THE EU CAPITAL CITIES WASTE MANAGEMENT BENCHMARK

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*The Association of Cities and Regions for Recycling and sustainable Resource management (ACR+) is an international network of members who share the common aim of **promoting the sustainable consumption of resources and management of waste through prevention at source, reuse and recycling.** ACR+ currently has more than 90 members, mainly local and regional authorities as well as national networks of local authorities representing around 750 municipalities. ACR+ also welcomes other key players in the sustainable resource-product-waste management, such as NGOs, academic institutions or private organisations, as partner members.*

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Executive summary

Improved waste management is an essential element in efforts to make Europe more resource efficient. If a city is to generate greater economic returns at lower costs to the environment then it must find ways to extract more value from the resources that it takes from nature, while cutting the burden of emissions and waste. One key means of achieving that is by shifting waste management up the waste hierarchy focusing on waste prevention, reuse and recycling .

Effective implementation of the European Union (EU) waste policies demands an understanding of what has been achieved so far and progress towards future targets. The present report responds to that need, reviewing the current performances of EU capital cities regarding municipal waste management in their territories.

→ Key findings

The total amount of **waste generated by capital cities varies considerably** and no clear pattern can be found when comparing the city rates with national ones. The assumption that waste generation rates in urbanized areas are higher than national waste generation levels cannot be confirmed.

Very few capital cities (1 out of 3) have **distinctive data on household waste and assimilated waste**.

In general, capital cities have displayed substantial increases in the proportion of Municipal Solid Waste (MSW) recycled. In this 7 years period all capital cities - for which 2005 and 2012 data were available - have increased their recycling rates. This clearly indicates significant improvements in their recycling performances, even if the numbers display widespread differences among the cities' performance.

Progress in enhancing recycling rates is **primarily due to trends in recycling of materials, with bio-waste performing less well**.

Nearly half of the cities do **not make any distinction between municipal waste selectively collected and recycling rates**. Nevertheless, recycling rates rarely correspond to the selective collection rates and therefore the Destination to Recycling principle (DREC) (see definition on page 3) should be widely introduced and applied by cities when reporting on recycling.

Interestingly, there is **no direct link between recycling rates in the capital cities as compared to country recycling performances.** EU and national targets are the overall drivers of prompting better municipal waste management and regional and local implementation is crucial for achieving these targets.

The generally accepted statement "**the higher the economic development and rate of urbanization, the greater the amount of solid waste produced" cannot be confirmed**. Besides economic development, MSW generation rates are influenced by population density, unemployment rate, geographical location, public habits, and local climate.

On the whole, the analysis of municipal waste management is undermined by **uncertainties in the comparability of data**. Capital cities do not have a common definition of 'Municipal Solid Waste'. Correspondingly, further efforts are needed with regard to harmonizing common reporting methodologies, especially concerning the waste fractions when referring to municipal solid waste.

Introduction

The EU capital cities waste management benchmark measures and rates the municipal waste management performance of 18 out of 28 EU capital cities. This index considers individual indicators for each one of the cities targeted, concerning different stages of the municipal waste management scope: from waste generation and its composition to current waste management practices and some additional waste related aspects.

Why do cities matter? 72% of the EU's population lives in urban areas. It is clear that cities must be part of the solution if an urbanizing continent is to grapple successfully with ecological challenges such as waste and resource management. Improved waste and resource management programs will without any doubt contribute to achieving several objectives and targets of the Europe 2020 strategy. A better application of the waste hierarchy defined by the European Waste Framework Directive will certainly prompt the development of new economic activities and, in addition, it will create new, "green" jobs. Local & Regional Authorities (LRAs) play a very important role implementing new solid waste management measures so as to achieve better waste management practices in their local settings, as part of a circular economy concept. And, at the same time, LRAs will exert as role models for the whole country, since in most cases their performances can be taken as indicators for the national level too. There are several factors that play an important role when it comes to choosing and defining adequate and best available waste management operations. Factors range from sizes of cities and demographical characteristics like population and density to various climate and geographical features of a city or region.

In 2010 ACR+ launched a European Observatory of municipal waste performances, focusing first and foremost on the analysis of recycling performances across different regional and local authorities in Europe and acting as a platform for sharing experiences and demonstrating statistical best practices. As a complement to the work of the Observatory, ACR+ has been involved in *Regions for Recycling (R4R)*, a European project aiming at sharing good practices to improve selective collection and recycling schemes at regional and local level.

Why this publication? This index is a result of the ACR+ European Observatory's activities and takes into account/considers a number of key waste management indicators per targeted city. The main purpose of this index is both to showcase the individual EU Capital Cities performances in municipal solid waste management and to benchmark their waste management strategies against the measures implemented by other cities. The limitations and shortcomings in the data collection procedures are displayed as well. The publication serves the purpose of providing LRAs with a tool that will contribute to enhance the understanding and decision-making abilities of interested audiences in waste & resource management performances by displaying waste data in an easy and reproducible way. This exercise will be repeated in the future in order to allow for measuring the progress in time while expanding it to all 28 EU capitals and possibly to other interested LRAs.

This publication focuses on data analysis of municipal solid waste streams regarding selective collection, composition, and treatment operations. It also includes descriptions of other waste related aspects such as the waste collection system, the concrete waste prevention actions if implemented and, finally, the financing method. Household waste represents the largest part of the total amount of municipal solid waste. Apart from waste reduction and preparation for reuse, this is where the potential for an increased separated collection strategy and further material recovery and recycling strongly lies. Waste separation at the source contributes to ensuring high quality recycling processes, and, as a result, using this output as a reliable source of raw material, limiting energy recovery to non-recyclable materials and restricting landfilling exclusively to non-recoverable waste, would comply with the objectives stated in the 7th EU Environmental Action Programme.

Methodology

Diversity of sources: Different data sources were used for compiling this overview. The data comes either from the respective cities and their local administrations, from statistical offices or directly from the waste operator responsible for the collection or treatment of the generated waste. Sources used for this occasion were Annual Reports from capital cities (Dublin – data on generation and treatment, Prague, Paris, Berlin, London), Annual Reports from waste operators (Ljubljana, Helsinki, Bratislava, Madrid, Vienna), Annual Reports from national Environmental Protection Agencies (Dublin – data on waste composition), National Statistical offices Annual Reports (Valletta) or directly from the capital cities through a questionnaire (Stockholm, Lisbon, Sofia, Rome, Denmark, Brussels, Luxembourg, Vienna – data on waste treatment). All the data on population and city areas come from national or municipal statistical offices, while the national averages as well as national recycling rates come from Eurostat.

