (NL), Hampshire County (UK), IDELUX Inter-communale (B), INTRADEL Inter-communale (B), Leiria (P), Liège (B), Lisbon (P), Mallorca City (E), Nantes (F), Nicosia (Cy), Odense (Dk), Padova Uno (I), Pamplona (E), Mairie de Paris (F), Poitou-Charentes (F), Porto (P), Priula (I), Salzburg (A), Settimo Torinese (I), South Dublin County (IRL), Vienna (A), Walloon Region (B), and Western Macedonia (Gr).

We would want once again for their availability and for their kindness for the time they devoted to fill the questionnaire and answer our questions.

Doing so, they have contributed significantly to what makes the objectives and essence of a network as ACR+.

3.1. Methodology

This report is based upon a detailed questionnaire (see Annex 1), sent to all local and regional authority members of ACR+ in Spring 2005. It is the third such exercise undertaken by ACR+, the previous being delivered in 1996 and in 2000. On some issues, we make reference to the 2000 survey, but not necessarily as a direct comparison to this survey especially as the participating authorities are different.

The 2005 questionnaire was divided into different sections:

- General information on the authority's population size and density, housing structures
- Responsibility areas of the authority – e.g. collection, planning, taxation, etc.
- Total tonnage of household and municipal waste production
- What types of waste is considered municipal waste, and tonnages if available
- Materials and collection styles and design of selective collection systems
- Evolution of the selective collection system

- Treatment of materials and waste collected as municipal waste
- Financial elements – costs and charges
- Initiatives and campaigns – communications, activities in waste prevention and sustainable consumption, surveys, etc.
- Future developments – upcoming activities over next 5-10 years

The questionnaire included the typical materials found in 'dry' recyclables collections, that is, **paper/card, glass, plastic, metal, and beverage cartons**. We also included products and materials that are addressed by specific directives. In particular, the directives on **waste electrical and electronic equipment** (WEEE) and on **batteries**, and the landfill directive's requirements to divert **biodegradable** (organics) municipal waste, made these materials a priority to analyse.

The report also includes the information provided by **regional authorities** and other types of authorities beyond the municipality level (such as 'inter-communales' or sub-regional authorities even though, the information they provided was less detailed overall than that received by local authorities. Regional authorities have varying waste management responsibilities, some being responsible for selective collection, and others only being responsible for waste treatment/disposal. For this reason, the level of detail they were able to provide varied according to their areas of responsibility.

In most cases, responses to the questionnaire were followed up with email and/or telephone contact for verification and in an attempt to harmonise answers from different countries.

4. Waste production

In the 2000 survey we undertook, we detailed the per inhabitant production of household and municipal waste for 39 European authorities. For household waste, production ranged from 259 kg to 631 kg (average of 422 kg); for municipal waste, the range was from 329 to 964 kg (average 637 kg). In the 2005 survey, there is an average arisings per person for household waste at 451 kg and for municipal waste at 548 kg. Those averages exclude Danish results because their definition of municipal waste does not correspond to usual European definition.

The table 2 here below provides all data's collected during both surveys. It does not appear sensible however at this stage to make a direct comparison between the two surveys, most importantly because the participating authorities are different.

The assessment of trend in waste arising is made in a specific section below on the basis of individual figures provided by some authorities for the period between 1990 and 2005.

Table 2: Waste (household and municipal) production - kg/inhabitant

Authority	Country	2005 survey			2000 survey	
		Household	Municipal	Year	Household	Municipal
Aalborg	Dk	621	3.746	2004	421	3,042
Almada	P				532	612
Aveiro	P				365	445
Ancona Province	I	325	542	2003		
Andalucia	E	-	456	2003		
Barcelona (Metropolitan Area)	E	-	527	2003	356	456
Basel	CH	338	577	2003		
Bern	CH				417	447
Bordeaux	F				631	
Brussels Region	B	-	465	2003		
Cardiff	UK				383	453
Carpi	I				554	848
Catalunya	E	551	588	2001		
Chiclana de la Frontera	E	765	864	2003		
Coimbra	P				469	
Cordoba	E				438	545
Dublin	IRL	375	494	2004	358	841
Dunkirk	F				539	933
East Milan	I	304	468	2004	297	495
Evora	P				353	510
Flanders Region	B	535	557	2003		
Groningen	NL	450	645	2003		
The Hague	NL				407	461
Le Havre	F				503	579
Hampshire County	UK	519	550	2003/4		
IDELUX	B	-	588	2004		
INTRADEL	B	469	-	2003		
Leiria	P	400	-	2003	430	874
Liège	B	389	-	2003	465	510
Lille	F				559	632
Lisbon	P	462	624	2002	543	560
Lyon	F				324	433
Madrid	E				405	457

Mallorca	E	-	750	2004		
Milton-Keynes	UK				426	473
Munich	D				380	407
Namur	B				406	477
Nantes	F	466	-	2003	442	
Nicosia	CY	606	968	2001	530	964
Odense	Dk	680	1.227	2003		
Oslo	N				310	360
Padova Uno	I	230	384	2003		
Palermo	I				556	590
Pamplona	E	-	449	2003		
Paris (Mairie de)	F	520	566	2004	382	524
Poitou-Charentes	F		560	2003		
Porto	P	460	511	2003	405	417
Priula	I	-	380	2004		
Saarbrücken	D				281	329
Salzburg	A	511	518	2003	365	487
Settimo Torinese	I	309	515	2004		
Setubal	P				469	
South Dublin County	IRL	412	456	2003		
Vienna	A	495	569	2003	384	549
Walloon Region	B	291	426	2003		
Warsaw	Pl				259	370
Western Macedonia	Gr	233	352	2001		
MIN		230	352		259	329
MAX		765	968		631	964
AVERAGE*		451	548		422	637

**Municipal waste average does not include Danish figures because these include wastes from industrial sources, from energy production and sludge, amongst other sources.*

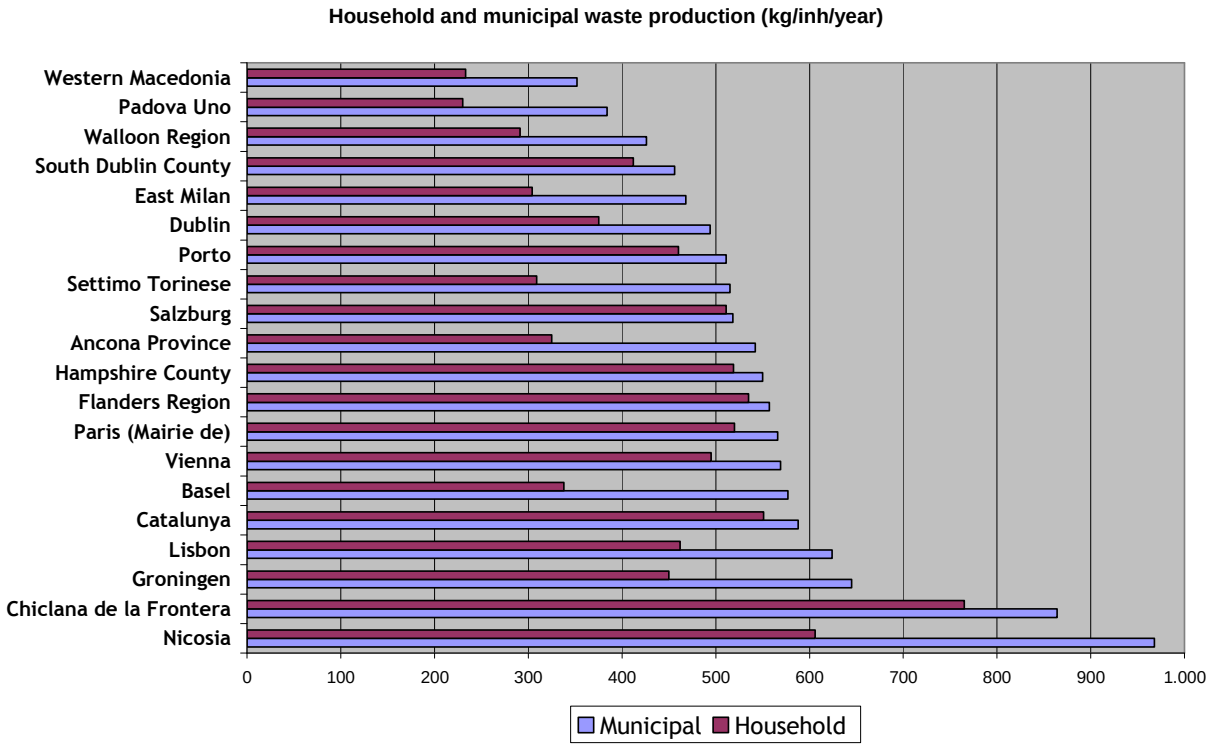
4.1. The municipal/household waste ratio : an insight into the scope of municipal activities

Figure 5 here below provides an image of the kg/inhabitant waste production for household and municipal waste. Only those authorities who provided both figures feature. The proportion of household waste as an element of municipal waste range from 59% to 96%, with an average of 77%.

However, it must be emphasised that there still remains confusion and discrepancy in what authorities consider household or municipal waste. As far as **household** waste is concerned, it actually is very complicated to measure on the ground since it requires the realization of sample and analysis campaigns of those municipal waste which actually are produced by the normal activity of households. This explains why very few local authorities have a good knowledge of **household** waste arising on their territory.

The confusion between those two concepts must be emphasised and is discussed in more details here below.

Figure 5: household and municipal waste production (kg/inhabitant)



4.2. Defining 'household' and 'municipal' waste

According to definitions by official institutions such as OECD, Eurostat and EEA, **municipal waste** usually refers to wastes collected by municipalities or by order of them whereas **household waste** encompass waste generated by the domestic activity of households

We took as a starting point for our questionnaire the OECD definition of municipal waste:

> *"Municipal waste is waste collected and treated by or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden waste, street sweepings, the contents of litter containers, and market cleansing waste. The definition excludes waste from municipal sewage networks and treatment, as well as municipal construction and demolition waste."*

However, in practice municipal waste quantities and composition vary from municipality to municipality and so cannot be compared:

1. **in the scope of municipal waste management activities :** municipal collection encompasses traditional collection methods i.e :
   - bagged waste collected door-to-door (as well mixed waste collected in bulk as separately collected fractions)
   - waste collected through street containers and igloos
   - waste collected from container parks or civic amenity sites

   However, differences occur as regards :
   - the range of waste flows municipalities include in their statistics for municipal : some of them – and more frequently in Austria, Germany and Switzerland - do not include waste collected selectively for recycling
   - the authorization of access to containers parks (since possibilities for traders and small companies to access those facilities varies on a case by case basis)
   - the understanding of the "on behalf" concepts since in some countries, municipal waste also include waste selectively collected (for recycling) for their own account by other operators such as non-profit organizations, charities and the private sectors (textiles collected by charities for instance are sometimes included in municipal waste statistics, sometimes not)

- the origin of waste collection figures which may be calculated either at the collection stage (in which case it is rather simple to identify waste collected "on behalf" of municipalities) either at the treatment plants (in which case the data do not necessarily excludes waste collected by operators not working for municipalities).

2. **in the origin of waste reported :** municipal waste generally include a large proportion of waste from households. However, inconsistencies occur as regards :
   - the extent to which municipalities (or they subcontractors) collect waste from commerce and trade, small businesses, office buildings and institutions such as schools, hospitals, government buildings, etc.
   - the inclusion or not of waste from selected municipal services i.e. waste from parks and garden maintenance, from street cleaning services (street sweepings, content of litter containers, market cleansing, …)
3. **in the categories of waste analysed :** generally speaking municipal waste tend to exclude *"all those wastes requiring treatment other than municipal waste"* and thus to include all wastes, which because of their nature or composition, are similar to wastes from households.
   Generally speaking the definition excludes :
   - waste from municipal sewage network and treatment
   - construction and demolition waste but it is not always clear what is done with construction and demolition waste from the activities of municipalities e.g. building maintenance, construction, roads, etc…or with inert waste collection via container parks..
   - Vehicles (abandoned or otherwise)

   Status is not clear for some waste such as :
   - Reused waste materials
   - Incineration residues
   - Clearance of fly-tipped waste

The scope of the concept of **household waste** appears more simple since it is linked specifically to the origin of waste, consisting of waste from a unique type of source : households. However, in practice, waste collected from households will often be collected and mixed with waste from other sources such as offices, restaurants, commercial establishments, ….. This means, that even though, the concept of household waste looks rather simpler to apprehend, it actually is much more complicated to measure on the ground since it requires the realization of sample and analysis campaigns of those municipal waste (that is the sum of bagged mixed waste, of selectively collected waste and of waste collected in container parks) which actually are produced by the normal activity of households.

In Table 3, we have tried to present the different elements of municipal waste as they are collected by the authorities who provided details. This illustrates that the blurring between household and municipal waste sources is widespread and 'normal', with the resulting difficulty of comparing data between authorities.

Table 3: Elements of municipal waste collected by the authorities

	Suggestions provided in questionnaire								Other sources provided by respondents								
Authority	household		street cleansing, public bins	schools, institutions, administration offices, etc.	Hospitals/clinical (non-haz)	Shops and retailers	markets	SMEs	fairs	public parks and gardens	Commerce and shopping malls	street gravel (winter)	drainage gullies	private gardens	cemeteries	industry	C&D
Aalborg	X		X								X						
Ancona Province	X		X	X	X												
Basel	X		X	X	X	X	X	X									
Barcelona (Metropolitan Area)	X		X	X	X	X	X	X									
Catalunya	X		X														
Chiclana de la Frontera	X		X			X	X	X			X						
Dublin	X		X	X	X	X	X										
Est Milano	X		X	X	X	X	X										
Flanders Region	X		X														
Hampshire County	X		X	X	X												
INTRADEL	X		X	X	X												
Leiria	X		X	X	X	X	X	X									
Liège	X		X	X	X												
Lisbon	X		X	X	X		X		X	X				X	X		
Nantes	X			X	X	X		X									
Nicosia	X		X	X		X	X									X	
Odense	X		X	X	X												
Pamplona	X		X	X		X	X	X									
Paris (Mairie de)	X		X				X										
Poitou-Charentes	X		X	X			X										
Porto	X		X	X	X	X		X			X						
Priula	X		X	X	X	X	X	X									
Salzburg	X		X	X	X	X	X	X									
Settimo Torinese	X		X	X	X	X	X	X									
South Dublin County	X		X	X	X			X									
Vienna	X		X	X	X	X	X	X		X	X	X	X				
Walloon Region	X		X	X	X	X											
Western Macedonia	X			X	X												X
Number of occurrences	28		26	23	20	15	15	12	1	2	4	1	1	1	1	1	1

Individual authority situations

- Aalborg, DK - Municipal waste includes waste from households, enterprises, inert waste, and waste from incineration, energy production and sewage sludge.
- Waste from institutions is collected as household waste by Catalunya (E), Odense (DK), Poitou-Charentes (F), Porto (P) and Salzburg (A).
- Waste from institutions and SMEs is collected as household waste by South Dublin County (IRL).

- In the Walloon Region (B) as well as in Poitou-Charentes (F) , waste from shops is considered as household waste if it is collected at the same time. Chiclana de la Frontera (E) includes in municipal waste, waste that is put in compactors (at shopping malls, etc.)
- Catalunya (E) considers institutional waste that is collected in neighbourhood banks as commercial waste.
- Est Milano and Priula (I) mix non-household waste with household as long as the quantity and contents are similar, according to local regulations.
- The Mairie of Paris (F) includes in household waste that which comes from SMEs and is collected at same time as household.
- Salzburg (A) data from markets, retailers, shops, SMEs, etc. is included in waste from households and institutions.
- Vienna (A) household waste includes waste from institutions and SMEs (about 20% from SMEs); and municipal waste includes abandoned vehicles, used tyres and commercial waste delivered by the companies direct to the authority's treatment plants.
- For England and Wales (UK), see description of household waste in Box 1.

Box 1: UK definition of household and municipal waste

Differentiating at national level

The Office of the Deputy Prime Minister (ODPM) in the UK has created a set of Best Value Performance Indicators against which the performance of local authorities is assessed (in areas beyond waste management). In order to ensure better comparability between authorities in terms of performance in waste management, the ODPM created the following listing for what is considered "household" waste.