Limitations and uncertainties regarding data: Due to the complex process of gathering information coming from different sources, results appear as inconsistently displayed because of the lack of standardization among the data provided. This is in consequence of inharmonious calculation methods and the absence of a standard concept for collection and (pre-) treatment of certain waste streams. Some comparative analysis of data will thus have uncertainties, especially those on waste composition. All the cities have provided data on selectively collected waste versus residual waste; whereas only 6 cities have data for household waste when compared to assimilated waste. The most common reason for this is that household waste is equated with municipal waste in some cities, and therefore only figures for municipal waste were given. In some cases, again due to the variety of ways in which data is displayed and depending on the type of data actually provided, a couple of complementary sources were necessary in order to complete the overview for certain cities. This could account for slight incoherence in total amounts. Cities that included construction and demolition waste in their statistics were asked for clarifications so as to understand better the generated values, and hence to exclude this fraction from our factsheets.

DEFINITIONS

The following definitions, related to the terminology used in this publication, are put forward:

Municipal waste – according to Eurostat, is waste collected by or on behalf of municipal authorities, or directly by the private sector (business or private non-profit institutions) not on behalf of municipalities. The bulk of the waste stream originates from households, though similar wastes from sources such as commerce, offices, public institutions and selected municipal services are also included. It also includes bulky waste but excludes waste from municipal sewage networks, end-of-life vehicles and municipal construction and demolition waste.

> **Household waste** – this is waste originating from households (regardless if it is collected through kerbside collection, civic amenity sites, bring banks etc.)

Assimilated waste – this is the rest of municipal waste, similar to household waste and usually originating from businesses, private and public institutions (schools, universities etc.). In our sources, this waste was labeled differently (commercial waste, waste from private and public properties etc.).

> **Selectively collected waste** – waste collected through primary separation schemes (separation in households, bring banks, civic amenity sites) or (selectively collected) waste that undergoes secondary separation in recycling centres and sorting facilities and end up as recyclable material.

Residual waste – waste that is not selectively collected.

> **DREC (Destination RECycling)**: quantity of collected waste effectively sent to recycling, including: municipal waste streams separated at source & collected separately (one homogeneous waste stream not mixed with other waste streams) with the purpose of recycling; the output from sorting facilities (including bulky waste sorting centres) going directly to facilities for recycling; the output from mechanical biological treatment installation going directly to facilities for recycling.

Besides, the complexity of the municipal waste management systems in use today with regard to sorting steps, pre-treatment, imports and exports, lead to uncertainties and differences in the output values when reporting on municipal waste. These inconsistencies generally reduce the comparability of municipal waste data and also affect the interpretation of recycling rates showcased in this report.

Indicators: Indicators used for comparing different waste management performances and benchmarking were population density, waste generation per capita (of various waste streams), percentage of recycled and composted waste, composition of waste (percentage of each fraction) and Gross Domestic Product (GDP) per capita in European capital cities. After compiling and reviewing the fact sheets, the capital cities were asked to validate the data. 14 out of 18 cities have validated the data.

Capital cities versus national performances: Apart from comparing individual capital cities among each other, the publication also compares differences and correlations between data on generation and recycling rates at the national level. Data used for national rates comes from Eurostat[1]. As it was said in the introduction, the publication has also the aim to refer to European targets and the countries' distance from those ones. Therefore, the waste treatment analysis was done with a reflection on the Waste Framework Directive and its 50% recycling target - under review, among other targets - by 2020 Of course, numbers alone only give part of the picture. To complement the core data within the index in the future, ACR+ will seek to provide a more detailed context including additional indicators (climate change, financing systems, urban planning,…), with in-depth city portraits that provide not only data and performances but also display the challenges, strengths and weaknesses of each city, as well as highlight the emerging best practices and innovative ideas that other might wish to emulate.

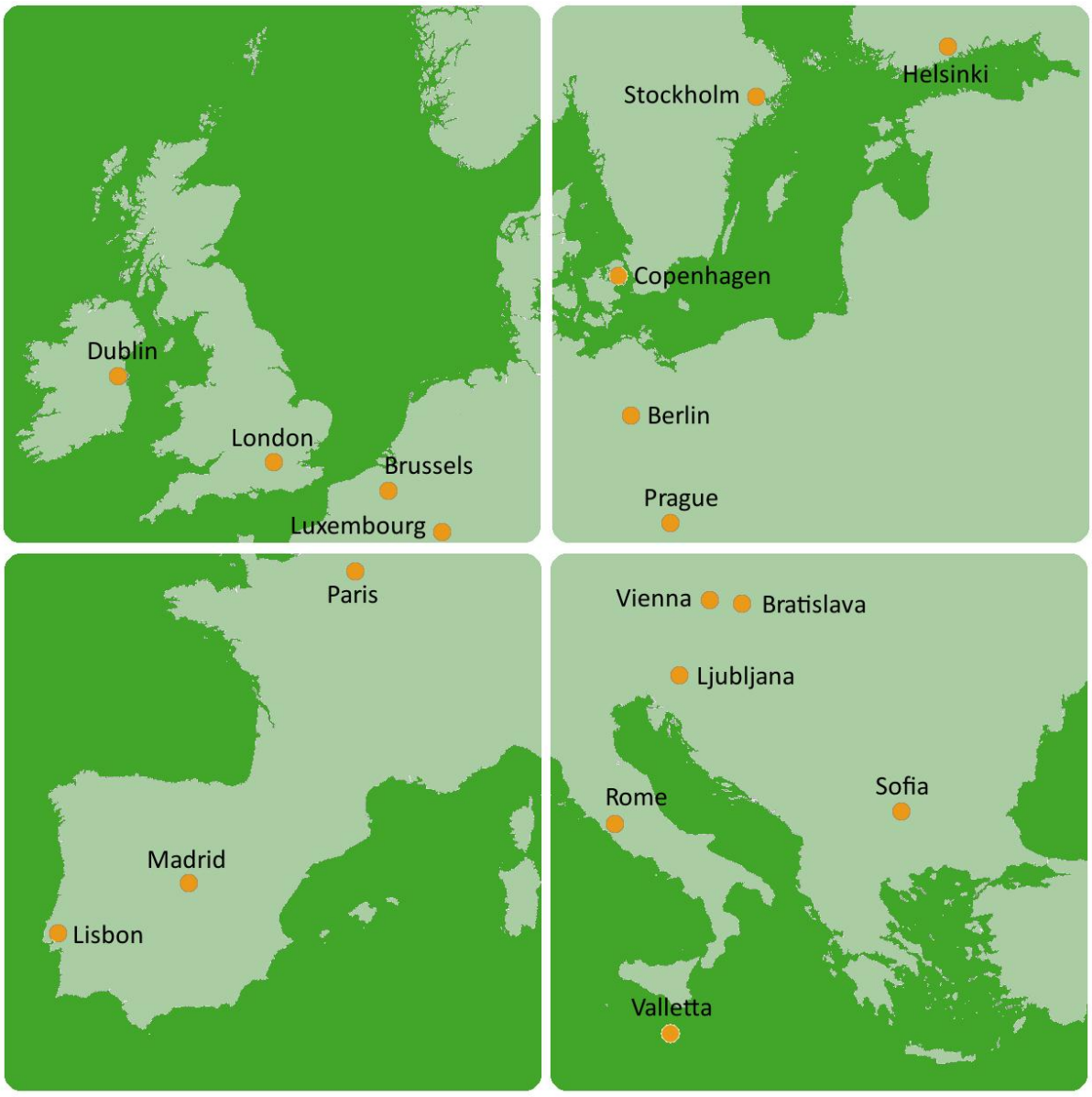
The principle of DREC: Regions for Recycling (R4R) is a 3-year European project (2012-2014) aiming to enable its partners to improve their recycling performance through consistent comparisons and an exchange of good practices. Expert group meetings within this project have showcased difficulties linked to the definition of "sorting rates" and "recycling rates". One drawback was the fact that local and regional authorities generally have limited information on the outcomes of sorted material (e.g. what fractions of the material bills going out of sorting facilities are effectively used as recycled material in industrial processes).