Household waste includes *waste from the following sources:*

- *Waste collection rounds (including separate rounds for collection of recyclables);*
- *Street cleansing and litter collection;*
- *Bulky waste collections, where 'bulky waste' is defined as*
  - any article of waste which exceeds 25 kilograms in weight
  - any article of waste which does not fit, or cannot be fitted into:
  (a) a receptacle for household waste provided in accordance with section 46 of the Environmental Protection Act 1990; or
  (b) where no such receptacle is provided, a cylindrical container 750 millimetres in diameter and 1 metre in length.
- *Hazardous household waste collections*
- *Garden waste collections*
- *Waste collected from drop-off/bring systems*
- *Park litter (but not grass cuttings, leaves, etc.)*
- *Household clinical waste collections*
- *Any other household waste collected by the authority.*

Household waste does not include*:*

- *Incinerator residues, even if these are used in a way that avoids the need to send it to landfill;*
- *Beach cleansing wastes (i.e. produced by the specific activity of cleaning up a beach);*
- *Rubble (including soil associated with the rubble);*
- *Home composted waste;*
- *Clearance of fly-tipped wastes;*
- *Vehicles (abandoned or otherwise);*
- *Re-used waste material;*
- *Grass cuttings, leaves etc. in parks.*

Tyres that are recycled can only be counted if they are household waste, i.e. they are collected from a house or at CA sites from households rather than businesses or taken directly from a vehicle.

The Department for Food, Environment and Rural Affairs (Defra) has defined municipal waste as:

This includes household waste and any other wastes collected by a Waste Collection Authority, or its agents, such as municipal parks and gardens waste, beach cleansing waste, commercial or industrial waste and waste resulting from the clearance of fly-tipped materials.

[http://www.defra.gov.uk/environment/statistics/wastats/mwb0304/wbannexe.htm]

5. Trends in production

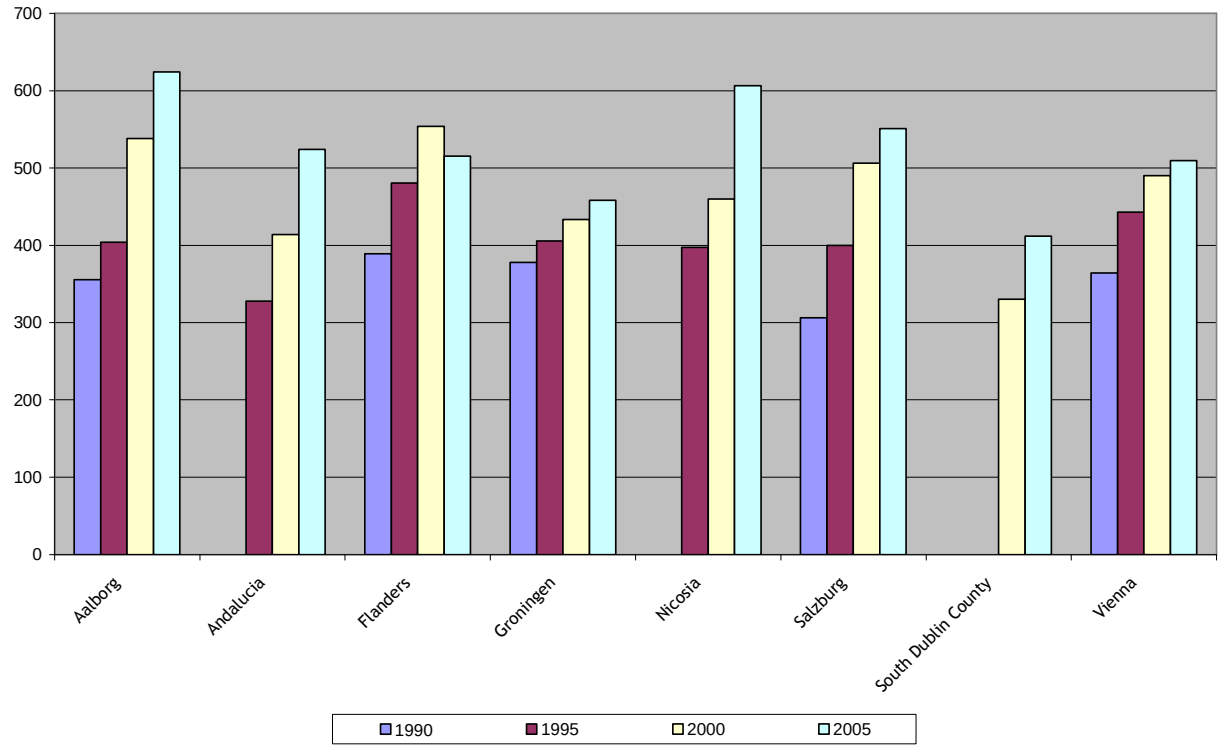
Cities were asked to detail the evolution of their household and municipal waste production over time. Figures 6 and 7 provide an image of the evolution in household and municipal waste production for some authorities between 1990 and 2005, where these were available[2].

In regards to the discussion above, it is noteworthy that a rather limited number of local authorities were able to provide series of data's for household waste.

A quick glance at production levels for those authorities illustrates differing evolutions over time. In the 10 years interval between 1995 and 2005, both household and municipal waste have increased in most cases with an average of 20% for municipal waste and by nearly 30% for household waste.

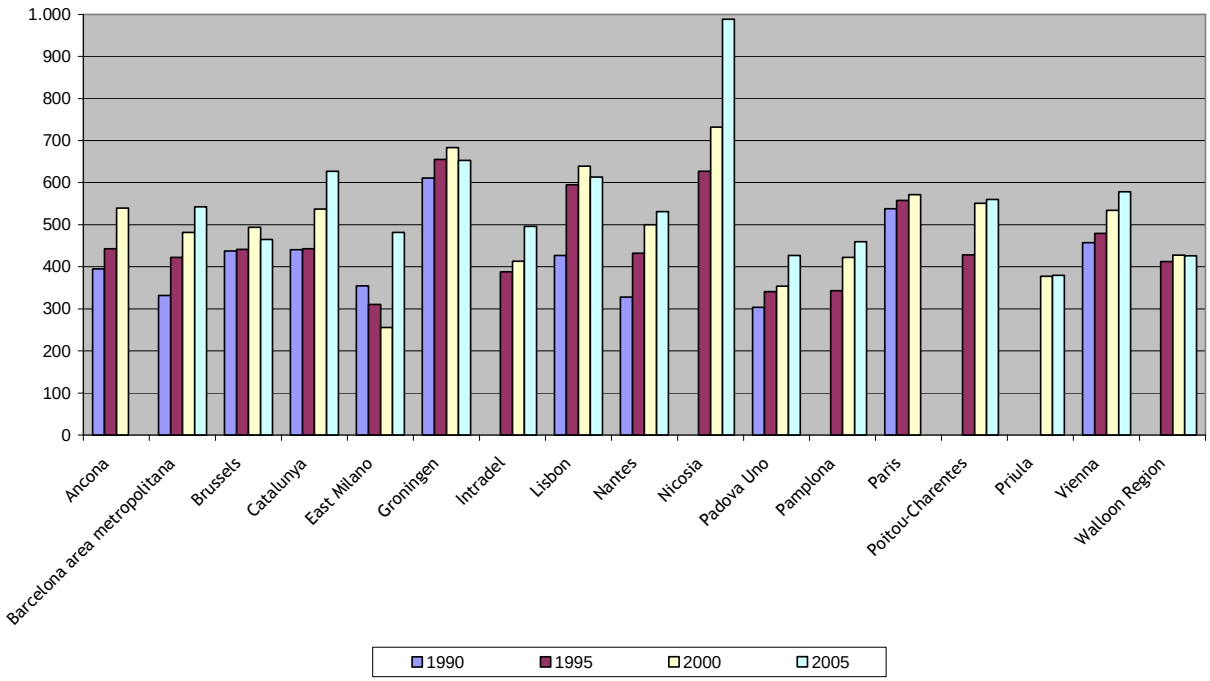
However it is important to mention that increased household waste production may reflect changes in actual waste production by households and its relation with economic structure and lifestyles, whereas a variation of municipal waste generation may also originate from variations in the scope of municipal collection activities.

Figure 6: Trend in household waste arisings per capita



[2] Although the tables are presented as figures for 1990, 1995, 2000 and 2005, the figures do not necessarily correspond to these precise years.

Figure 7: Trend in municipal waste arisings per capita



6. Waste composition

Having a good knowledge of the quantity and types of waste which are produced on its territory is crucial for a municipality not only to assess the collection and treatment capacities to be made available but also to estimate the performances of selective collection and to assess, for each material, the stock of waste which remains to be captured by selective collections.

However, having a good knowledge of municipal and household waste composition remains an objective very difficult to attain. Indeed, there are mainly two possibilities for a municipality to get an insight of municipal waste to be collected and treated per type :

1. One is to sum the amounts of waste selectively collected (to add amounts of all the materials which are selectively collected for recycled be it through kerbside collection, via bring containers or in container parks).
2. the second is to perform sampling and analysis campaigns of the residual municipal waste

When combined, those two methods contribute to provide a good insight of waste stocks for each material but they are not sufficient to provide a complete picture of the municipal waste stock since they address two different waste stocks. Indeed :

- the first method usually encompasses all municipal waste (that is from households and from other sources)
- the second one usually focuses on waste from households only

Having a thorough and complete picture of the composition of municipal waste would thus require sampling and analysis of all those municipal wastes not from household origin (that is from sources such as offices, restaurants, commerce,….).

Samples and analysis campaigns of residual waste are time-consuming and expensive operations which explains that only 6 municipalities have been able to provide detailed composition data. Those data are presented in table 4 below.

It is worth mentioning however that those analyses differ as regards the methodologies followed and as regards the scope of waste considered since 3 of them concern all municipal waste (including material from collection systems) and 3 consider only residual waste.

In order to provide an image as complete and comparable as possible of household waste composition for those municipalities, we have tried to calculate for each materials the amounts of waste selectively collected[3] and we have added them to waste materials quantities identified in residual waste. Results are expressed in kg/inh/year.

It is worth reminding that limitations mentioned above as regards the scope of analyses remain valid.

Table 4: Municipal Waste composition analyses results (in kg/inh/year)

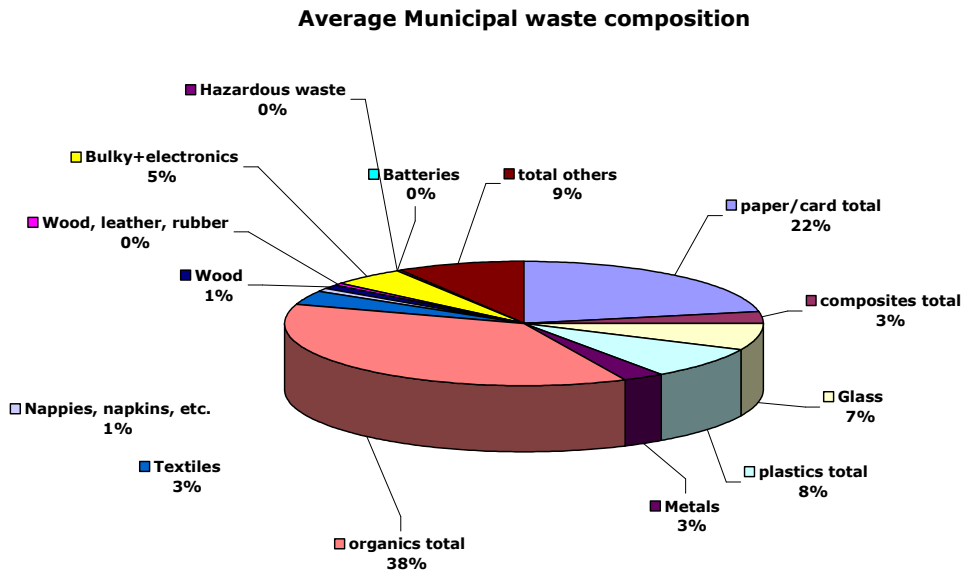
	Andalusia	Pamplona 2003	Lisbon 2003	Basel 2001			Groningen 2004			Vienna 97/98		
	global	**global**	**global**	**Total**	residues	Select. collect.	**Total**	residues	Select. Collect.	**Total**	residues	Select. Collect.
Paper/card total	**77,5**	**88,9**	**155,3**	**152,6**	76,0	76,7	**89,1**	40,4	48,7	**119,1**	46,9	72,2
Composites total	**0,0**	**5,4**	**0,0**	**47,6**	47,6	0,0	**14,8**	14,8	0,0	**23,1**	23,1	0,0
Glass	**27,3**	**37,7**	**40,5**	**49,0**	19,3	29,7	**29,2**	10,5	18,7	**29,7**	15,0	14,7

[3] Of course, in this case, the rise of **multi-material recycling collections** creates another difficulty since authorities cannot always identify specific tonnages for each of the materials collected.

Plastics total	**45,6**	**31,0**	**55,5**	**44,8**	44,8	0,0	**49,1**	49,1	0,0	**29,5**	24,0	5,4
Metals	**13,7**	**10,8**	**13,7**	**12,2**	7,8	4,4	**15,6**	15,6	0,0	**20,1**	9,0	11,1
Organics total	**223,3**	**204,7**	**223,3**	**222,0**	175,0	47,0	**84,5**	44,5	40,0	**166,2**	116,2	49,9
Textiles	**18,2**	**7,6**	**29,9**	**17,2**	13,1	4,0	**23,6**	19,9	3,6	**9,4**	9,2	0,2
Nappies, napkins, etc.	**0,0**	**17,5**	**0,0**	**0,0**	0,0	0,0	**11,7**	11,7	0,0	**0,0**	0,0	0,0
Wood	**0,0**	**0,0**	**0,0**	**0,0**	0,0	0,0	**10,9**	10,9	0,0	**17,0**	0,0	17,0
Wood, leather, rubber	**0,0**	**0,0**	**0,0**	**0,0**	0,0	0,0	**0,0**	0,0	0,0	**13,0**	13,0	0,0
Bulky+electronics	**0,0**	**14,8**	**0,0**	**5,5**	1,6	3,9	**96,0**	1,2	94,8	**24,2**	2,5	21,7
Batteries	**0,0**	**0,0**	**0,0**	**0,1**	0,1	0,0	**0,0**	0,0	0,0	**0,3**	0,0	0,3
Hazardous waste	**0,0**	**0,0**	**0,0**	**0,6**	0,4	0,2	**0,7**	0,7	0,0	**3,7**	3,1	0,6
Others total	**50,1**	**31,9**	**105,4**	**24,6**	24,6	0,0	**23,8**	23,8	0,0	**38,9**	38,8	0,1
TOTAL	**455,8**	**450,2**	**623,8**	**576,3**	410,4	165,9	**449,0**	243,1	205,8	**494,1**	300,8	193,3

Figure 8 below provides a pie chart illustration of the average composition analysis make-up from table 4.

Figure 8: Average Municipal waste composition



Comparative analysis

Table 5 provides a general comparison of composition analysis results between the 2005 ACR+ survey, against an 2003 OECD study for some European countries and against a survey of Swiss waste realised by the federal ministry of Environment.

'Average' waste composition, be it at regional, national or supra-national levels, is a misnomer since these tend to hide significant variations within individual analyses. However, the comparative table provides a comparison between various surveys.

Table 5: Percentage municipal waste composition

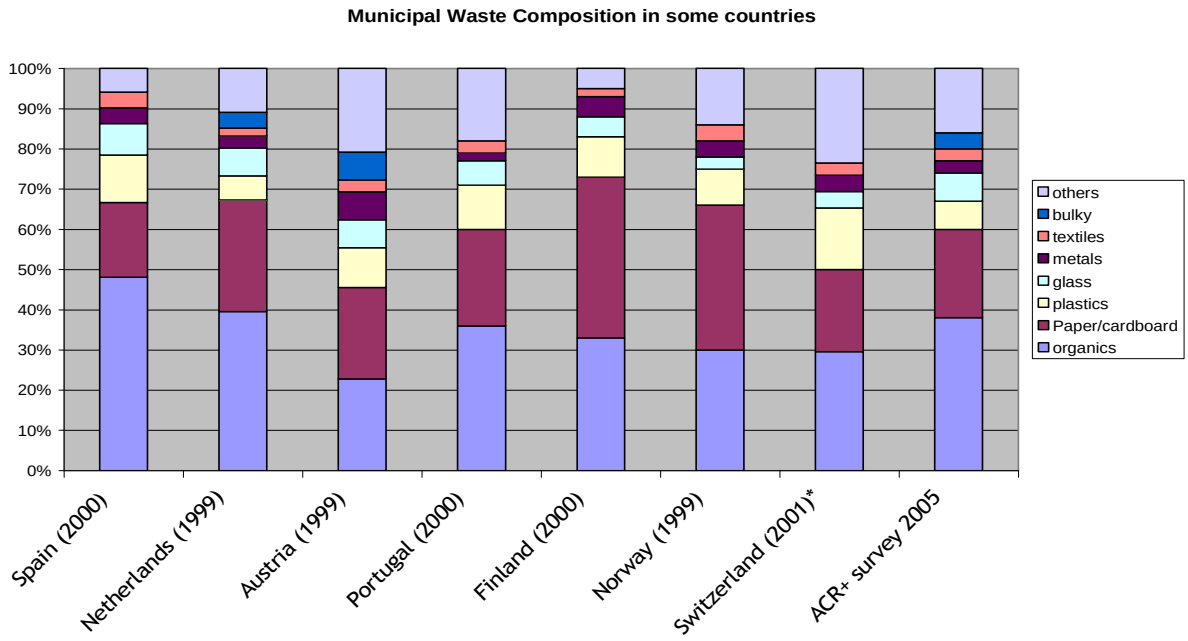
Sources	OECD 2003 [4]						OFEFP 2003	ACR+ 2005
Countries/year	Spain 2000	Netherlands 1999	Austria 1999	Portugal 2000	Finland 2000	Norway 1999	Switzerland[5] 2001	EU[6]
Paper/card	19	28	23	24	40	36	20	22
Beverage cartons							4	3
Glass	8	7	7	6	5	3	4	7
Plastics	12	6	10	11	10	9	15	7
Metals	4	3	7	2	5	4	4	3
Organics	49	40	23	36	33	30	29	38
Textiles							3	3
Nappies, napkins, etc.								1

[4] Source : Waste generated and treated in Europe 1990-2001, Eurostat 2003
[5] Analyse de la composition des ordures 2001/2002, Office fédéral de l'environnement, des forêts et du paysage, 2003
[6] Data from present ACR+ survey

Wood								1
Bulky		4	7					4
electronics							0.6	1
Hazardous waste							0.2	1
Others	6	11	21	18	5	14	20	9

Figure 9 below provides an illustration of the average composition analysis make-up from table 5.

Figure 9: Average municipal waste composition analysis for some countries



Average composition calculated here is consistent with those obtained from other sources with dry recyclables representing the most important fraction (between 35 and 45%) and organics (showing greater variations between 35 and 40%). Let's mention that the inclusion or not of fractions such as wood, inert and other bulky waste in the scope of the analysis may distort significantly the validity of the comparison.

7. Selective Collection

In the years since the first ACR+ survey in 2000, many local and regional authorities have made their recycling schemes more convenient for users by providing a kerbside service (replacing neighbourhood banks), by providing more neighbourhood banks (reducing the distance to be travelled by users to deposit materials), and/or by increasing the range of materials being collected.

Although all figures for collection details are presented as kg/inh, we want to stress that this does not make performance comparable between the different authorities. It is worth stopping to consider some elements of collection, which are important to bear in mind when analysing the figures:

- **Selective collection performance usually refers to municipal waste. Results thus depends upon the scope of the collection activities** from non-household sources.

- It is worth stating from the start that **materials collected selectively are not necessarily collected for recycling or composting**. That is, they are collected separately so that their treatment is controlled more specifically. For example, some authorities collect household batteries so that they can be incinerated rather than landfilled.

- Many authorities collect more than one material in the same container, otherwise known as multi-material collections. **Sometimes, when materials are collected together, authorities cannot identify specific tonnages for each material**. We consider this in more detail below in the section *'Analysis of materials'*. This can be the case because the data simply is not collected when the materials are sorted, or because the materials from many authorities can be taken to the same sorting centre, thereby losing the 'traceability' of the materials and their tonnages. This is more immediately important for authorities that have mandatory individual recycling targets (such as in Italy and the UK).

- **Variations in interpretation of collection styles exist from authority to authority.** In other words, it was possible to have an authority collecting a material only using neighbourhood banks to present their figures as 'kerbside' (also called 'door-to-door', which is clearly different from neighbourhood banks)[7].

- Although we cannot directly compare figures from the 2000 survey, it is worth noting that **figures for all materials collected have increased**, as has the overall kg/inh total average.

7.1. "Dry" and "wet" collection rates

The table 6 below presents quantities of "dry" and "wet" waste selectively collected. Comparison with municipal waste production allows to calculate diversion rates.

It shows that in average, nearly 120kg of waste per inhabitant have been diverted in the studied cities which represents a average diversion rate of 24%. Nearly two thirds of those selectively collected fractions are dry waste (that is the sum of five main packaging materials + textiles, WEEE and batteries). The remaining third is made of organic kitchen and garden waste for which selective collection is less frequent.

[7] This was similarly the case for neighbourhood banks which were sometimes presented as recycling 'centres' or 'eco-points', but which were actually civic amenity sites. Where possible, we clarified this with the authority or deduced the response according to 'norms' in the country or in broader municipal waste management service provision terms. Of course, we do not anticipate having achieved 100% accuracy, and we welcome corrections from any authorities who think they have been misrepresented in the presentation of their response. At the very least, it shows a lack of standard terms to be used by all LRAs.

Extremes range from 20kg to nearly 260kg of waste selectively collected per inhabitant with six municipalities with diversion rates above 40%.

Table 6: Selectively collected quantities and diversion rates for municipal waste

	Municipal waste production (kg/inh/year)	Selectively collected quantities			Diversion rate for municipal waste		
		in kg/inh/year			in %		
Authority		**Dry**	**Wet**	**Total**	**Dry**	**Wet**	**Total**
1. Aalborg		85,1	94,9	**179,9**			
2. Ancona	542	53,8	16,5	**70,3**	9,9%	3,0%	**13,0%**
3. Andalucia	456	20,0	0,0	**20,0**	4,4%	0,0%	**4,4%**
4. Barcelona (Metropolitan Area)	527	37,8	37,8	**75,7**	7,2%	7,2%	**14,4%**
5. Basel	577	114,8	9,1	**123,9**	19,9%	1,6%	**21,5%**
6. Brussels Region	465	56,7	9,7	**66,4**	12,2%	2,1%	**14,3%**
7. Catalunya	588	41,2	20,9	**62,1**	7,0%	3,6%	**10,6%**
8. Chiclana de la Frontera	864	20,6	7,2	**27,8**	2,4%	0,8%	**3,2%**
9. Dublin	494	91,0	0,0	**91,0**	18,4%	0,0%	**18,4%**
10. East Milan	468	124,9	120,1	**245,0**	26,7%	25,7%	**52,3%**
11. Flanders Region	557	129,2	130,3	**259,5**	23,2%	23,4%	**46,6%**
12. Groningen	645	79,2	40,0	**119,2**	12,3%	6,2%	**18,5%**
13. Hampshire County	550	103,8	42,4	**146,2**	18,9%	7,7%	**26,6%**
14. IDELUX	588	110,6	127,3	**237,9**	18,8%	21,6%	**40,5%**
15. INTRADEL	-	103,1	46,2	**149,3**			
16. Leiria	-	20,0	0,0	**20,0**			
17. Liège	-	110,4	1,4	**111,8**			
18. Lisbon	624	46,7	6,3	**52,9**	7,5%	1,0%	**8,5%**
19. Mallorca	750	96,9	34,1	**131,0**	12,9%	4,5%	**17,5%**
20. Nantes	466	73,8	51,3	**125,1**	15,8%	11,0%	**26,8%**
21. Odense		98,1	0,0	**98,1**			
22. Padova Uno	384	129,4	101,9	**231,3**	33,7%	26,5%	**60,2%**
23. Pamplona	449	55,3	11,7	**67,0**	12,3%	2,6%	**14,9%**
24. Paris (Mairie de)	566	50,9	4,4	**55,2**	9,0%	0,8%	**9,8%**
25. Poitou-Charentes	560	109,4	63,3	**172,7**	19,5%	11,3%	**30,8%**
26. Porto	511	25,0	9,0	**34,1**	4,9%	1,8%	**6,7%**
27. Priula	380	124,7	114,2	**238,9**	32,8%	30,1%	**62,9%**
28. Salzburg	518	123,3	103,2	**226,5**	23,8%	19,9%	**43,7%**
29. Settimo Torinese	515	30,3	28,1	**58,4**	5,9%	5,4%	**11,3%**
30. South Dublin County	456	64,0	3,2	**67,2**	14,0%	0,7%	**14,7%**
31. Vienna	569	105,7	50,0	**155,7**	18,6%	8,8%	**27,4%**
32. Walloon Region	426	101,2	56,4	**157,6**	23,8%	13,2%	**37,0%**
33. Western Macedonia	352	74,0	2,3	**76,4**	21,0%	0,7%	**21,7%**

Average*	**530**	**79,1**	**40,7**	**119,8**	**15,6%**	**8,6%**	**24,2%**
Max	864	129,4	130,3	259,5	33,7%	30,1%	62,9%

7.1.1. Selectively collected quantities per materials

Table 7 and Figure 10 provide the minimum, maximum and average kg/inhabitant collected for typical selective collection materials. We consider each material in further detail in section 'analysis by material' in *Selective Collection*.

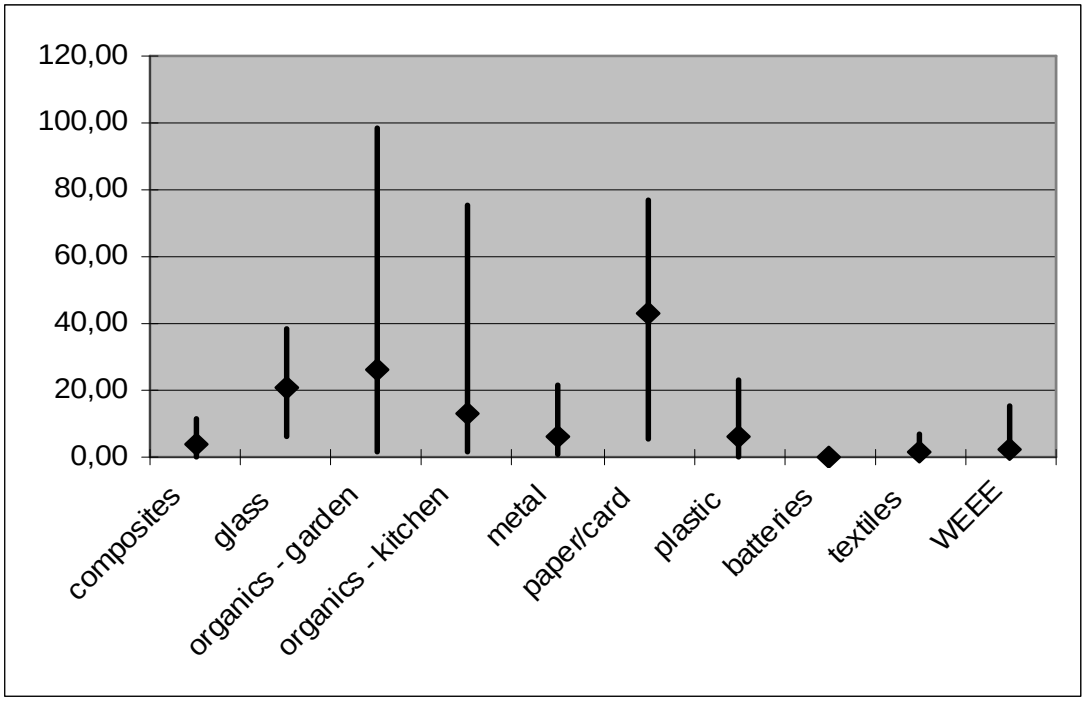
With no surprise, paper/card, organics-garden waste and glass are the three materials the most represented in selective collection.

Table 7: Minimum, maximum and average kg/inhabitant materials collected

Material	Maximum	Average
Beverage cartons	11.53	3,65
Glass	38.64	20,83
Organics - garden	98,50	26,15
Organics - kitchen	75,22	13,02
Metal	21,71	6,52
Paper/card	76,65	43,22
Plastic	22,83	5,88
Batteries	0,57	0,24
Textiles	6,99	1,41
WEEE	15,52	2,04
Total	**368.16**	**122,96**

**Minimum amounts do not include zero figures where authorities do not collect the particular material.*

Figure 10: Minimum, maximum and average kg/inhabitant materials collected



7.2. Collection styles by material

Table 8 provides more detail on *what* materials are collected and *how* according to kerbside, neighbourhood banks (also known as 'eco-points'), civic amenity sites (recycling centres), or 'on demand' where the citizen contacts the local authority or a partner organisation to request the collection of materials.

Table 8: Collection style by material

	Organics (garden)				Organics (kitchen)				Beverage Cartons				Glass				Metal				Paper/card				Plastic				Batteries				Textiles				WEEE			
Authority	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD	K	B	CA	OD
1. Aalborg			x							x				x			x	x			x	x				x								x					x		
2. Andalucia										x				x	x			x	x			x								x										
3. Basel	x			x										x			x	x			x												x							
4. Brussels Region	x								x		x		x	x	x		x				x		x											x						
5. Chiclana de la Frontera		x								x				x								x												x						
6. Dublin City Council									x		x			x	x		x	x	x		x	x	x			x												x		
7. Est Milano	x		x		x								x	x	x		x		x		x		x		x		x							x				x		
8. Flanders Region	x	x	x	x	x				x		x		x	x	x		x	x	x		x	x	x		x	x	x						x	x	x			x	x	
9. Groningen	x													x							x	x											x					x	x	
10. Hampshire County	x		x										x	x	x		x	x	x		x	x	x		x		x				x			x	x			x	x	
11. IDELUX			x		x						x			x	x				x		x		x				x				x				x			x		
12. INTRADEL	x	x	x						x		x			x	x				x		x		x											x				x		
13. Leiria									x	x	x	x		x							x	x	x	x																
14. Liège			x						x					x							x																			
15. Lisbon	x								x	x			x	x							x	x									x									
16. Mallorca		x			x					x				x								x																		
17. Nantes			x						x	x	x			x							x	x	x											x					x	
18. Odense														x	x				x			x	x	x										x					x	
19. Padova Uno	x	x	x		x	x			x	x	x		x	x	x		x	x	x		x	x	x		x	x	x		x				x	x				x	x	
20. Pamplona		x								x				x				x				x								x	x		x					x	
21. Paris (Mairie de)	x								x		x		x	x	x		x				x				x	x								x			x			
22. Poitou-Charentes			x		x				x	x	x		x	x			x		x		x	x	x		x	x							x					x		
23. Porto			x						x	x	x	x		x	x	x					x	x	x	x						x			x							
24. Priula	x		x		x				x				x		x		x		x		x		x		x									x				x		
25. Salzburg				x	x						x			x			x		x			x	x	x			x				x	x		x			x		
26. Settimo Torinese	x		x		x	x							x	x					x		x	x											x				x	x	
27. South Dublin County			x						x		x			x	x		x	x	x		x		x				x	x					x			x	x			
28. Vienna	x	x	x	x		x							x	x				x	x	x	x	x	x				x						x					x	x	
29. Walloon Region	x		x		x				x		x		x	x	x		x		x		x		x		x		x						x	x	x			x		
30. Western Macedonia		x				x																											x		x			x		
Incidences	14	8	16	4	10	4	0	0	15	11	14	2	12	28	15	1	14	10	16	1	24	19	18	4	8	7	8	0	1	3	6	1	7	15	10	1	1	1	19	6

K = kerbside ; B = neighbourhood banks; CA = civic amenity sites; OD = on demand

We consider each material in more detail further in this section, but it is interesting to note the following points from the incidences of collection styles in Table 7. The number of incidences correspond to 30 authority responses. It is worth stating that **authorities often use more than one collection style for a material.**

- **Garden organics**: these appear to be collected slightly more from civic amenity sites than from kerbside (14 from kerbside, 16 from civic amenity sites), followed by neighbourhood banks (8). A small number of authorities report collecting these on demand (4).

- **Kitchen organics**: these are mostly collected from kerbside (10 incidences). Markedly fewer authorities collect from neighbourhood banks (4), and none collect at civic amenity sites or on demand.

- **Beverage cartons**: a roughly equal number of incidences were reported for kerbside and civic amenity site collections (15 and 14, respectively) , followed closely by neighbourhood banks (11). 2 authorities reported collecting on demand.

- **Glass**: 28 of 30 authorities collect glass from neighbourhood banks, showing this to be the most popular form of collection for any of the materials. A relatively equal number of authorities also collect from kerbside and civic amenity sites (12 and 15, respectively), and 1 collects on demand.

- **Metals**: The most popular collection style is civic amenity sites (16), closely followed by kerbside (14). Slightly fewer collect from neighbourhood banks (10). 1 collects on demand.

- **Paper**: The second strongest result (after neighbourhood banks for glass) is kerbside for paper (24 incidences). Neighbourhood banks and civic amenity sites are slightly less popular but still represent a majority collection style (19 and 18, respectively). 4 authorities collect on demand.

- **Plastic**: Where information for plastics was provided separately from 'PMC' collections, there is not much variation between kerbside (8), neighbourhood banks (7) and civic amenity sites (8). No authorities collect on demand.

The following products are considered separately from the typical 'dry' and 'wet' recyclables addressed above. We consider these in further detail under 'other elements of collection schemes'.

- **Batteries**: few authorities reported collection details for these. 6 collect from civic amenity sites, 3 from neighbourhood banks, and 1 each from kerbside and on demand.

- **Textiles**: half of the 30 authorities (15) collect from neighbourhood banks, slightly fewer (10) from civic amenity sites and still fewer (7) from kerbside. 1 collects on demand.

- **WEEE**: Despite difficulties in implementation of this directive, already 19 authorities report collecting from civic amenity sites. The second most used method is on demand (6 incidences). 1 authority each reported collecting from kerbside and neighbourhood banks.