Therefore, R4R partners have agreed on a new notion, "DREC" (Destination RECycling). Waste streams collected separately (one waste stream not mixed with other waste streams) with negligible contamination going to a recycling facility, can be counted as DREC. The collection method can be door-to-door, bring banks, civic amenity site (CAS), etc. … If the collected stream is strongly contaminated, a sorting process before the recycling will be necessary. In this case the outputs of the sorting facilities have to be reported.

Municipal waste Statistical data in Europe are mainly handled by Eurostat. Eurostat collects these data from national authorities, who rely mostly on the data provided by local and regional authorities depending on how waste competences are distributed on the considered territory. Despite the efforts undertaken by Eurostat to collect, treat and present the data in the best possible way, many questions regarding the accuracy and reliability of these data still remain unsolved. Data collection always has limiting factors and therefore the interpretation of data should be done with care. Comparing countries on the basis of the figures provided by Eurostat can be done, as long as one considers that the figures do not reflect the full reality of waste management in those countries.

[1] Eurostat news release on national waste recycling rates: http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8-25032014-AP/EN/8-25032014-AP-EN.PDF

EU Capital Cities Factsheets

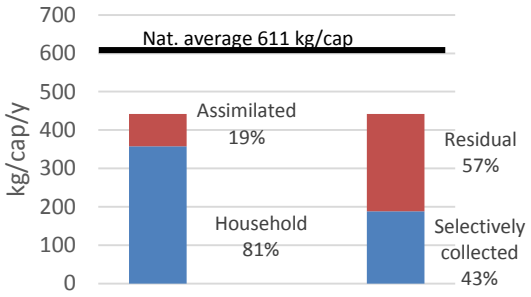


BERLIN (Germany)

2012

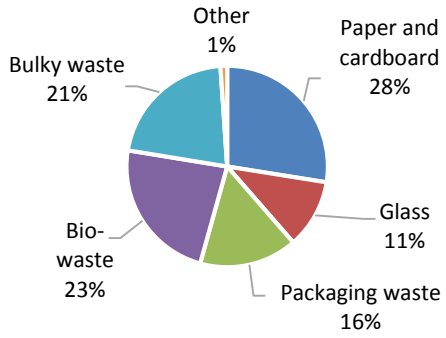
General data			
Population	3,375,200 inhabitants	**Administration**	Senate Department for Urban Development and Environment www.stadtentwicklung.berlin.de
Density	3,785.1 inhabitants/km²		
Area	891.70 km²		

Municipal waste generation and collection



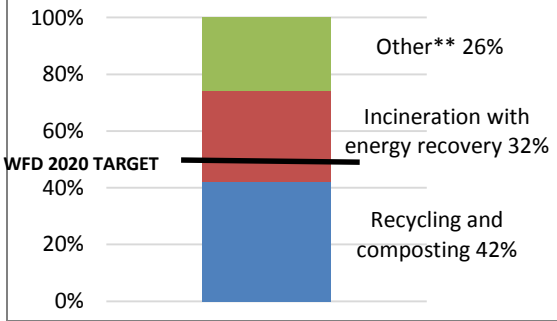
	Tonnes	kg/capita/y
Municipal waste	1,492,000	442.05
Selectively collected waste	635,000	188,14
Residual waste	857,000	254.08
Household waste	1,207,000	357.61
Selectively collected waste	533,434	158.05
Residual waste	673,566	199.56
Assimilated waste*	285,000	84.44

Composition of selectively collected household waste



	Tonnes	kg/capita/y
Paper and cardboard	146,769	43.48
Glass	59,143	17.52
Packaging waste	83,912	24.86
Bio-waste	123,969	36.73
Bulky waste	113,899	33.74
Other	5,742	1.7
Total	**533,434**	**158,03**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	635,000	188.14
Incineration with energy recovery	471,000	139.55
Other**	386,000	114.36
Total	**1,492,000**	**442.05**

Collection system

Responsible organisation: Berliner Stadtreinigungsbetriebe (BSR)

Collection and disposal is organised from 4 BSR depots, organising 194 trips for residual waste collection daily and 42 for bio waste. Packaging waste and other recyclables are collected selectively from households. BSR operates 15 recycling yards and 6 collection points for small household hazardous substances, collecting 20 different recyclable materials and 30 different hazardous waste categories.

Prevention policies/measures

Waste prevention programme of Germany under the partnership of the federal states

Financing system

Cost recovery: BSR finances itself from the collection fees and other charges but it does not generate profits. Collection of residual waste is charged higher than waste separated at home, however an equivalent of 30l residual waste is charged by default as a minimum fee.

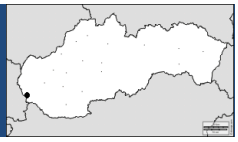
* Berlin statistics also include road sweepings in municipal waste (56,000 tonnes)

** Mechanical-Physical-Stabilization and Mechanical Biological Treatment including the production of RDF

Source: Statistical office of Berlin-Brandenburg; Berlin waste balance, Senate Department for Urban Development and Environment, 2012; Municipal waste management in Berlin, Senate Department for Urban Development and Environment, 2013

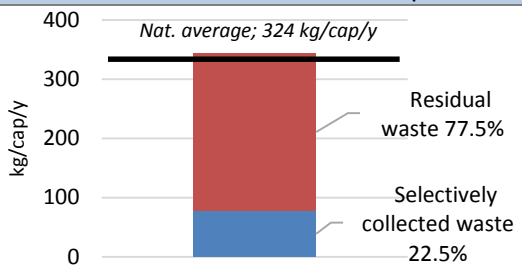
Bratislava – SLOVAKIA

2012



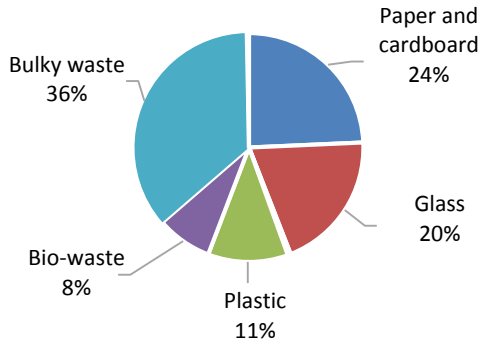
General data			
Population	415,589 inhabitants	**Administration**	Department for Environment and Urban Greenery of City of Bratislava www.bratislava.sk
Density	1,130.4 inhabitants/km²		
Area	367.63 km²		