7.2.1. Selective collection performance by material

Table 10 provides kg/inhabitant figures for individual materials collected, where these figures were provided separately for each material. The average figures in the table are for individual material figures (that is, the average does not include the multi-material figures) only for performing authorities. In this way, we present what is possible as an average that reflects positive performance, rather than an average across all the authorities regardless of whether they collect the materials or not.

Figures 11 and 12 show a percentage breakdown by material for 'dry' and 'wet' recyclables. For 'dry' recyclables, paper/card and glass make up 80% of the materials collected.

Figure 11: Average percentage 'dry' recyclables collected

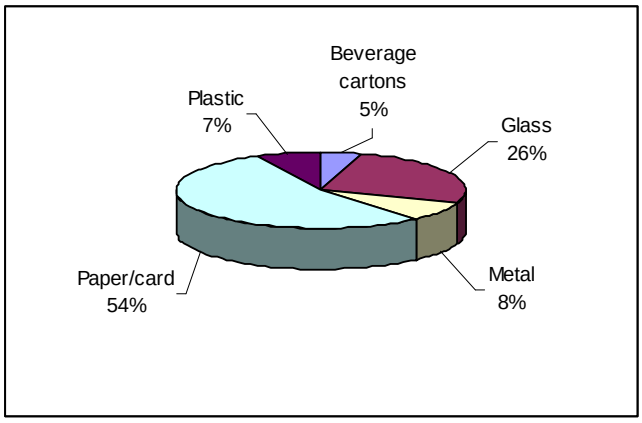


Figure 12: Average percentage 'dry' and 'wet' recyclables collected

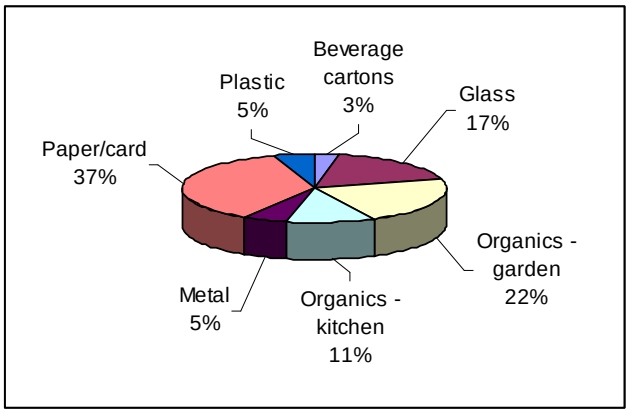


Table 9: Selective collection materials collected (kg/inhabitant)

Authority	Paper/ Card	Composites	Plastic	Metal	Glass	Organic (garden)	Organic (kitchen)	Textiles	WEEE	Batteries	Total SC
Aalborg	42,39		1,27	18,37	16,57	94,85		1,16	5,29		179,9
Ancona	23,91	8,47		5,03	13,58	14,99	1,54	1,43	0,94	0,42	70,31
Andalucia	5,22	5,25	0,32	2,04	7,13	0					19,96
Barcelona (Metropolitan Area)	19,27		6,68		11,62	7,22	30,6		0,26		75,65
Basel	76,65			4,4	29,72	9,11		4,04			123,92
Brussels Region	39,88	13,13				9,73		2,3	1,24	0,16	66,44
Catalunya	18,96	7,35			13,94	6,57	14,35	0,49	0,4	0,07	62,13
Chiclana de la Frontera	6,37	5,36			8,2	7,16		0,69			27,78
Dublin	74,02	0,15	0,33	3,75	11,25				1,52		91,02
East Milan	59,24		15,51	12,99	35,82	46,65	73,41	1,28	0,06		244,96
Flanders Region	70,67	1,58	7,95	12,38	29,07	78,9	51,39	4,3	3,29		259,53
Groningen	48,69				18,74	39,97		3,63	8,14		119,17
Hampshire County	83,04				16,56	42,36		1,83	1,82	0,57	146,18
IDELUX	53,51	1,45	4,31	13,4	30,95	98,5	28,8	0,79	6,09	0,11	237,91
INTRADEL	50,59	21,82			27,59	46,2		0,04	3,02		149,26
Leiria	9,14	2,42			8,44						20
Liège	60,88	19,74			29,79	1,37					111,78
Lisbon	27,09	4,81			14,75	6,25				0,03	52,93
Mallorca	73,97	4,38			18,57	31,74	2,36				131,02
Nantes	47,72				24,51	51,27			1,55		125,05
Odense	64,09			18,4	9,63			1,9	4,12		98,14
Padova Uno	54,03	11,53	22,83	8,89	24,65	51,94	49,93	5,07	1,9	0,5	231,27
Pamplona	35,04	11.62			19,62	11,66		0,35	0,07	0,21	78,57
Paris (Mairie de)	25,89				24,18	4,36		0,71	0,08		55,22
Poitou-Charentes	42,54		6,18	21,71	38,64	59,07	4,27	0,15	0,17		178,91
Porto	10,11	2,25			12,58	9,03				0,1	34,07
Priula	54,39	64,37				50,64	63,58	3,14	2,82		238,94
Salzburg	72,44	7,75	7,75	6,88	23,8	27,97	75,22	2,2	2,45		226,46
Settimo Torinese	15,44			0,78	13,16	14,62	13,43	0,5	0,42		58,35
South Dublin County	46,09	0,08	0,26	3,25	11,89	3,18		1,12	1,21	0,1	67,18
Vienna	72,22		5,41	11,11	14,71	45,69	4,26	0,15	1,79	0,34	155,68
Walloon Region	48,59	21,31			27,28	54,49	1,92	0,93	3,08		157,6

Western Macedonia	37,31			8,16	5,83	2,33		6,99	15,52	0,22	76,36
Average*	44,68	4,53	6,56	9,22	19,12	31,99	29,65	1,88	2,69	0,24	121.7

***** *Averages are only of figures for individual materials and of performing authorities*

Table 10 presents authorities grouped according to the materials they presented combined. Where more than one authority presented the same combination of materials, an average is also given.

Table 10: Multi-material combinations and performance (kg/inhabitant)					
Multi-materials: PMC					
Authority	Country				
Catalunya	E	7.35			
Chiclana de la Frontera	E	5.36			
INTRADEL	B	21.82			
Leiria	P	2.42			
Liège	B	19.74			
Lisbon	P	4.81			
Mallorca	E	4.38			
Porto	P	2.25			
Walloon Region	B	21.31			
Average		9.94			
Multi-materials: PMC and glass					
Authority	Country				
Brussels Region	B	13.13			
Priula	I	64.37			
Average		38.75			
Multi-materials: PMC, paper/card and glass					
Nantes	F	47.72			
Paris (Mairie de)	F	25.89			
Average		36.81			
Multi-materials: paper/card, plastic, metal, glass					
Hampshire County	UK	83,04			
Multi-materials: Paper/card and composites; plastic and metal					
Authority	Country	Paper/card	Composites	Plastic	Metal
Barcelona	E	19,27		6,68	
Multi-materials: composites and plastic					
Authority	Country				
Pamplona	E	6,47			
Poitou-Charentes	F	42,54			
Average		24,51			

7.2.2. Selective collection styles for dry recyclables

Table 11 provides average and maximum kg/inhabitant figures for 'dry' recyclables according to collection style. The number of occurrences of is also mentioned for each collection style.

Before we look at each material or product more closely, the following general points can be made:

- As mentioned earlier, many authorities have introduced **'multi-material' or 'co-mingled' collections**, most frequently mixing plastics, metals and composite packaging - what we have called 'beverage containers'. Francophone authorities call this 'PMC' (plastics, metals and cartons) and Spanish authorities use the term 'light packaging'. However, these are not the only possible mixed for multi-material collections. Table 10 most clearly presents the materials that are collected in a co-mingled way, giving insight into the different mixes possible for materials.

- A subsequent result from the previous point is that **figures for the different materials cannot be segregated**. There are several knock-on effects from this:

    - **It can appear that some materials are not being collected, since no specific figures are provided for them.** This is particularly true for metals and plastic since they are agglomerated within 'beverage containers'.

    - **Figures for a material can appear inflated.** In particular, this is the case for Hampshire County (collecting paper, cardboard, plastics and metals together) and Nantes and the Mairie of Paris (collecting paper, cardboard and PMC). Tonnages for their multi-material collections have been presented in the **'paper/card'** column. The Brussels Region and Priula collect **glass** together with PMC. For each of these cases, the amalgamated figures have been presented as the heavier material (paper or glass) since this will make up the bulk of the weight.

    - **It is not because no specific results are provided for some materials that they are not collected.**

- We have already stated earlier that **the source of the materials collected is not always presented clearly**. Hence, some of the variations in the total kilograms collected per inhabitant could be due to some authorities collecting mostly from households, while others will have presented their figures for all the *municipal* sources.

Table 11: 'Dry recyclables' collection styles – results in kg/inhabitant

	Glass					Paper and card					Metal					Beverage cartons					Plastic			
Authority	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**TOT**
Aalborg		16,6			16,6	6,5	35,9			42,4	1,2	17,2			18,4							1,3		1,3
Ancona Province					13,6					23,9					5,0					8,5				
Andalucia		6,7	0,5		7,1		5,2			5,2			2,0		2,0		5,3			5,3		0,3		0,3
Barcelona (Metropolitan Area)					11,6					19,3					6,7									
Basel		29,7			29,7	76,7				76,7	2,9	1,5			4,4									
Brussels Region			10,9		13,1					39,9														
Catalunya					13,9					19,0										7,4				
Chiclana de la Frontera		8,2			8,2		6,4			6,4							5,4			5,4				
Dublin City Council		10,9	0,3		11,3	72,1	1,5	0,5		74,0	2,2	0,4	1,2		3,8	0,1		0,1		0,2		0,3		0,3
Est Milano	24,6	1,1	10,6		36,3	31,2		28,9		60,1	2,1		11,0		13,2						12,6		3,2	15,7
Flanders Region	4,1	20,1	4,8		29,1	52,5	0,6	17,5		70,7	4,2	0,0	8,1		12,4	1,3		0,3		1,6	4,9	0,0	3,1	8,0
Groningen		18,7			18,7	25,6	23,1			48,7														
Hampshire County	29,9	14,0	2,6		46,4	29,9	5,0	4,3		**39,1**		0,0	14,0		14,0								0,0	0,0
IDELUX		18,0	13,0		31,0	13,5		40,1		53,5			13,4		13,4			1,5		1,5			4,3	4,3
INTRADEL		24,0	3,6		27,6	40,5		10,1		50,6			6,4		6,4	14,5		0,9		15,4				
Leiria		8,4			8,4	0,2	6,7	1,7	0,6	9,1						0,1	1,9	0,4	0,1	2,4				
Liège		29,8			29,8	60,9				60,9						19,7				19,7				
Lisbon	0,9	13,8			14,8	2,7	24,4			27,1						0,6	4,2			4,8				
Mallorca		18,6			18,6		74,0			74,0							4,4			4,4				
Nantes		24,5			24,5	20,4	20,4	6,9		47,7														
Odense		4,5	5,2		9,6	24,0	20,4	19,7		64,1			18,4		18,4									
Padova Uno	24,7				24,7	54,0				54,0	8,9				8,9	11,5				11,5	22,8			22,8
Pamplona		19,6			19,6		35,0			35,0		5,2			5,2		2,4			2,4		4,1		4,1
Paris (Mairie de)	19,9	4,2	0,1		24,2	25,8				25,8								0,1		0,1				
Poitou-Charentes	6,2	32,5			38,6	22,9	13,5	6,1		42,5	2,5		19,2		21,7						4,6	1,6		6,2

Porto		11,4	0,7	0,5	12,6	1,1	5,3	2,3	1,4	10,1						0,7	1,4	0,0	0,2	2,3				
Priula	48,5				48.48	44,8		9,6		54,4	7,5		8,4		15,9									
Salzburg		23,8			23,8	0,0	66,4	2,7	3,4	72,4	1,9		5,0		6,9			7,8		7,8			7,8	7,8
Settimo Torinese	4,3	8,9			13,2	7,8	7,6			15,4			0,8		0,8									
South Dublin County		11,6	0,3		11,9	45,4		0,7		46,1	1,2	0,2	1,9		3,3	0,1		0,0		0,1		0,2	0,1	0,3
Vienna	0,6	14,1			14,7	64,0	7,1	1,1		72,2	0,0	2,8	7,9	0,4	11,1							5,4		5,4
Walloon Region	1,6	20,2	5,5		27,3	32,6		16,0		48,6			8,7		8,7	10,1	0,0	2,5		12,7				
Western Macedonia					5,8					37,3					8,2									
# occurrences	11	26	13	1	33	24	18	16	3	33	11	8	15	1	22	10	8	10	2	19	4	8	6	13
Maximum kg/inhab	48,5	32,5	13,0	0,5	46,4	76,7	74,0	40,1	3,4	76,7	8,9	17,2	19,2	0,4	21,7	19,7	5,4	7,8	0,2	19,7	22,8	5,4	7,8	22,8
Average kg/inhab	**15,0**	**15,9**	**4,4**	**0,5**	**19,9**	**31,5**	**19,9**	**10,5**	**1,8**	**43,2**	**3,1**	**3,4**	**8,4**	**0,4**	**9,5**	**5,9**	**3,1**	**1,3**	**0,1**	**6,0**	**11,2**	**1,6**	**3,1**	**5,9**

Besides, in the table 11 bis below, we have tried to analyse, for relevant municipalities, the effect of combining two parallel selective collection methods for each materials. It seems worth mentioning that a combination of kerbside and bring containers is widespread, mainly for glass, paper and cardboard and metals. For those materials, having igloos in parallel with kerbside collection seems to allow to increase collection rates by about 50%. Such combinations are much less widespread for metals and plastics. The interest of such a combination appears far less obvious.

Table 11 bis: Combined collection – Kerbside + Bring systems

	Glass			Paper and Card			Metal			Beverage Cartons			Plastics		
	K	B	K+B	K	B	K+B	K	B	K+B	K	B	K+B	K	B	K+B
# occurrences	11	26	9	24	18	14	11	8	6	10	8	4	4	8	2
Average kg/inhab	15,0	15,9	**24,6**	31,5	19,9	**40,5**	3,1	3,4	**5,6**	5,9	3,1	**4,7**	11,2	1,6	**5,5**

7.2.2.1. Kerbside collection frequency

The table 12 below presents kerbside collection frequencies (in number of collections/month) for various municipalities[8]. Frequency is highest for residuals and organic kitchen. Residual waste are most often collected weekly with increased frequencies in urban zones. Some parts of Flanders, Groningen and Odense collect residuals every two weeks. Organic kitchen are usually collected once a week. Twice in some cases. Kerbside collection is in many cases only organised in summer months. Paper and PMC are in a great majority of cases collected weekly whereas bulky waste are collected on demand.

Table 12: Kerbside collection frequency (times/month)

	residuals	organic garden	organic kitchen	paper and card	Glass	PMC	metals	bulky waste
Aalborg			4	1			1	1
Basel		2		1			1/2	4 (OD)
Brussels	8	4*				4		OD
Dublin				1			1	
East Milano	4		8	4	4		4	
Flanders	2 - 4	1/3	2	1	1	2		1/6 to 1
Groningen	2	2		1				
Intradel	4			1		2		
Leiria				4		4		
Liège	4			4		4		1
Nantes	4 - 8			2 or 4		2 or 4		
Odense	2	2	2	1				1/6
Padova Uno	4		8	2	1			
Pamplona								OD
Paris					4	4		OD
Poitou-Charentes	4 to 20		4	4	4	4		
Porto				4		4		
Priula	4	4*	8	2		2		
Salzburg	up to 12	1/6	4	4		4	2	1/6
Settimo Torinese	4	4	8	2	2			
South Dublin	4			1		1		

[8] Fractions mean that collection is less frequent than once/month. For instance 1/3 means that collection is done 4 times a year.

Vienna	4 to 30	4		4 or 8	2 or 4		
Min	2	1/6	2	1	1	1	1/2
Max	30	4	8	8	4	4	4

* in summer months

7.2.3. Collection styles - Analysis by material

7.2.3.1. Glass

Glass is collected by all the authorities, and makes up a considerable element of selective collection systems, because it is long-established in recycling collections (some authorities introduced banks as long ago as the 1970s) and because it is a heavy material.