Municipal waste generation and collection



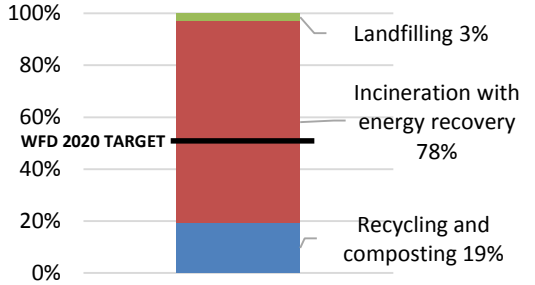
	Tonnes	kg/capita/y
Municipal waste	143,127	344.39
Selectively collected waste	32,191	77.46
Residual waste	110,936	266.93

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	7,821	18.07
Glass	6,363	14.70
Metal	136	0.32
Plastic	3,644	8.42
Bio-waste	2,528	5.84
Bulky waste	11,599	26.80
Other	99	0.23
Total	**32,191**	**77.46**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	27,484	66.13
Incineration with energy recovery	111,502	268,29
Landfilling	4,141	9.96
Total	**143,127**	**344.39**

Collection system

Responsible organisation: Odvoz a likvidácia odpadu, a.s. (OLO)

The municipality is in charge of collecting municipal waste generated in Bratislava. Citizens are provided with sorting options (glass, paper, packaging and residual waste) in street containers. OLO also operates its own civic amenity centres where citizens can drop off unlimited quantities of waste free of charge.

Prevention policies/measures

One of the main activities is the OLOmpic games that is held annually and is aimed at education and awareness raising through a set of workshops, games, competitions for prizes etc.

Financing system

Tax: Local municipal tax used for covering the costs of municipal waste management.

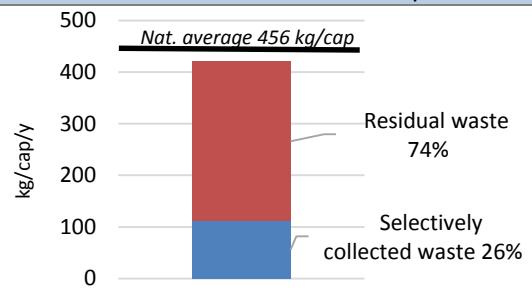
Source: Statistical Office of Slovak Republic; OLO Annual Report 2012, Odvoz a likvidacia odpadu (OLO)

Brussels – BELGIUM

2012

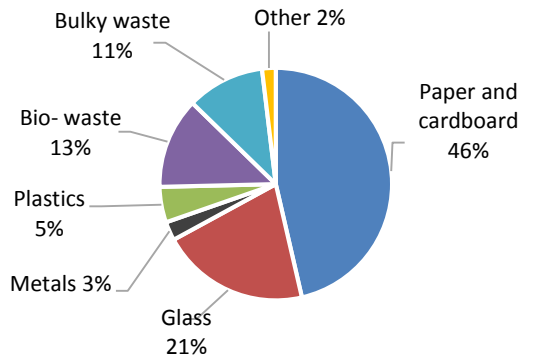
General data			
Population	1,138,854 inhabitants	**Administration**	Brussels Environment (IBGE – BIM) www.bruxellesenvironnement.be
Density	7,057 inhabitants/km²		
Area	161.38 km²		

Municipal waste generation and collection



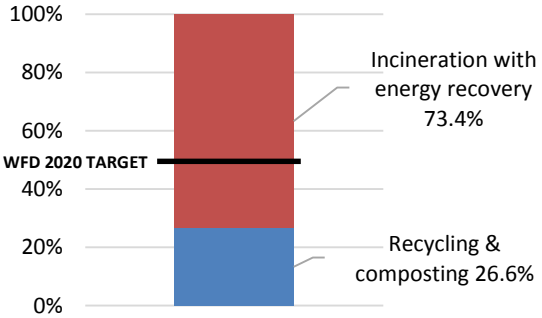
	Tonnes	kg/capita/y
Municipal waste	479,787	421.29
Selectively collected waste	126,852	111.39
Residual waste	352,935	309.90

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	58,804	51.63
Glass	26,204	23.01
Metals	3,310	2.91
Plastics	6,274	5.51
Bio- waste (garden waste only)	16,041	14.09
Bulky waste (WEEE, Textiles, Wood,…)	13,717	12,20
Other (incl. used oils)	2,410	2.12
Total	**126,760**	**111.31**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling & composting	126,760	111.31
Incineration with energy recovery	349,000	306.45
Total	**475,760**	**417.75**

Collection system

Responsible organisation: Bruxelles - Propreté

Door-to-door collection schemes exist for residual, selectively collected waste and bulky waste (annually). Bring banks available for glass and textiles. Hazardous waste is disposed of at mobile drop sites. Civic amenity sites allow for drop off bulky waste, construction and demolition waste, wood, WEEE and hazardous waste.

Prevention policies/measures

Campaigns: No junk mail letterbox stickers, "BRAVO" to promote the services of waste reducers (repair, rent, relook), home and community composting, annual EWWR campaigns (European Week for Waste Reduction). Waste Prevention plan since nearly 20 years.

Financing system

Tax: the cost is integrated within the regional tax. Incineration tax: €6 per tonne incinerated (2013) with a penalty of €29 /t beyond a certain threshold (as from 2015).
EPR schemes for WEEE, tyres, mineral oils, edible oils, batteries, packaging (with a full cost recovery principle), drugs and ELV.

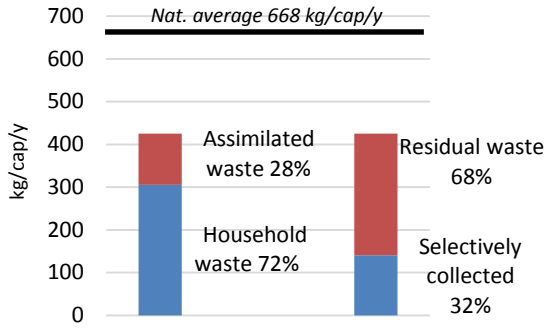
Source: Brussels Environment (IBGE-BIM), Sustainable Development Directorate, Waste Department

Copenhagen – DENMARK

2012

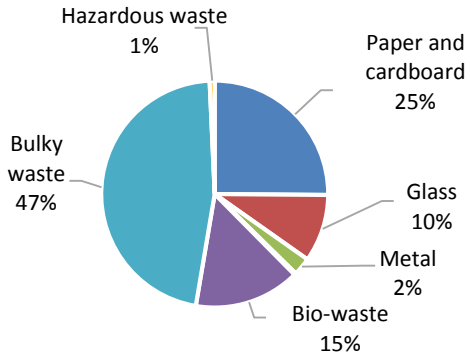
General data			
Population	549,050 inhabitants	**Administration**	City of Copenhagen, the Technical and Environmental Administration; www.kk.dk
Density	7,350 inhabitants/km²		
Area	74.70 km²		

Municipal waste generation and collection



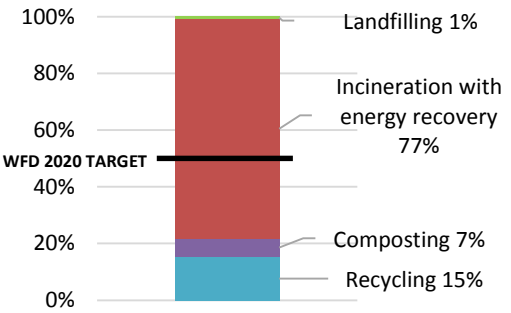
	Tonnes	kg/capita/y
Municipal waste	233,627	425.51
Selectively collected waste	77,075	140.38
Residual waste	156,552	285.13
Household waste	167,799	305.62
Assimilated waste	65,828	119.89

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	19,367	35.27
Glass	7,433	13.54
Metal	1,981	3.61
Plastic	187	0.34
Bio-waste	11,630	21.18
Bulky waste (Wood, WEEE,…)	35,922	65.43
Hazardous waste	555	1.01
Total	**77,075**	**140.38**

Household waste treatment



	Tonnes	kg/capita/y
Recycling	25,617	46.66
Composting	10,833	19.73
Incineration with energy recovery	129,490	235.84
Landfilling	1,362	2.48
Total	**167,302**	**304.71**

Collection system

Responsible organisation: private entrepreneurs

Door-to door collection is provided for residual waste, paper and cardboard, garden waste, as well as bulky waste, WEEE and hazardous waste. Bring banks are provided for glass bottles. Recyclables can also be delivered at civic amenity sites.

Prevention policies/measures

Campaigns run by the city include "Stop Advertisement" letterbox stickers (national), home composting promotion (bins offered free of charge to all single family houses), information campaigns on waste prevention

Financing system

Tax: taxes for single-use plastic bags (federal), glass and PET bottles, as well as for landfilling and incineration.
Cost recovery: fee per household relative to the type of housing, collected with property tax. Upcoming change: fee based on the volume of residual waste.
EPR schemes in place for WEEE, refrigerators, tyres and cars.

Source: City of Copenhagen, the Technical and Environmental Administration, Statistics Denmark

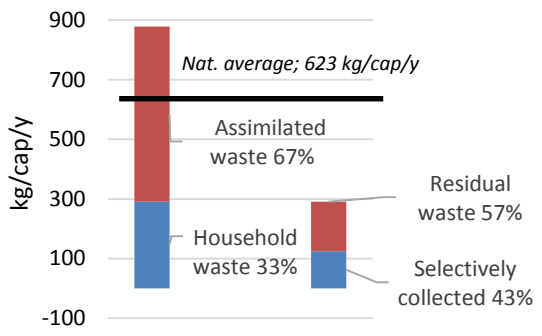
Dublin – IRELAND

2011

General data

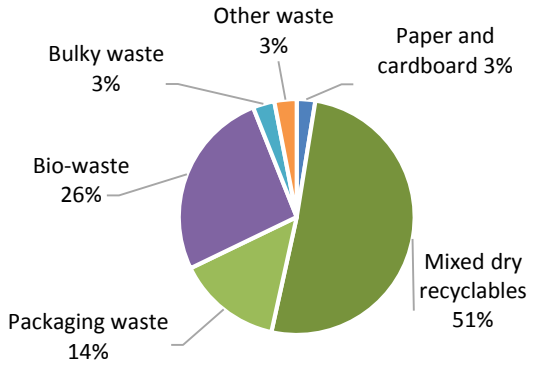
Population	525,383 inhabitants	**Administration**	Dublin city, Engineering and Environment Department www.dublincity.ie
Density	4,568.9 inhabitants/km²		
Area	114.99 km²		

Municipal waste generation and collection



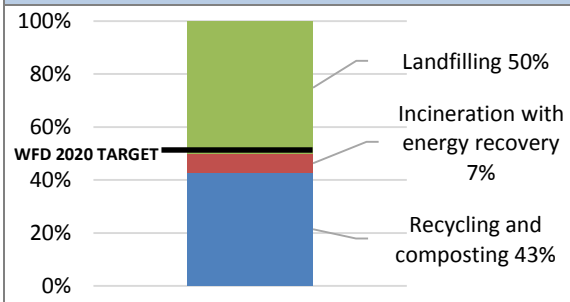
	Tonnes	kg/capita/y
Municipal waste	461,428	878.27
Household waste	152,947	291.11
Selective waste	65,491	124.65
Residual waste	87,456	166.46
Assimilated waste	308,481	587.15

Composition of selectively collected household waste



	Tonnes	kg/capita/y
Paper and cardboard	1,632	3.11
Mixed dry recyclables	32,705	62.25
Packaging waste	9,244	17.59
Bio-waste	16,783	31.94
Bulky waste (Wood, WEEE,…)	1,909	5.63
Other waste	1,962	3.73
Total	**64,235**	**122.26**

Household waste treatment



	Tonnes	kg/capita/y
Recycling and composting	65,491	124.65
Incineration with energy recovery	10,649	20.27
Landfilling	76,807	146.19
Total	**152,947**	**291.11**

Collection system

Responsible organisation: 9-10 waste operators contracted by households and commercial holders of waste

Waste collection is an open market system and households and commercial holders of waste can enter a contract with any waste operator for the collection and treatment of their waste. Collection is provided through door-to-door collection, Civic Amenity Centres (CAC) and bring banks.

Prevention policies/measures

There are several waste prevention, awareness and education activities in the region - green business activities supporting businesses in developing green strategies aimed at waste management, community awareness campaigns, green school campaign and labelling, FreeTrade service promoting re-use, a local 21 agenda is in place and home composting provided for households.

Financing system

Cost recovery: charges are paid by households directly to the waste operator they have a contract with. EPR scheme is in place for packaging which is operated by a State appointed organisation - REPAK.