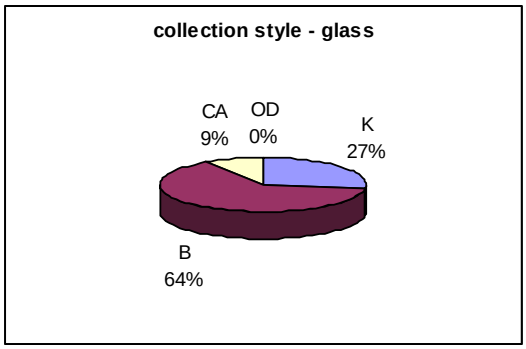


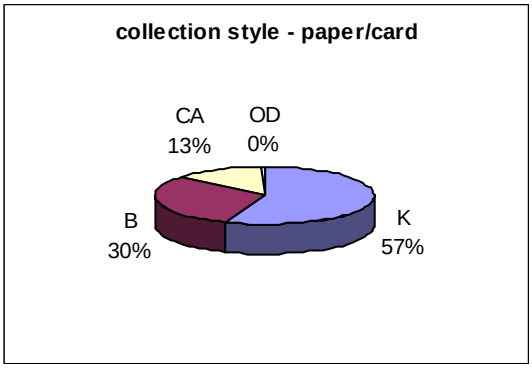
Figure 13 shows that the average collection amount - nearly 20 kg/inh - is approximately half of the maximum amount provided by a responding authority, showing significant potential in collecting more of the glass available.

The pie-chart on the right shows that glass tends to be collected separately from other materials, normally from neighbourhood banks rather than kerbside, although kerbside remains the second most popular collection style. It is worth noting again that some of the glass collected at kerbside was not packaging, so this percentage is likely to be somewhat inflated.

Many authorities and recycling collectors have taken a very strong 'separation at source' approach, particularly where green dot systems have been implemented. Here, glass is collected from the banks and taken directly to recyclers, rather than being separated at sorting centres (where PMC is usually taken). Also, glass can be further separated at source according to colour, with individual banks being provided for clear and coloured glass.

7.2.3.2. Paper/card

It should be stated that paper and card, although presented as a single material in this report, are not necessarily treated as a single material by all authorities. Paper, as a higher quality material, is collected more widely than cardboard, but as our survey did not distinguish between the materials we present them as one. For the sake of ease, we use the term 'paper'.

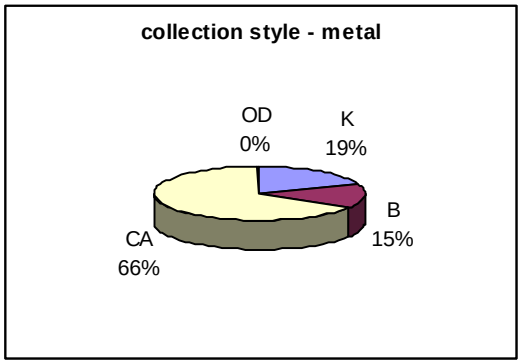


Paper shares many selective collection characteristics with glass. It is a material collected by all responding authorities. With an average of nearly 45kg/inh selective collection, it forms a considerable element of typical 'dry' or 'dry'/'wet' collection systems – 54% and 37% respectively. The market for this material is well developed, and has been so for decades.

The figure 14 to the right shows that it is a popular kerbside collection material, far ahead of second-placed neighbourhood bank.

According to Figure 14, the average kg/inhabitant collected is just over half of the maximum collected from responding authorities. However, as stated earlier in this report, some 'PMC' tonnages have been calculated along with paper, and considerable tonnages can be collected from non-household sources such as offices. Therefore, the image is less clear than we present it here.

7.2.3.3. Metal



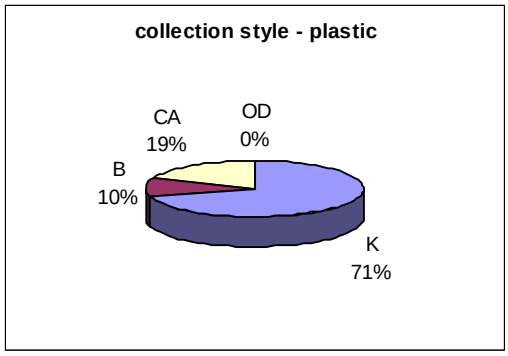
Metal is one of the 'PMC' materials, therefore it is not necessarily presented as an individual selective collection material (although 22 of the 34) responding authorities provided separate figures for it.

Figure 15 shows that the average kg/inhabitant collected is one-third of the highest amount cited by a responding authority, but as stated earlier the tonnages for metal provided by some authorities included non-packaging (therefore heavy) units such as furniture (shelves, desks, etc.). 9 of the 22 authorities who provided specific figures for metal are collecting more than 10 kg per inhabitant, so there is room for improvement nonetheless.

The Figure 15 to the right show that the most popular collection style for this material is civic amenity sites, followed by kerbside and closely followed by neighbourhood banks.

Although we did not distinguish between the types of metals in our survey, and therefore do not in our analysis, some authorities distinguished between ferrous and non-ferrous metals.

7.2.3.4. Plastic



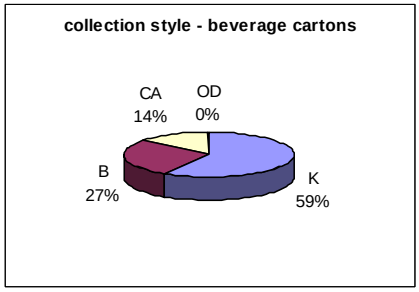
The last of the 'light packaging' materials, plastic is collected mostly from kerbside and, unlike any of the other packaging materials, civic amenity sites are the second most popular collection type (comparable only to kitchen organics, which are collected only by these two styles).

Figure 16 shows that the average kg/inhabitant collected represents approximately 25% of the highest amount given by a responding authority, which makes it possible to significantly increase waste collection rates.

Plastic makes up a similar percentage of 'dry' and 'dry'/'wet' selective collection systems, and more or less mirrors the metal percentage.

7.2.3.5. Composites

It is difficult to be precise in analysing composites because some authorities could not provide individual figures for this packaging type. We have already said that authorities in countries where the 'green dot' system has been applied collect 'PMC' or 'light packaging', meaning plastic, metals and 'composites' or 'bricks'. In the UK, where the 'green dot' system has not been introduced, and where authorities have weight-based recycling targets, considerably few authorities collect 'composites'. In our analysis, we have tried to treat it in isolation from other 'PMC' materials by analysing only those authorities who provided separate figures for composites.



According to Figure 17, the average kg/inhabitant collected is just under one-fifth of the highest amount recorded from responding authorities, showing that there is much of this material still to be collected. The majority of authorities providing figures for this material collect between 2-8 kg/inhabitant.

Due to its light weight, it makes up a relatively small percentage of 'dry' or 'dry'/'wet' collection systems – 5% and 3% respectively. These are slightly lower than percentages for metal and plastic, so it

appears that where the different 'PMC' materials can be identified separately (for example, if metals, plastics and composites are collected separately at civic amenity sites) composites still do not make up a significant proportion of recycling collection.

Most of the material is collected kerbside, more than double from the next most popular collection style – neighbourhood banks.

7.2.4. Selective collection styles for organics

Table 13 provides average and maximum kg/inhabitant figures for 'dry' recyclables according to collection style. The number of occurrences of is also mentioned for each collection style.

Table 13: Organics collection style (kg/inhabitant)

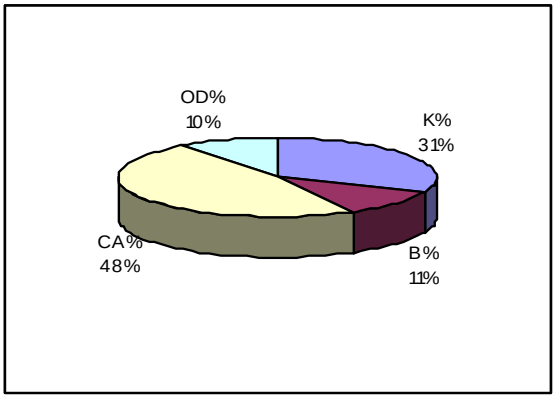
	Organics - garden					Organics - kitchen				
Authority	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**
Aalborg			94,9		94,9					
Barcelona (Metropolitan Area)			7,2		7,2					30,6
Basel	6,1			3,0	9,1					
Chiclana de la Frontera		7,2			7,2					
Est Milano	6,3		41,0		47,3	74,5				74,5
Flanders Region	8,9	1,1	66,9	2,0	78,9	51,4				51,4
Groningen	40,0				40,0					
Hampshire County Council	1,9		40,4		42,4					
IDELUX			98,5		98,5	28,8				28,8
INTRADEL	8,9		37,3		46,2					
Liège			1,4		1,4					
Lisbon	6,3				6,3					
Mallorca		31,7			31,7	2,4				2,4
Nantes			51,3		51,3					
Padova Uno	51,9				51,9	49,9				49,9
Pamplona		11,7			11,7					
Paris (Mairie de)	4,4				4,4					
Poitou-Charentes			59,1		59,1	4,3				4,3
Porto			9,0		9,0					
Priula	36,1		14,5		50,6	63,6				63,6
Settimo Torinese	7,4		7,2		14,6	7,4	6,0			13,4
South Dublin County			3,2		3,2					
Région Wallonne	3,8		50,7		54,5	1,9				1,9
Western Macedonia		2,3			2,3					
Vienna	38,0	1,2	5,7	0,8	45,7		4,3			4,3
# occurrences	13	6	16	4	29	10	2	0	0	14
Maximum kg/inhab	51,9	31,7	98,5	28,0	98,5	75,2	6,0			75,2
Average kg/inhab	**16,9**	**9,2**	**36,8**	**8,5**	**31,6**	**35,9**	**5,2**			**31,9**

Organics

In our questionnaire, we distinguished between garden and kitchen organics because their different characteristics mean that they are usually managed differently, from collection to treatment.

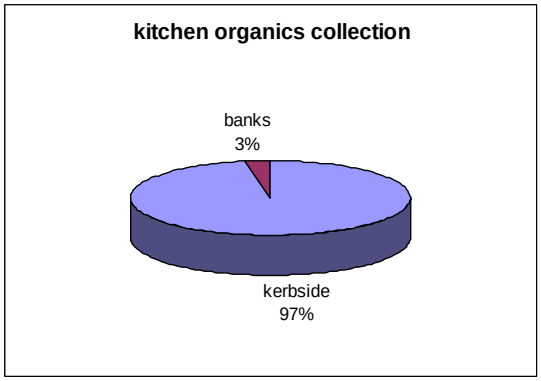
Of the 34 authorities that responded to the questionnaire, 29 collect garden organics and only 14 collect kitchen organics. Indeed, more than three-quarters of the organics collected by the responding authorities are from the garden.

Figure 18: Average collection style for organics (garden and kitchen combined)



There are marked differences in collection of the two types of organics. The large majority of garden organics (66%) are collected at civic amenity sites, and the second most popular collection style – kerbside – is considerably less (25%). These two collection styles, however, make up more than 90% of the collection systems provided by the responding authorities. On the contrary, kitchen organics are only collected by kerbside (97%) or neighbourhood banks (3%) (see figure 19 here below).

Organics are also considered in more detail in the section on Treatment, and under 'home composting' in *Prevention*.



Organics require a strategic approach that addresses all the points along its management chain – from collection and treatment to the production of an end-product and the monitoring of its quality and its marketing. However, given that organics make up a considerable proportion of municipal waste (anywhere from 20% to over 60%), it is an important material to manage, and warrants a management plan or strategy of its own if it is to be managed well.

Recognising the support needed by LRAs, ACR+ has published a guide on 'biowaste', as organics are also called, entitled *Managing Biodegradable Household Waste: What Prospects for European Local Authorities*. The guide goes into much more detail than is possible here, providing a reader-friendly explanation of its biological nature and its subsequent needs in relation to collection, treatment and end-products.

In the table 13 bis below, we have tried to analyse, for relevant municipalities, the effect of combining kerbside collection and collection via civic amenity sites for organics garden. It looks like combining two collection methods has the same effect for organics garden as for glass, paper and cardboard and metals and allows to increase collection rates by about 50%.

Table 13 bis: Combined collection- kerbside and civic amenity sites for organic gardens

	Organics - garden		
	K	**CA**	**K+CA**
# occurrences	13,0	16,0	8
Maximum kg/inhab	51,9	98,5	75,8
Average kg/inhab	**16,9**	**36,8**	**46,9**

7.2.5. Other elements of collection schemes – batteries, textiles, 'WEEE' and others

In the years since the last survey, new EU directives have been developed that address products rather than materials. In particular, electrical and electronic equipment (WEEE) and batteries are the subject of directives, despite their not yet being fully implemented by some national governments (WEEE) or not yet having been concluded at EU level (batteries). We asked authorities to provide us details for these elements because in anticipation of the involvement of LRAs in meeting targets set in the Directives, we realised that collection systems would need to be partially or fully implemented by LRAs.

Textiles also featured in our questionnaire because they are a traditional material for collection for some authorities. Reuse is considered in somewhat more detail under Prevention.

In our questionnaire, we invited authorities to provide details of collection and treatment for 'other' wastes without specifying these. It was our wish to invite further information from authorities on wastes or materials beyond the typical selective collection candidates.

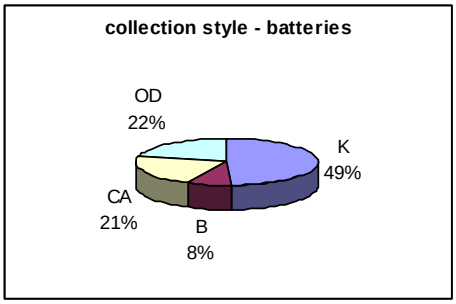
Table14: Collection style and amounts - WEEE, batteries and textiles

	WEEE					Textiles					Batteries				
Authority	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**	**K**	**B**	**CA**	**OD**	**TOT**
Aalborg			3,36	1,94	5,29		1,16			1,16					
Ancona Province					0,94					1,43					0,42
Andalucia												3,62			3,62
Barcelona (Metrop. Area)					0,26										
Basel						4,04				4,04					
Brussels Region					1,24		2,30			2,30					0,16
Catalunya					0,40					0,49					0,07
Chiclana de la Frontera							0,69			0,69					
Dublin City Council			1,52		1,52										
Est Milano			0,06		0,06		1,30			1,30					
Flanders Region			3,20	0,09	3,29	1,61	2,41	0,29		4,30					
Groningen			6,62	1,52	8,14	3,63				3,63					
Hampshire County			1,30	0,52	1,82		1,53	0,30		1,83			0,57		0,57
IDELUX			6,09		6,09			0,79		0,79			0,11		0,11
INTRADEL			3,02		3,02			0,04		0,04					
Lisbon												0,03			0,03
Nantes			1,55		1,55										
Odense			4,12		4,12			1,90		1,90					
Padova Uno	1,90				1,90	5,07				5,07	0,50				0,50
Pamplona			0,07		0,07	0,35				0,35		0,13	0,08		0,21
Paris (Mairie de)	0,08				0,08		0,71			0,71					
Poitou-Charentes			0,17		0,17			0,15		0,15					
Porto								0,00		0,00			0,10		0,10
Priula			2,82		2,82		3,14			3,14					
Salzburg			2,45		2,45	0,90	1,29			2,19					
Settimo Torinese			0,26	0,16	0,42			0,50		0,50					
South Dublin County			1,21		1,21		1,03	0,09		1,12			0,10		0,10
Vienna			1,64	0,16	1,79		0,15			0,15			0,34		0,34
Walloon Region			3,08		3,08	0,23	0,37	0,33		0,93					
Western Macedonia		15,52			15,52		6,99			6,99				0,22	0,22
# occurrences	2	1	18	6	25	7	13	10	0	25	1	3	6	1	13
Maximum	1,9	15,5	6,6	1,9	15,5	5,1	7,0	1,9	0,0	7,0	0,5	3,6	0,6	0,2	3,6

kg/inhab															
Average kg/inhab	**0,99**		**2,36**	**0,73**	**2,69**	**2,26**	**1,77**	**0,44**		**1,81**	**0,50**	**1,26**	**0,22**	**0,22**	**0,50**

7.2.5.1. Batteries

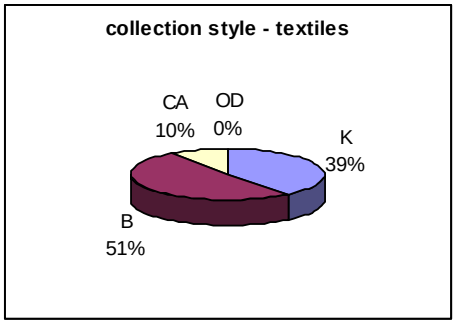
13 authorities provided figures for batteries collected, although this does not necessarily reflect anticipation of the Batteries directive and does not mean that the collected batteries are recycled. Generally, they are considered a hazardous waste and therefore are collected separately from residual waste. A small number of authorities provided distinct figures for household and car batteries, which have significantly different weights per unit. Hampshire County collects only car batteries, Porto collected 6 times as many car batteries as household batteries, and just over 90% of Vienna's collection is car batteries.



The draft Batteries directive is currently based upon a recycling target according to the amount of product put on the market, but it is not yet clear how LRAs will be involved in meeting the targets. Given that half the batteries were collected from kerbside (see figure 20 here above), this implies that the authorities are managing this product themselves.