Source: Central Statistics Office; Dublin City, Waste Management Plan for the Dublin Region – Annual Progress Report 2012; Environmental Protection Agency – National Waste Report 2011

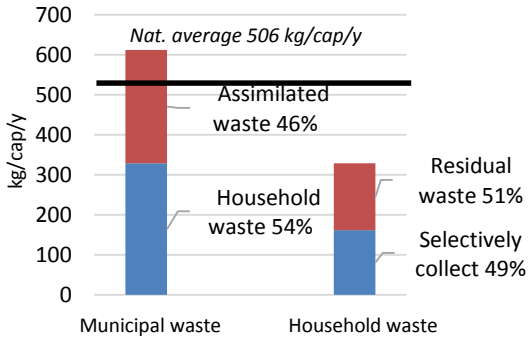
Helsinki – FINLAND

2012

General data

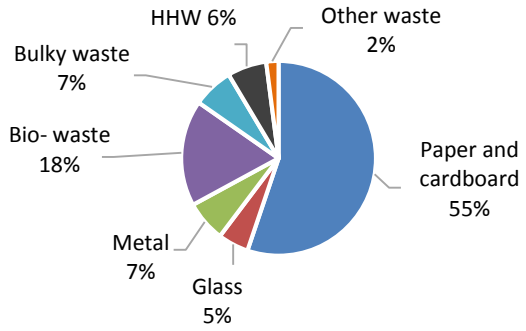
Population	1,059,631 inhabitants	**Administration**	Helsinki Region Environmental Services HSY www.hsy.fi
Density	1,375.8 inhabitants/km²		
Area	770.2 km²		

Municipal waste generation and collection



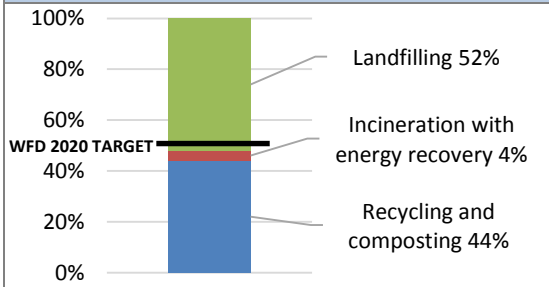
	Tonnes	kg/capita/y
Municipal waste	648,670	612.17
Household waste	348,240	328.64
Selectively collected waste	171,633	161.97
Residual waste	176,607	166.67
Assimilated waste	300,430	283.52

Composition of selectively collected household waste



	Tonnes	kg/capita/y
Paper and cardboard	94,715	89.38
Glass	8,750	8.26
Metal	11,670	11.01
Bio- waste	30,239	28.54
Bulky waste (Wood, WEEE)	11,570	10.92
Hazardous household waste (HHW)	11,178	10.55
Other waste	3,510	3.31
Total	**171,633**	**161.97**

Household waste treatment



	Tonnes	kg/capita/y
Recycling and composting	153,226	144.6
Incineration with energy recovery	13,930	13.15
Landfilling	181,085	170.89
Total	**348,240**	**328.64**

Collection system

Responsible organisation: Helsinki Region Environmental Services HSY

Door-to-door collection is provided for residual, paper and cardboard, garden waste. Free collection of WEEE, scrap metal and hazardous waste is provided in spring by touring collection vehicles. Bulky waste is collected upon request. Take back scheme is in place for glass bottles. Bring banks exist for paper and cardboard, glass, reusable clothes and metal. Sortti stations (civic amenity centers) for disposal of all recyclables and garden waste brought in by the citizens in large quantities free of charge.

Prevention policies/measures

Campaigns: WASTEPrevKit (LIFE+ project aimed at awareness raising), website with suggestions how to reduce waste, JESSE project on waste prevention (until 2010), no/advertisements stickers.

Financing system

Cost recovery: Fees depend on the size and emptying frequency of the containers favouring recycling and aiming at reducing the amount of residual waste. Current fee (2013) is €10.84/container emptying (varying from €92.17 to €561.08 per year, depending on the size of the container). EPR applied to packaging waste, paper, batteries and accumulators, WEEE, tyres and vehicles.

Source: Helsinki Environmental Services HSY, Helsinki Region Infoshare

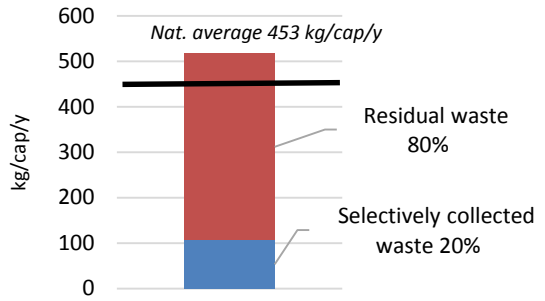
Lisbon – PORTUGAL

2012

General data

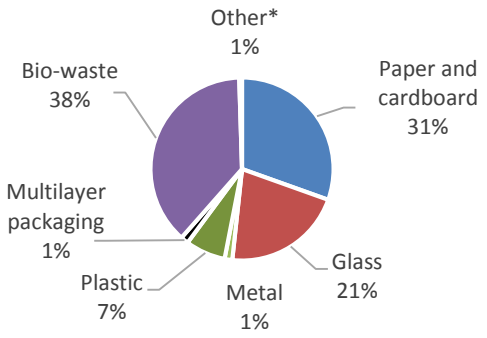
Population	530,847 inhabitants	**Administration**	Lisbon City Council, Department of Urban Hygiene www.cm-lisboa.pt
Density	6,247 inhabitants/km²		
Area	84,97 km²		

Municipal waste generation and collection



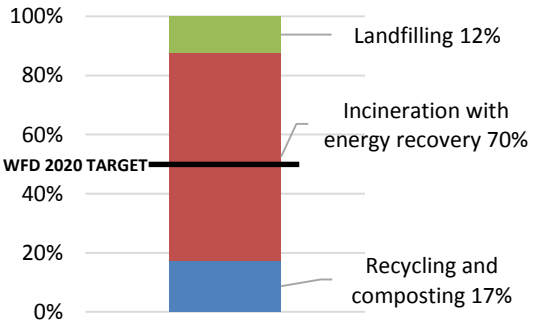
	Tonnes	kg/capita/y
Municipal waste	274,445	517.00
Selectively collected waste	56,232	105.93
Residual waste	218,213	411.07

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	17,123	32.26
Glass	11,945	22.5
Metal	762	1.44
Plastic	3,979	7.50
Multilayer packaging	768	1.45
Bio-waste	21,367	40.25
Other*	275	0.51
Total	**56,219**	**105.90**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	47,489	89.47
Incineration with energy recovery	193,070	363.70
Landfilling	33,887	63.83
Total	**274,446**	**517.00**

Collection system

Responsible organisation: Valorsul - Recovery & Solid Waste Treatment Company for Lisbon & Oeste

Several collection schemes exist in Lisbon: door-to-door and bring bank for selective waste and mixed waste. Civic amenity centres are available for WEEE, cooking oils, buljky waste and street waste, while collection by request is provided for garden and bulky waste, WEEE and other. Commercial waste is collected along with household waste.

Prevention policies/measures

Several campaigns and educational programs using mass media, public discussions, seminars, social responsibility programs and campaigns, prevention plan, webpage. Participation in the European Week for Waste Reduction (EWWR).