7.2.5.2. Textiles

As already stated, textiles are traditionally collected for recycling, however not always by the authorities themselves. Many responding authorities could not provide figures for textiles collected by these 'third parties' (usually charitable organisations, but also private companies), which means that the tonnages are not being counted as part of municipal waste arisings. However, as the materials are not being 'managed' (collected or treated) by the authority, it is understandable that they are less concerned with them.

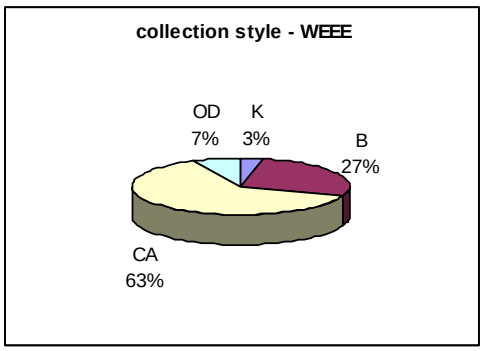


A few authorities have collected between 3-5 kg per inhabitant pa, which is substantial enough to justify collecting data. Half of the materials were collected at neighbourhood banks, and the second most popular form of collection is kerbside (which implies that they are collected by the authorities).

As for WEEE, textiles are not always recycled, and are a popular material for reuse. These are considered in more detail in 'reuse' in the section on 'Prevention'.

7.2.5.3. Waste electrical and electronic equipment ('WEEE')

Details of collection of WEEE were provided by 25 of the 34 responding authorities, averaging just over 2 kg/inh/year. The WEEE directive has an initial target of separate collection of 4 kg per person by 31 December 2006. 5 authorities have already met this target. The highest amount collected per inhabitant – 15.52 kg – appears anomalous in relation to the performance in other authorities. It is likely that this result was based upon an EU-funded project. In any case, the authority specified that the products were from non-household sources as well.



It is recognised that member states are having difficulty implementing the directive, in particular in identifying what costs will be covered by product manufacturers and the collection systems to be created. For local authorities, the collection of WEEE requires space for the storage of the products, and so it is not a

surprise to see that most authorities collect WEEE at civic amenity sites. Having clarified the responses from some authorities, 'neighbourhood banks' mean 'recycling points' where many materials are collected. A much more recent development is the introduction of small home electrical appliances (such as shavers, electric toothbrushes, etc.) into kerbside collection schemes, so this collection style could increase in future.

Not all WEEE is collected for recycling, but we consider this further under the section on 'Treatment' and in 'reuse' in the section on 'Prevention'.

7.2.5.4. Other materials collected

Some authorities encourage or require their residents to separate many more types of materials and products than have been considered so far in this report. At the very least, this makes their safe treatment (particularly hazardous waste) easier, while also requiring the public to engage more with the waste they produce.

The table below illustrates some materials collected **mostly at civic amenity sites**, their corresponding tonnages and kg/inhabitant, and, where provided, the type of treatment they undergo.

Table 15: Example of other materials/products collected (tonnes and kg/inh/y) and treatment

Material	kg/inh/y	Treatment
Cooking and motor oil*	0.05	Recycled
	1.01	Recycled
	0.88	Recycled and incinerated with energy recovery
	0.05	Not indicated
	0.87	Not indicated
Corks	0.09	Recycled
	0.01	Recycled
Flat glass	1.03	Not indicated
Medicines	0.05	Recycled
	0.002	Not indicated
	0.07	Not indicated
Plastic bags	1.06	Recycled
Polystyrene	0.24	Recycled
Tyres	0.15	Recycled
	0.43	Not indicated
	0.29	Not indicated
Wood	3.92	Incinerated without energy recovery
	36.87	Incinerated without energy recovery
	22.83	Not indicated
	3.67	Not indicated

** These are not necessarily collected together, but their amalgamated tonnages have been presented to show how much it is possible to collect.*

It must be emphasised however that this list of materials is far from exhaustive and that selective collection tends to diversify considerably notably at civic amenity sites. There is some evidence that with the development of selective collection, outlets are being found for increasing numbers of materials collected by municipalities. This study was focused on most common municipal recyclables.

Information collected however show that civic amenity sites allow in some cities to collect important amounts of materials such as wood, furniture, plastic foils, inert waste for recycling. This is certainly a domain worth to be analysed further in the future.

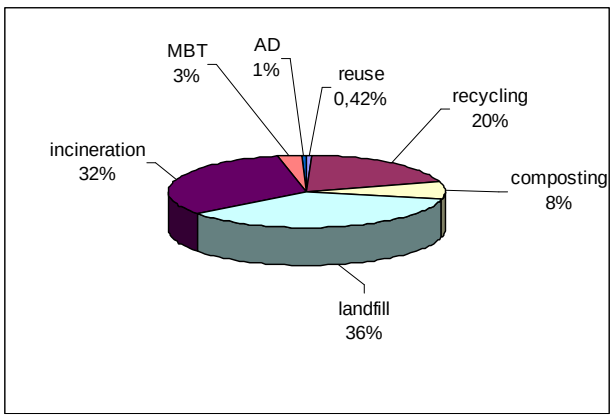
8. Treatment

Table 16 below shows percentage breakdowns of treatment types for household or municipal waste.

Table 16: Household and municipal waste treatment (%age)

Authority	reuse	recycling	composting	landfill	Incineration	MBT	AD
Aalborg	0,29	12,9	15,3	11,3	60,2		
Basel	0,60	34,0	3,0		62,4		
Dublin		24,3		75,7			
Groningen		42,1	8,9	0,0	29,6	19,5	
Hampshire County	4,19	19,3	7,8	55,2	13,5		
INTRADEL	0,01	34,2	9,8	39,0	16,9		
Leiria		5,0		95,0			
Liege		29,9	0,4	34,8	34,9		
Lisbon		10,1	1,4	3,0	85,5		
Odense	0,28	29,7		15,8	54,2		
Porto		5,4		17,2	77,4		
Salzburg		20,7	5,5		14,6	44,5	14,7
Settimo Torinese		12,8	9,1	78,1			
South Dublin County		15,6	0,8	83,6			
Vienna	0,03	24,7	10,1	4,3	60,9		
Ancona Province	0,26	13,2	3,1	83,5	0,02		
Catalunya	0,32	18,5	3,8	55,0	18,9	3,5	
Chiclana de la Frontera	0,08	2,4	0,8	96,7			
East Milan	0,27	36,4	25,7	4,3	33,4		
IDELUX		23,7	29,0	41,3	6,0		
Mallorca		12,9	4,2	26,0	56,5		0,3
Nantes	0,11	15,6	11,0		73,3		
Padova One	0,68	25,3	28,8	45,3			
Pamplona	3,15	16,2	2,6	78,0			
Paris		8,8			91,2		
Poitou-Charentes	0,05	19,5	11,3	47,3	19,6	2,3	
Priula	0,83	40,8	30,0	8,3	11,8	8,3	
MIN	0,03	2,4	0,4	1,2	0,02	2,3	0,3
MAX	4,19	40,8	30,0	96,7	91,2	44,5	14,7
TOTAL AVERAGE	0,42	20,1	8,0	36,0	32,0	2,9	0,5

Figure 23: Average treatment methods for municipal waste



The following points are worth noting:

- Since the 2000 survey, **treatment types have diversified**. The more recent developments in treatment are in **mechanical-biological treatment and anaerobic digestion**.
- In the 2000 survey, the averages for waste treatment were:
  - landfill – 53%
  - incineration – 30%
  - composting – 4%
  - recycling – 12%
- Thus, **landfilling continues to diminish, and composting and recycling are the beneficiaries**. We consider mechanical-biological treatment and anaerobic digestion in a bit more detail below.
- **Reuse** has been included in this list although it should not be considered a treatment type as such (since it is preventing the creation of waste, rather than treating it). However, we have presented it with the treatment types in order to give an indication of the status of reuse as an option. At less than 1%, it is clear that authorities are either not collecting any or comprehensive data on this activity, or they are not doing it at all. We consider reuse in more detail in *Prevention*.

Alternative technologies

Waste treatment technologies have diversified beyond the traditional options of landfill or incineration. Both anaerobic digestion (AD) and mechanical-biological treatment (MBT) have emerged as more popular choices.

MBT can be used to treat mixed waste (rest waste and recyclables not collected selectively) or rest waste (that is, waste outside of that which is selectively collected). However, the quality of product that comes out of mixed waste treatment MBT (recyclables and/or compost separated from the residual waste) is usually very low compared to selectively collected materials and no evidence exist today to say that those technologies may ensure the production of high quality products with sufficient market potential for recycling or compost. Most often they result in a waste-based end-product (refuse derived fuel) or in a stabilised organic material that needs to be landfilled or incinerated.

This introductory text aimed to provide the context in which these new technologies are being introduced. Below we look in a little more detail at AD and MBT, as they are being used by some authorities who responded to our survey.

9. Financial elements

9.1. Charging

Charging structures for waste management vary greatly from authority to authority, with some authorities not making very clear to their residents how much they pay in local taxes for waste management, and others charging for waste management according to the volume collected or the number of collections.

It is generally accepted that when the public is required to pay directly for the waste they produce, participation in selective collection schemes increases as does behaviour towards waste prevention. Although we do not go into greater detail on the impact of charging on recycling or composting performance, the table below gives some figures for charges for waste management together with the kg/inh/yr figure for municipal waste and for materials collected selectively (including WEEE, batteries and textiles). It is worth noting that one authority, Priula, has also differentiated its charge according to whether the household participates in home composting.

Two authorities, Basel and Priula, are considered in a little bit more details here below . Basel has introduced a direct charge system in 1993 and undertaken an analysis after 10 years of this charging system. Priula consorzio developed kerbside collection and PAYT more recently but it has analysed its own experience and effects with comprehensive details. The introduction of the PAYT system appears a determining factor in the impressive selective collection results in the region.

Table 17: Charging systems and waste management fees

Authority	General charge	Waste-related charge	Kg/inh municipal waste	Kg/inh selective collection
Aalborg	€92,50/family (2,04 people) for recycling.	€89,20 per 100-litre container collection of residual waste.	3,746 (but includes C&D waste) or 624 'household'	179,90
Brussels Region	€170,20 per household.		465	66,44
Dublin City	Standing charge - €80/240L or €65/140L bin per year	€5/collection - 240L bin or €3/collection - 140L bin €2,5/pre-paid label for bags €28/1100L bin for apartments	494	91,03
Flanders Region (308 local authorities)	A fixed waste or environmental tax. Household charge of €60 or €83/family.	Volume-based charging - €1,14/60L bag or €3/120L bin Weight-based charging - €0,15/kg €0,5-€1/collection	557	259,53
Groningen	€276/household		645	119,17
INTRADEL (72 local authorities)	61 use PAYT (charging bag) system. 1 has a fixed tax and gives residents free bags. Fixed charge according to number of inhabitants.		469 (household)	149,26

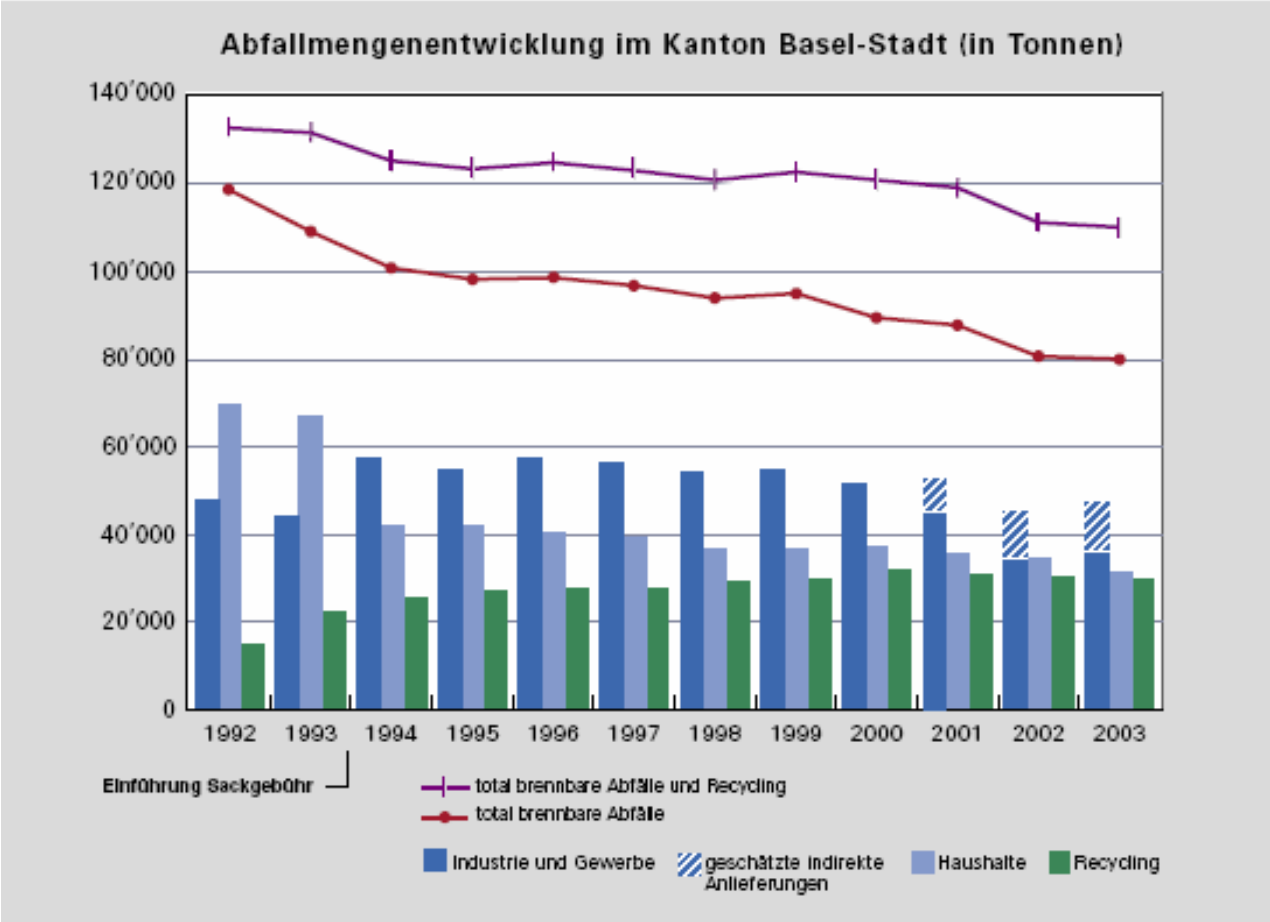
Liège	Fixed charge per household - €96 for single people and €150 for >1 person households.	€0,21/30L bag and €0,42/60L bag (Authority provides 50 free bags/year)	389 (household)	(111,77)
Odense		Charges according to bin size cover costs of collection of residual waste and paper/card from kerbside every 2 weeks, and for the use of 8 civic amenity sites. 130L bin - €140 190L bin - €175 240L bin - €225 400L bin - €350 600L bin - €525 800L bin - €700	680 (household)	98,15
Padova Uno	Per inhabitant charge of €21 and by size of dwelling (€0,21/m²)		384	231,27
Paris (Mairie de)	Based upon value of the building, equivalent to approximately €80/person/year.		566	55,21
Priula	PAYT system made up of fixed and variable charges. Fixed charge is €215/year.	Variable element is per collection of 120L bin of €8,36 or €5,85 if home composting is done.	380	241,56
Salzburg	€181,48 per household for weekly waste and biowaste collections.		518	226,45
South Dublin County		€6/240L bin €3/150L bin	456	67,20
Settimo Torinese	According to size of dwelling at €1,50/m².		515	58,35
Vienna		Per collection according to bin size: 120L - €3,16 240L - €6,32 770L - €22,12 1100L - 31,60 2200L - 63,20 4400L - €126,40	569	155,69

9.1.1. The case of Basel's 'Bebbi-Sack'

In July 1993, the paying bag system was introduced and each 35L bag cost approximately €1,25. Analysis of waste production and recycling after 10 years of the system has shown that 120 tonnes of waste were produced in 1992 (before the bag system was introduced), which reduced to 100 tonnes two years later, and has further reduced in 2003 to 80 tonnes.

Recycling, on the other hand, increased from 15,000 tonnes in 1992 to more than 30,600 tonnes in 2003. More figures - 33,000 tonnes of waste were incinerated in 2003, 8% less than in 2001; and the 30,600 tonnes of recycling in the same year represents a 3% drop compared to 2001. Therefore, preliminary analysis shows that less is being recycled because less is being consumed.

Figure 24: Waste production trends in Basel (t)



Textual translation

Einfuhrung sackgebuhr - introduction of paying bag system
Total brennbare abfalle und recycling - total 'burnable' waste and recycling
Total brennbare abfalle - total 'burnable' waste
Industry und gewerbe - Industrial and commercial
Gaschatzle indirekte anlieferungen - Estimation of waste that is still produced but is sent to waste sorting sites now so source is not clear
Haushalte - household
Recycling - recycling

According to the authority, the private waste sorting sites started business in 2000/1 because incineration was increasingly seen as an expensive option and the sorting of private waste became less expensive for the companies which began to send their waste there.

9.1.2. The case of Priula

In the year 2005, Priula Consortium coordinates the management schemes of 23 municipalities involving about 215.000 inhabitants. 18 municipalities out of 23 are applying PAYT charge since 2002.

Before 1999, waste management in the area was fragmented and heterogeneous with :

- different collection rules and regulations
- quality of the service varying according to motivation and availability of the municipality staff
- standard separate collection bins from 1 per 200 to 1 per 1.300 inhabitants
- different rating methodologies (by inhabitants, surface area, detailed measurement, etc….)
- costs covering through the waste tax between 75 and 100%
- separate collection ranging from 9 to 33%
- household composting reduction from 10 to 30%

The consortium started in 1999 to take over the municipal competencies about waste management. The Consortium administration substitutes completely local authorities (the single municipalities) in all task regarding:

- the organisation of the collection system
- the payment of MSW management services
- the introduction of a PAYT scheme.

In the year 2000 the Priula Consortium proposed all municipalities to change from road containers to kerbside collection in order to:

- rise source separation rates on district area;
- optimise the quality of materials source-separated;
- develop a WM scheme capable of effectively intruding a PAYT charge (tariff) for all utilities.

All materials are collected with plastic bins and containers of different colours and volume, corresponding to the specific production of utilities; standard collection scheme for households is as follows:

Table 18: standard collection scheme for households

	Collection container	*Frequencies*
Residual waste '	120 l bin	1/week
Foodwaste	25 l bucket for semi-detached households 120 l bins for block of flats	2/week
Paper and cardboard	50 l bucket	Every 2 weeks
Glass & cans & plastic	120 l bin	Every 2 weeks
garden waste '	max 3 x 100 l reusable bags	1/week March-December

Each wheel bin assigned for residual waste to households and companies is provided with a transponder, that is automatically read during the emptying of the container, assigning the waste collected to the owner of the container. A weighting device is also installed on each compacting vehicle. Data are stored in an on-vehicle device and are transmitted to the Waste Charging Office at the end of the collection round

Charging system (tariff) year 2004

The waste charge to be paid for the MSW management service is composed of 2 quotas :
a fixed one and a variable one. The fee structure is extremely precise. For households the waste charge is as follows:

- The fixed quota is equal for all families; this quota covers all cost regarding common services, recycling collection ad business utilities, but not residual waste collection.
- The Variable quota is 0.87 €/kg of waste collected and is proportional to the volume of the bin used and to the number of collectiosn of the wheel bin. It covers the cost for the residual MSW management only.

Since the variable cost element is only linked to the amount of residual waste delivered, and therefore does not take into account the possible lower delivery of biowaste where home composting is being practiced, householders doing composting in the backyard are allowed a 30% reduction of the variable quota, depending if they are composting only garden waste, only foodwaste or both of them..

Examples:
a) Household with 3 persons in a single house, with one emptying on the wheel bin (120 l) for residual waste in 4 weeks (medium data), excluding VAT and others local tax;

- fixed quota: 76,73 €/year
- variable quota: 11 emptying * 9.45 €/emptying = 103.95 €/year
- total charge: FQ + VQ = 76..73 + 103.95 = 180.68 €/year

b) Household with 3 persons in a block of flats with a container:

- fixed quota: 76..73 €/year

- variable quota: depending of global emptying subdivided between all the householders living in the building.

For non-domestic utilities the waste charge is the same as for households for residual waste. The main difference is the application of the PAYT principle also to recyclable collected if they exceed the standard capacities, depending on the volume and number of, containers assigned to each utility and the emptying frequencies (paper, glass, plastic-tin, organic). To promote separate collection from companies the fixed quota for different collection tools for recyclables is reduced in comparison with the containers for residual waste.

Information and participation

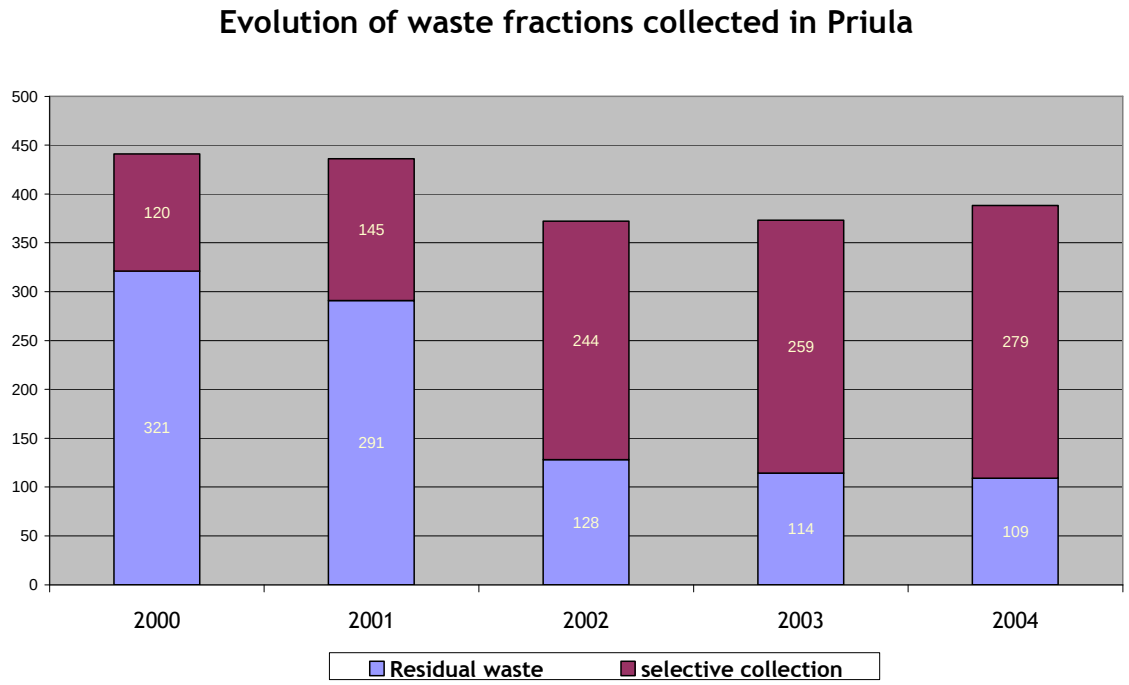
The PAYT charge was introduced by giving adequate information to all residents of the area; at least 50 public meetings (about 3 per each municipality) where realised before introducing the new charge. A special advertising campaign has been performed and organised and specific mailing has been performed to each utilities. A magazine on waste management is distributed twice a year. In addition, the Priula Consortium realised a network of info-desks (one in each municipality building) where households and utilities can get information about waste management services, complain about dysfunction, ask for new collection buckets or tools (ex.. biobags for food waste collection) and be informed about waste charges.

Effects on waste production

The graph below illustrates the evolution of waste fractions collected in Priula in the five years from 2000. It shows that the introduction in June/July 2001 of an integrated kerbside collection lead to a sharp rise in recycling rate, with a sensible reduction of residual waste and a reduction of the total amount of waste produced..
The PAYT scheme introduced in 2002 further increments the reduction of residual waste production and the rise of source separation but also determines a sensible reduction in waste produced.
Besides, according to Priula consortium :

- the total amount of municipal waste produced was reduced by 10 to15% (from 54,000 tonnes in 2000 to 48,000 tonnes in 2002);
- Source separation rate homogenised between cities and increased in average from 27% in 2000 to 66% in 2002
- the environmental awareness is growing; people are more attentive and careful as they buy goods, generate and separate their waste.
- illegal dumping and fly tipping was limited to maximum 1% of total amount of waste produced
- the introduction of the PAYT charge on a district level, has allowed to optimise investment cost and administration efforts in designing, testing and implementation of the scheme
- the ability to fully describe the cost breakdown of collection service is an important aspect for further optimisation of MSW management strategies.

Figure 25: Evolution of waste fractions collected in Priula



Effects on fly-tipping

The Priula Consortium tackles fly tipping and illegal dumping, instituting a specific waste-officer "Ecovigile". Fines can be assigned in proportion to amount and kind of waste dumped. The analysis of the bags (mainly of domestic origin) indicate a large concentration of recyclable materials as food waste, glass and plastics. The result suggest that these phenomena are due to households which do not want to apply to the recycling collection schemes and are not a attempt to reduce the waste charge; the cost for the separate collection of materials are already paid by families through the fixed charge. Households with very low or zero-waste production are systematically checked and visited by the waste officer..

Cost of implementation

Collection services are provided by public company. Total operational cost for MSW management in the Priula Consortium in the year 2003 (excluding VAT and others local tax) is :
65.7 €/inhabitant/year, comparable to those of other Italian situation applying kerbside collection. Costs of specific instruments to individuate and register the emptying of bins may be estimated as follows :

- transponder for each residual-waste bin 2.10 €/unit
- on-vehicle devices (transponder reader and PC) 2,500 €/collection vehicle

The continuous support of municipalities and utilities guaranteed by the info-desks-staff ("Ecosportelli", realised in each municipalities) have a cost of about 2.5 €/inhab/year.

9.2. Costs

Waste management costs are notoriously difficult to present in isolated form, according to material or source (household, institutional, commercial, etc.) and cannot easily be made comparable between authorities. In providing figures for different materials in the table below, we wish to illustrate the costs identified by different authorities, but do not provide analysis. Costs per tonne vary according to factors such as collection design, variety of materials collected, contractual arrangements (whether collection is undertaken by a private company, a non-profit body or the authority itself), etc. Table 15 below provides some figures for costs for different elements of waste management according to material. Unless otherwise stated in the 'notes' column, figures are €/tonne.

Table 19: Waste management costs for selective collection materials and products, and residual waste (in€/tonne)

Glass

Authority	Collection	Sorting	Treatment	Total	Income	Notes
Aalborg	46,0	9.3		71,0		Represents. Calculated on the basis of a total sorting costs for glass of 25.000€.
East Milan	85,6		20,7			Collection figure is our calculation based upon a per inhab figure of €3,11 and 36.3 kg of glass collected /inh. €20,66 represents the amount per tonne given by the 'green dot' organisation.
Nantes	52,0					
Flanders Region	49,0					
Padova Uno	116,8					
Paris	74,0 169,0			49,0 166,0	25,0 3,0	For **bring system**, therefore a cost of €8/tonne/bank. For **kerbside service**, therefore a cost of €10/bin.
Settimo Torinese					14,0	

Metal

Authority	Collection	Sorting	Treatment	Total	Income	Notes
Aalborg	219,0		7			For metal and bulky waste.
Barcelona (Metropolitan Area)			164,2			2 plastic and metal packaging sorting centres and 1 'dry fraction' sorting centre.
East Milan			15,5			Treatment cost is that given by the 'green dot' organisation.
Flanders Region					10	Ferrous metal
Priula					11	
Settimo Torinese					5,0	

Kitchen organics

Authority	Collection	Sorting	Treatment	Income	Total	Notes
Barcelona (Metropolitan Area)						
East Milan	70,0		100,0			Calculated on the basis of a cost of 5.16€/inh/year and 74kg of waste collected/inh/year
Hampshire County						
Padova Uno	118,2		72,5			
Salzburg	69,3		98,7		168,0	
Settimo Torinese	158,0		90,0			

Garden organics

Authority	Collection	Sorting	Treatment	Total	Notes
Barcelona (Metropolitan Area)			48,2		1 ecopark treating kitchen and garden organics + MBT treatment
			56,7		3 compost centres treating kitchen and garden organics
East Milan			25,3		
Hampshire County				45.9	Collection costs are paid by District councils (level below Hampshire). Sorting and treatment have been contracted to a private company and are subject to a single disposal rate.
Padova Uno	66,1		21,5		
Salzburg	53,3		29,7	83,0	
Settimo Torinese	65,0		30,0		

Paper/Card

Authority	Collection	Sorting	Treatment	Total	Income	Notes
Aalborg	105,0	7,8*		159,0		Calculated on the basis of total sorting costs for paper/card of 54,000€.
East Milan	73,2		20,0			Collection is our calculation based upon a per inhab cost of €4,40 and 60 kg of paper collected:inh. Treatment cost is that given by the 'green dot' organisation.
Nantes	154,0	126,0		280		Includes packaging - plastics, metals and composites.
Flanders Region	46,0				5	
Padova Uno	86,9					
Priula					4	
Salzburg				11,0		
Settimo Torinese					28,0	

PMC

Authority	Collection	Sorting	Treatment
Flanders Region	179,0	193,0	
Padova Uno	184,5		
Settimo Torinese			9

WEEE

Authority	Collection	Sorting	Treatment	Total
Aalborg	23,7		267,0	
East Milan				72
Salzburg			100	100
Settimo Torinese			40	

Residuals

Authority	Collection	Sorting	Treatment	Total	Notes
Aalborg	19,2	0,8	7	89,2	
Barcelona (Metropolitan Area)			19,4		Landfill
			28,9		Incineration (2 plants)
Hampshire County				44,9	
Nantes	74,0		103,0	177,0	Includes direct and indirect costs, amortisation and investment.
Padova Uno	86,8		91,4		
Paris	114,0		81,0	195,0	Total cost of €10/bin.
Salzburg	75,5		137,5	213,0	
Settimo Torinese	56,0		116,0		

10. Waste Prevention

Waste prevention is not the core element of this study. However, the ACR+ 2005 survey invited information on this topic and other 'Initiatives and campaigns' addressing *awareness of the impacts of lifestyles, supporting lifestyle changes,* and *encouraging change in consumption behaviour*.

The objective here was to consider how widespread are the waste prevention activities among local and regional authorities. The results are presented in table 18 below. It shows that most local authorities now have waste prevention initiatives in one form of another. Among those waste prevention initiatives, it is the promotion of home composting which is the most frequent (actually, all except one of responding municipalities develop such campaigns). After that, waste prevention initiatives mainly address citizens consumption and try to make it more sustainable.

Readers interested in learning about the range of waste prevention activities already being undertaken by authorities are encouraged to read a report published by ACR+ and the Brussels Region environment organisation, IBGE-BIM in 2005. *Voluntary actions supported by local authorities to encourage waste prevention in Europe*, It provides examples of activities such as those mentioned in the table below, amongst others.

Table 20: Waste prevention initiatives and campaigns

Activity	Aalborg	Ancona	Andalucia	Barcelona	Brussels	Catalunya	Dublin	East Milano	Flemish Region	Groningen	Intradel	Leiria	Liège	Lisbon	Mallorca	Nantes	Odense	Padova Uno	Paris	Poitou-Charentes	Uporto	Priula	Salzburg	Settimo Torinese	South Dublin	Vienna	Wallon Region	Western Macedoni	# occurrences
Raising awareness of the impacts of lifestyles																													
Encouraging citizens to calculate their ecological footprint	x				x								x						x		x								5
Calculating the ecological footprint of your authority's population					x																x					x			3
Participative democracy - involving citizens in political choices and implementation	x	x			x	x	x			x							x				x			x		x			10
High visibility activities on prevention or sustainable consumption - e.g. exhibitions, eco-teams				x	x	x	x	x	x		x	x	x	x	x		x				x	x		x		x		x	17
Supporting lifestyle changes																													0
Changing citizens' thoughts on 'needs'				x	x		x				x	x		x	x						x					x			9
Promoting the use of services in place of products - e.g. leasing, waste-free gifts, encouraging well-being				x			x				x			x	x				x		x		x			x	x		10
Promoting home composting - e.g. providing subsidised bins and kitchen containers, holding demonstration sessions.	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x		26
Encouraging change in consumption behaviour																													0
Promoting environmentally-friendly behaviour in shops - e.g. purchasing products with less waste, ecolabels, discouraging plastic bag use							x		x		x	x	x		x				x			x	x	x		x	x		12
Rewarding sustainable consumption choices - e.g. points on loyalty cards									x																	x			2
Monitoring progress towards sustainable consumption behaviour - e.g. families monitoring waste production, surveys, etc.				x	x			x						x			x	x						x		x	x		9
Promoting repair and reuse					x		x	x	x	x	x			x	x			x						x			x			11
Leading by example - green public procurement						x	x	x	x						x				x	x		x							8

10.1. Reuse

We included reuse in the analysis of waste treatment in the section on 'Treatment', to show which quantity of municipal waste is reused. We recognise that this is a misleading presentation of reuse because it treats this activity like any other type of waste management. Indeed, reuse is not a form of waste treatment *per se*, rather it is the extension of the life of a product. Reuse has taken place long before directives were created including it in potential management activities (such as the WEEE directive). In particular, textiles have been collected for decades for reuse either within the country where it is collected or for use in less developed countries as a means of aid.

Table 21 illustrates the reuse results of a selection of authorities – total tonnes reused, a kg/inh/y figure. It is obvious that not all authorities collect figures for the same materials – the range in kg/inhab results is too great (from 0.0043kg to 5.56 kg).

It is worth noting that there does not appear to be a clear approach to the collection of data on products or materials for reuse.