Financing system

Cost recovery: charged according to the household water consumption (fixed and variable fee) and making a distinction between household and non-household users. EPR schemes for paper, glass, packaging and batteries.

* Other includes wood & tyres (69 tonnes), WEEE (156 tonnes) and Hazardous waste (50 tonnes)

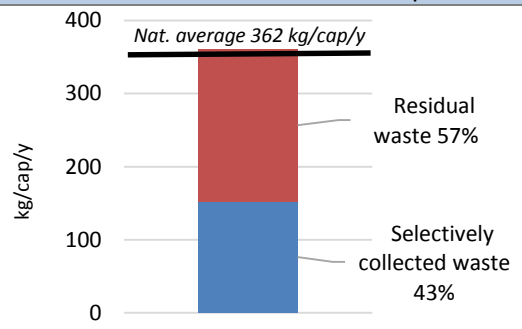
Source: Lisbon City Council, Department of Urban Hygiene

Ljubljana – SLOVENIA

2012

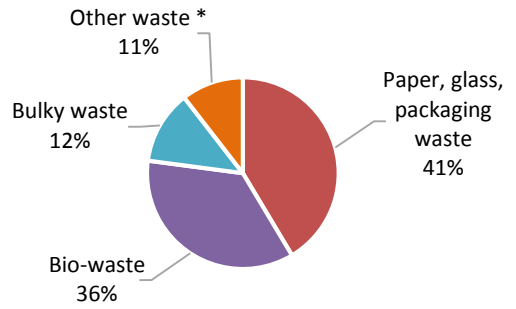
General data			
Population	352,349 inhabitants	**Administration**	City of Ljubljana, Department of Environmental Protection www.ljubljana.si
Density	390 inhabitants/km²		
Area	903.8 km²		

Municipal waste generation and collection



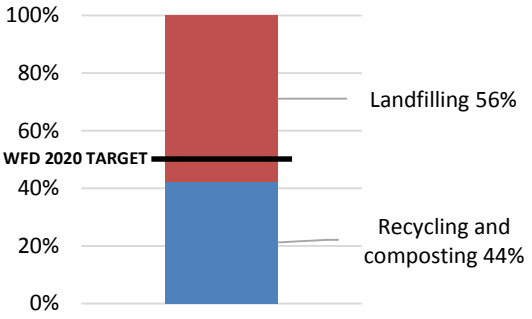
	Tonnes	kg/capita/y
Municipal waste	127,457	361.72
Selectively collected waste	53,884	152.93
Residual waste	73,342	208.15

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper, glass, packaging waste	22,311	63.32
Bio-waste	19,220	54.55
Bulky waste	6,690	18.99
Other waste *	5,653	16,07
Total	**53,884**	**152.93**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	53,884	152.93
Landfilling	73,342	208.15
Total	**127,457**	**361.72**

Collection system

Responsible organisation: Snaga public company

Packaging as well as bio-waste are collected door-to-door and/or from bring banks. There are dedicated containers/bins for residual waste. Hazardous household waste, WEEE and bulky waste can be disposed free of charge at collection points ("bring" system) or Civic Amenity Centres.

Prevention policies/measures

Awareness programmes and social activities aimed at informing and educating the wider public (including online support and communication tools). Campaigns and events with NGOs such as garage and second hand sales, clean up campaigns.

Financing system

Cost recovery: fees depend on the size of containers for residual and bio waste for individual housing, Fees for collective housings are shared among the residents. EPR schemes exist for packaging, WEEE and candles.

*Other also includes hazardous household waste and candles

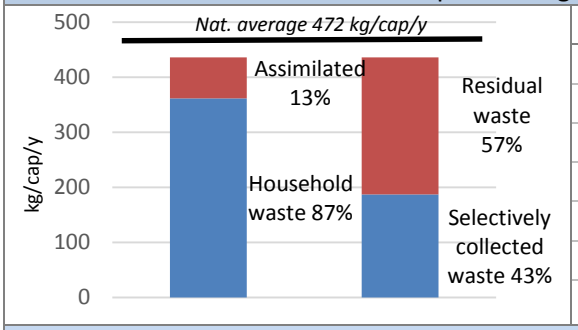
Source: Slovenian Statistical Data Portal; Snaga public waste management company; Snaga Yearbook 2012

London – UNITED KINGDOM

2013

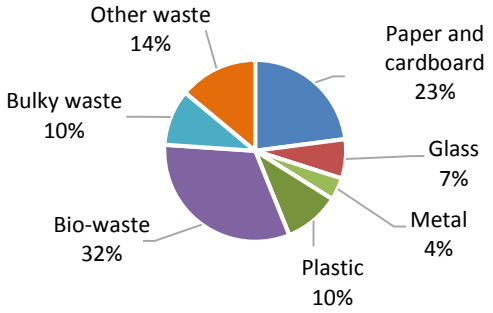
General data			
Population	8,173,941 inhabitants	**Administration**	Greater London Authority (GLA), Environment Committee www.london.gov.uk
Density	5,199 inhabitants/km²		
Area	1,572.15 km²		

Municipal waste generation and collection



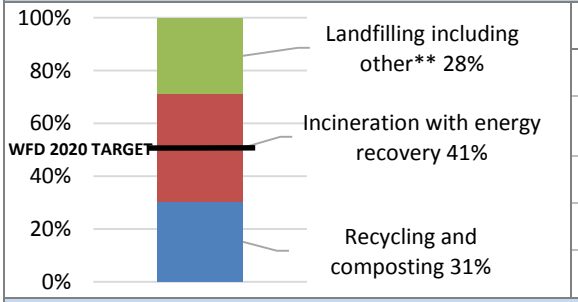
	Tonnes	kg/capita/y
Municipal waste	3,560,990	435.65
Household waste	2,954,017	361.39
Selectively collected waste	1,003,237	122.74
Residual waste	1,950,780	238.66
Assimilated waste	606,973	74.26
Selectively collected waste	522,588	63.93
Residual waste	84,385	10.33

Composition of municipal waste*



	Tonnes	kg/capita/y
Paper and cardboard	879,060	107.54
Glass	267,540	32.73
Metal	152,880	18.70
Plastic	382,200	46.76
Bio-waste	1,233,040	149.63
Bulky waste (Wood, Furniture, Textiles, WEEE, …)	382,200	46.76
Other waste	535,080	65.49
Total	**3,822,000**	**467.58**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	1,087,623	133.06
Incineration with energy recovery	1,461,940	178.85
Landfilling	911,422	125.56
Other**	115,002	14.06
Total	**3,575,987**	**437.48**

Collection system

Responsible organisation: Local authorities

Within the GLA, 12 local authorities ("boroughs") are responsible for both collection and disposal of their waste, while 21 are responsible for the collection only. All boroughs provide kerbside collection services for paper, mixed cans, glass and plastic bottles. All boroughs provide near entry (close to block or estate entrances) or bring site recycling banks for flats and estates, although there is great variation between boroughs on what materials are accepted. All except four boroughs provide a garden waste collection service (some with combined food waste). 17 boroughs offer separate food waste collection service.