Some authorities included these figures in their overall waste production figures, and others did not. Some only included the tonnages that they collect (for example, WEEE but not textiles if textiles were collected by a 'third party' such as a charity). It is clear that reuse needs more analysis and consideration if it is to become a credible and valid method of managing products and materials. Most importantly, **there needs to be clarification of whether *products* or *waste* (such as rubble) are being reused.**

Table 21: Percentage reuse as an element of waste management

Authority	Tonnes	kg/inh
Aalborg	289	0.18
Ancona Province	654	0.14
Basel	381	0,20
Brussels Region	55,582	5.56
Catalunya	3,253	0.05
Chiclana de la Frontera	47	0.07
East Milan	513	0.13
Hampshire County	27,118	2.17
INTRADEL	41	0.0043
Nantes	296	0.05
Odense	354	0.19
Padova One	528	0.24
Pamplona	4,292	1.39
Poitou-Charentes	448	0.03
Priula	663	0.31
Vienna	252	0.02

Furniture, household goods and electronic equipment

Some authorities have managed to integrate reuse into their waste management strategies. For instance, the city of Salzburg (A) has provided following information in relation to WEEE products: '*The prime goal of the WEEE Directive is not only to recycle but to reuse and recover electrical and electronic equipment. This offers the opportunities that local authorities may act together with social enterprises working in this field. For this reason … Salzburg is in contact with socio-economic enterprises to establish a model where jobless people will be qualified and reintegrated into the labour market. It is not only to recover electrical equipment but also furniture and other parts of the bulky waste. These activities should also ensure that socially disadvantaged people get access to cheap, second-hand products.*'

Similarly, Aalborg (Dk) stated that they work with a social enterprise that accepts 'reusable waste' (furniture, bicycles, books, etc.) for resale, while providing long-term unemployed people with **retraining** and **reskilling**. They have managed to reuse 100 tonnes of products which would otherwise have been waste.

10.2. Home/community composting

Given that organic waste makes up a significant proportion of the average household bin, and the landfill directive requires the significant diversion of biodegradable municipal waste from landfill, it is not surprising that so many local authorities have reported developing "promotion" activities in this domain. Those include :

- Providing leaflets or other information to the public on composting
- Providing subsidised bins (to be picked up by the public, or delivered to their home)
- Running compost training events (such as the 'Master Composter' programme)
- Holding 'open garden' days where residents receive other members of the public in their gardens to see their home composting activities and their results

A difficulty in incorporating home composting into waste management plans or strategies is the **limitations presented in identifying actual amounts prevented**.

Aalborg (Dk) reported that 6,000 home composting families have prevented the production of 500 tonnes of waste, a total of just over 83 kg per family.

We did not pose specific questions on **community composting** in our questionnaire, but this is also another method of managing organic materials as a means of waste prevention. Basle (CH) has a well developed community composting programme, which is supported by a **City Gardening Office**. According to the authority, in 2003, the City Gardening Office knew of 1,936 'backyard' composting sites which are visited or used by 8,088 households. These figures are based upon a registration system and some estimations. Their calculations/estimations for the year are that 6,949 tonnes of organic waste have been composted by residents. This translates to a per inhabitant figure of almost 37 kg. A further 950 tonnes (5 kg/inhabitant) of gardening waste was treated by a **shredding service** offered at certain times of the year. This material is then used in the gardens of the residents.

Although they did not provide figures for tonnages of materials prevented through home composting, Priula (I) encourages participation in home composting via financial incentives. The rate of the variable charging system implemented for waste collection is charged according to whether or not the household does home composting. More details are available in the sub-section 'charging' in *Financial Elements*.

EUROPEAN MUNICIPAL WASTE MANAGEMENT SURVEY 2005

Thank you for completing this form. We will use the information to present an updated picture of local and regional authority performance in waste and resource management, and to help identify future activities that better serve the needs of our members. The more clear and detailed the information you provide, the better we will be able to understand your situation.

The questionnaire is in 7 parts, made up of the following sections:

A. General information
B. Waste management data
C. Selective collection (of HOUSEHOLD waste)
D. Treatment of municipal solid waste
E. Financial aspects
F. Initiatives and campaigns
G. Other information

A. General Information

A1. Contact person

These details should be of the person completing this form, and who will therefore be our main contact if we need to ask for any further information. Contacts with specific areas of expertise, such as communications, financing, etc. should be listed in "Other contacts" on page 10.

Table 1

Surname & forename	…
Title/Responsibility	…
Department	…
Address	…
Tel :	…
Fax :	…
Email :	…
Web :	…

A2. Demographic details

Table 2

Authority name			
Population			inhabitants
Area			km^2
Density			inhabitants/km^2
Type of housing*	□  single dwelling	with garden	%
		without garden	%
	□  apartments	low-rise	%
		high-rise	%

Please provide figures for 2003 if possible. If you are using data from a different year, give the year here : _____

* Characterise the percentage of households according to the level of detail available on houses with and without gardens, and apartments that are low-rise (up to 4-5 storeys) and high-rise (more than 4-5 storeys).

A3. Waste management responsibilities and delivery

Using your authority as a reference point, please indicate whether your authority has responsibility for the activities listed below, and whether these are delivered by your authority (ticking the column "Directly") or whether you have contracted out delivery to another body. If your authority does not have responsibility for a particular activity, please indicate in the "Another authority level" column what level of authority this is. Please also indicate whether your authority has delegated responsibility to another level of authority for any activities.

We have left space at the bottom of this table for general comments if the situation relating to your authority is more complicated. Please add what details you wish.

Table 3

Activity	**Responsibility**	**Delivery**		
	(Y / N)	**Directly**	**Another authority level**	**Contracted**
Recycling collection				
Sorting				
Planning				
Taxation				
Public communication / awareness-raising				
Residuals treatment / disposal				
Other (provide details)				
e.g. Taxation	*N*		*Regional level*	
Other comments:				

B. Waste management data

The presentation of comparable data for waste and resource management is made difficult by the varied use of municipal or household waste figures. Where possible, please provide figures for both household and municipal waste arisings in your authority. To ensure better comparability, we provide the OECD definition of municipal waste:

> *"Municipal waste is waste collected and treated by or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden waste, street sweepings, the contents of litter containers, and market cleansing waste. The definition excludes waste from municipal sewage networks and treatment, as well as municipal construction and demolition waste."*

Where possible, we hope to use the same reference year for all submissions. This should be the same for all the data supplied throughout this questionnaire. In order to ensure most up-to-date information from all responding authorities, we have suggested 2003 as the reference year. Please indicate in the table below if your data is from a different year, and in the « Notes » sections in the different tables if the reference years are different from that below.

Table 4

Reference year	**20____**
Total MUNICIPAL waste arisings	**tonnes**
Total HOUSEHOLD waste arisings	**tonnes** **kg/inh**

These figures should include tonnages collected for recycling, composting, etc.

Municipal solid waste : *Please indicate which of the following are included in your definition of MSW.*

For the various wastes and their sources, provide more details if they are available. For "other sources" please provide figures of tonnages for each source for which data is available.

Table 5

Source	Y/N	Source detail	Quantity (tonnes)	Notes
• from households				
• from institutions (schools, municipal offices, hospitals)				
• from street litter bins and street cleansing				
• from other sources (e.g. markets, shops and retailers, SMEs, etc) (Please provide tonnages for each source that is available.)		markets retailers shops SMEs … …		
TOTAL*				

* (should be the same as total municipal waste arisings in Table 4)

Table 6

Do you carry out waste characterisation/composition analyses?	□ **YES**	□ **NO**
If yes	□ I attach relevant information on methods used and data obtained	

Trends in waste arisings levels

Please provide details for waste arisings levels for the years detailed. Figures should be in tonnes, and should include tonnages of materials that have been collected for non-disposal treatment options; such as composting, recycling, reuse, etc. .

Table 7

Type of waste	1990 (t)	1995 (t)	2000 (t)	2005 (t)
Household waste				
Municipal waste				

Construction and demolition waste

Please provide details of arisings of construction and demolition waste in your authority area and the percentage that is recycled.

Table 8

Waste arisings (t)	
Percentage recycled	

C. Selective collection/source separation of HOUSEHOLD waste

C1. Materials and quantities collected

Each authority has different collection systems for specific waste streams, for example:

- *kerbside collections*
- *bring system using neighbourhood containers (e.g. bottle banks or igloos)*
- *bring system using civic amenity sites*
- *collections from home on request*

You may also detail other wastes or collection systems such as:

- *household hazardous waste (e.g. batteries)*
- *collections contracted to private companies*
- *collections performed by third parties (e.g. charities collecting clothes)*

All figures in Table 9 must be expressed in tonnes

Table 9

Number	Material/waste type	Kerbside collection (t) 	Neighbourhood banks (t) 	Civic amenity sites (t)	Collected on request (t)	TOTAL (t)	Notes
1	Organic – green waste						
2	Organic – kitchen waste						
3	Glass						
4	Paper & card						
5	Metal						
6	Beverage cartons						
7	electrical equipment (WEEE)						
8	Bulky wastes						
9	Textiles						
10	Residual waste						
11 12 13 …	Other (e.g. batteries, oil, etc. - provide details)						
e.g.	organic green waste	7,000	13,000	8,000		28,000	
	TOTAL						

C2. Design of selective collection systems

Please indicate the frequency of collection for kerbside services, and materials collected in each types of system. See the example provided in the table. Please also indicate what percentage of households or population receives the specific service, in order for us to calculate a per inhabitant amount. You may add other materials for which you provide a collection service, which correspond with materials numbers 11 and onwards in the box to the right; or change the typology of existing categories.

Use the "Notes" column to provide any special aspects of your system, for example, the generic name for this collection system.

All figures in Table 10 must be expressed in tonnes

1.1. Materials numbers

1 – organic green waste
2 – organic kitchen waste
3 – glass
4 – paper and card
5 – metal
6 - beverage cartons
7 – WEEE

Table 10

Material number(s)	Kerbside collection  frequency	Percentage of population served by kerbside collection system	Neighbourhood banks  Number of people served per bank	Civic amenity sites (number per inhabitant)	Notes
e.g. 3, 4, 5	*Every two weeks*	*95*			*1 collected separately on opposite weeks to 3, 4 and 5; both collected by the authority*
Other comments:					

C3. Maturity and development of selective collection system

Please provide, in chronological order, the main steps in the development of your selective collection systems as they were introduced. This includes the addition of materials to existing collection systems, the provision of an existing service to a new proportion of the population, etc. Each significant change should be entered as a separate development.

For "Service type" please indicate whether it was a kerbside collection, neighbourhood bank or other service.

1.2. Materials numbers

1 – organic green waste
2 – organic kitchen waste
3 – glass
4 – paper and card
5 – metal
6 - beverage cartons
7 – WEEE

Table 11

Service type	Materials introduced	Year introduced	Population covered (%)
e.g. kerbside collection	*Paper, glass*	*1999*	*40*

D. Treatment of MUNICIPAL solid waste

Please, give as precise as possible estimates of the tonnages of municipal waste sent to the treatment types detailed in the box next to Table 12. These estimates must be expressed in tonnes per year. You may add new types of treatment options or change the typology of existing types of waste. The total quantity treated must equal the total municipal waste arisings given in Table 4 on Page 2.

Table 12

Material/ product	Treatment type (number)	Quantity treated (t / y)	Maximum capacity (t / y)	Notes
Organic – green waste				
Organic – kitchen waste				
Glass				
Paper & card				
Metal				
Beverage cartons				
electrical equipment (WEEE)				
Bulky wastes				
Textiles				
Residual waste				
Other (e.g. batteries, oil, etc. - provide details)				
e.g. organic – green waste	*2 4*	*15,000 75,000*	*25,000 150*	
TOTAL				

Treatment types

1: reuse/repair
2: composting
3: AD/biomethanisation
4: MBT
5: mechanical recycling
6: chemical recycling
7: incineration with energy recovery
8: incineration without energy recovery
9: landfill

E. Financial aspects

E1. Estimation of COSTS

Table 13

	YES	NO
Is there a system used to measure waste management costs ?	□	□
If yes, do these figures include costs for:		
- collection	□	□
- transport	□	□
- sorting	□	□
- treatment	□	□

Please indicate totals corresponding to different materials collected where possible. If several streams are collected, sorted or are generally managed together, please indicate this in the "Notes" column. This will help us to better understand the sharing of costs across a number of materials or products. Please also give figures for any income received for materials or products collected.

Table 14

Material/ product	Collection costs (€/t)	Sorting costs (€/t)	Treatment costs (€/t)	Total Costs (€/t)	Income (€/t)	Notes
Organic – green waste						
Organic – kitchen waste						
Glass						
Paper & card						
Metal						
Beverage cartons						
electrical equipment (WEEE)						
Bulky wastes						
Textiles						
Residual waste						
Other (e.g. batteries, oil, etc. - provide details)						
TOTAL						

E2. Systems of FINANCING

Please show in the table below how waste management is financed in your local authority. If citizens contribute by a general tax or a variable fee not linked to waste production, please specify the elements of calculation of the amount (e.g. size of household, size of the residence, water consumption, etc. in the appropriate box).

If citizens contribute by a variable fee linked to the production of waste (that is a sum determined according to the volume or the weight of the waste produced or to the frequency of collection), fill in the table in the corresponding category. Please, complete the table with details on the tariff/unit for each type of charge (for example 1.50€/90L bag, or 200€ per year for the weekly collection of waste from a 120L bin).

If there are other categories of specific charge than those listed, please add them to the table.

Table 15

FINANCING SYSTEM	YES/ NO	Criteria for calculation	Total amount raised per unit	Notes
No separate charge – the cost is integrated within other local taxes	□			
Charge is made in proportion to the household by :				
	□	- no. of inhabitants	/inh	
	□	- size of dwelling	/m^2	
	□	- other charging structure (e.g. water, electricity – please specify)	/	
Charges linked to waste production (variable charging):				
	□	- by volume	/ bag / dustbin *(please indicate the volume)*	
	□	- by weight	/kg	
	□	- by collection frequency	/collection	
Green Dot system (producer responsibility scheme)	□			
Other (please specify)	□			
Private financing (give details)				

F. Initiatives and campaigns

Please indicate any activities undertaken by your authority that extend beyond providing recycling and composting infrastructure or communicating these services. Some examples of typical activities are given below. Please indicate whether you have used these activities in any initiatives or campaigns.

Table 16

Activity	Used in your activities (Y / N)	Further details attached or available (Y / N)
Raising awareness of the impacts of lifestyles		
Encouraging citizens to calculate their ecological footprint		
Calculating the ecological footprint of your authority's population		
Participative democracy - involving citizens in political choices and implementation		
High visibility activities on prevention or sustainable consumption – e.g. exhibitions, eco-teams		
Supporting lifestyle changes		
Changing citizens' thoughts on 'needs'		
Promoting the use of services in place of products – e.g. leasing, waste-free gifts, encouraging well-being		
Promoting home composting – e.g. providing subsidised bins and kitchen containers, holding demonstration sessions,		
Encouraging change in consumption behaviour		
Promoting environmentally-friendly behaviour in shops – e.g. purchasing products with less waste, ecolabels, discouraging plastic bag use		
Rewarding sustainable consumption choices – e.g. points on loyalty cards		
Monitoring progress towards sustainable consumption behaviour – e.g. families monitoring waste production, surveys, etc.		
Promoting repair and reuse		
Leading by example – green public procurement		

Please give a brief description of one or more specific initiatives or campaigns that you would like to highlight. These initiatives or campaigns could be about :

- *waste collection and treatment*
- *awareness-raising campaigns on waste prevention, recycling, sustainable consumption*
- *reuse*
- *policy integration*
- *employment opportunities and job creation in waste management*
- *market development for recycled materials*

Our aim is to identify some <u>qualitative</u> factors that support your resource management activities. These initiatives can include public campaigns, incentives or penalties to guide behaviour, etc.

Specific initiatives:

G. Other information

G1. Other contacts

Please use the box below to list other people who could be approached for relevant information in your authority. Please provide details of their relevant activities in the "Responsibility" rows. For example, if they are responsible for communications, prevention activities, finances, etc. .

Contact 1	**Name**	
	Responsibility	
	Organisation	
	Email	
	Telephone	
Contact 2	**Name**	
	Responsibility	
	Organisation	
	Email	
	Telephone	
Contact 3	**Name**	
	Responsibility	
	Organisation	
	Email	
	Telephone	
Contact 4	**Name**	
	Responsibility	
	Organisation	
	Email	
	Telephone	

G2. Publications, videos, etc.

Please do not hesitate to send us any material (in electronic format or on paper) that may be relevant to this questionnaire. For example, we would be grateful to receive any of the following :

- Waste management strategies or waste prevention plans
- Annual reports on waste collection, sorting, treatment, financing etc
- Any facility descriptions
- Examples of public information used in education and awareness-raising campaigns – CD-ROMs, videos, posters, etc.

G3. Projects

Please give a brief description of any plans and developments expected in your local authority during the next 5 – 10 years.

Developments :