Prevention policies/measures

London has adopted a carbon based approach alongside weight based targets. Concrete policy proposals include 1 million CO_2 savings each year by 2031, 10% reduction of the 2008/2009 levels per household by 2020, increase of re-used waste from 6,000t in 2008 to 30,000t by 2031 & a 50% MW recycling rate by 2020.

Financing system

Tax: waste management costs represent £242 for the average council tax payer, which is 20% of the average annual household tax in London. Gate fees (£25) and taxes for incineration/landfilling (£80) are in place. Cost recovery: Some income from selling recyclables.

* Composition data for year 2010

** Other: w aste material sent for some form of pre-treatment or unknown destination

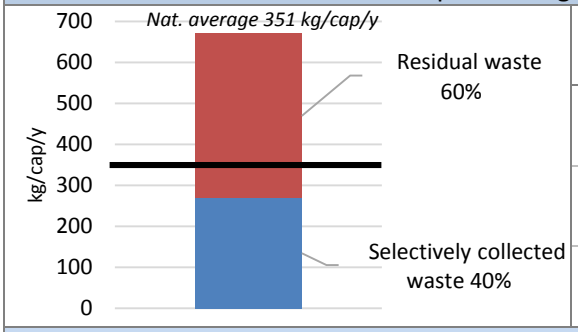
Source: Office for National Statistics; London's wasted resource - The mayor's municipal waste management strategy, 2011

Luxembourg – LUXEMBOURG

2012

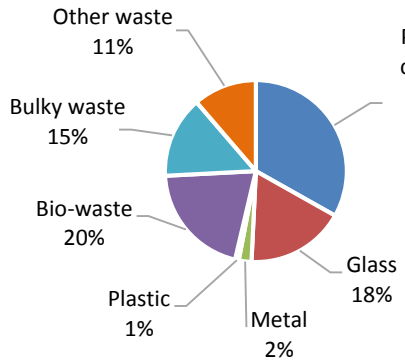
General data			
Population	100,390 inhabitants	**Administration**	City of Luxembourg, Department for Environment, Waste Division www.vdl.lu
Density	1,940.6 inhabitants/km²		
Area	51.73 km²		

Municipal waste generation and collection



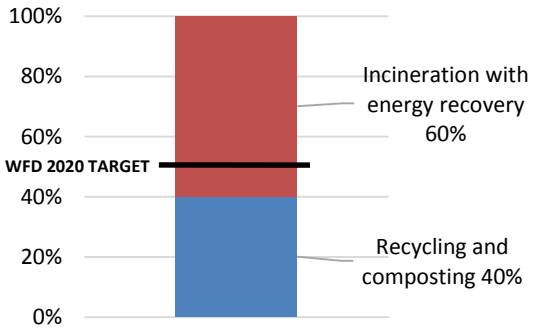
	Tonnes	kg/capita/y
Municipal waste	67,356	670.94
Selectively collected waste	27,032	269.27
Residual waste	40,324	401.67

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	8,964	89.29
Glass	4,761	47.43
Metal	609	6.07
Plastic	176	1.75
Bio-waste	5,542	55.21
Bulky waste (Wood, WEEE, Textiles)	3,923	39.07
Other waste (incl. hazardous household waste)	3,057	30.46
Total	**27,032**	**269.27**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	27,032	269.27
Incineration with energy recovery	40,324	401.67
Total	**67,356**	**670.94**

Collection system

Responsible organisation: Luxembourg municipality

Separate collection is provided through 3 different systems – door-to-door collection, recycling centres and bring banks. Residual waste (from households or businesses) is collected in large capacity containers.

Prevention policies/measures

Information stands organised in collaboration with SuperDrecksKëscht at the “Haus vun der Natuur”.

Financing system

Tax: as part of a general tax

EPR schemes in place for WEEE, packaging, mineral oils/edible oils, batteries and drugs

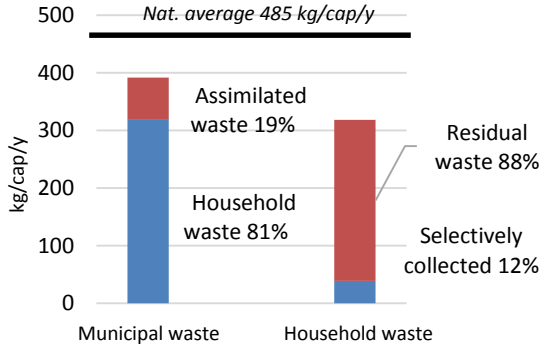
Source: City of Luxembourg, Department for Environment, Waste Division

Madrid – SPAIN

2011

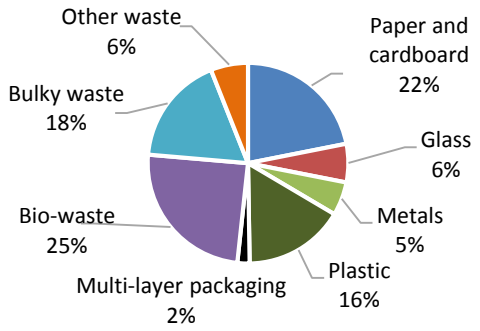
General data			
Population	3,269,861 inhabitants	**Administration**	City of Madrid, Department of Environment and Mobility; www.madrid.es
Density	5,410.9 inhabitants/km²		
Area	604.3 km²		

Municipal waste generation and collection



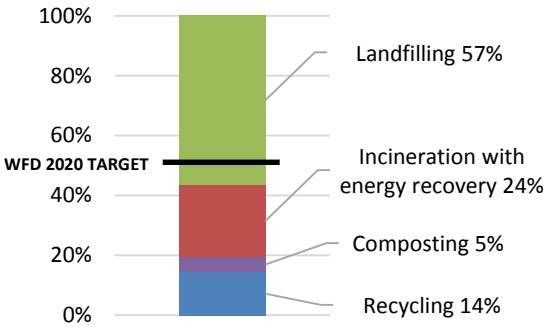
	Tonnes	kg/capita/y
Municipal waste	1,281,441	391.89
Household waste	1,041,342	318.47
Selectively collected waste	127,445	38.98
Residual waste	913,897	279.49
Assimilated waste	240,099	73.43

Composition of household waste



	Tonnes	kg/capita/y
Paper and cardboard	208,268	63.69
Glass	58,940	18.03
Metals	51,442	15.73
Plastic	154,535	47.26
Multi-layer packaging	18,744	5.73
Bio-waste	234,587	71.70
Bulky waste (Wood, textile, cellulose)	167,553	51.24
Other waste	57,274	17.52
Total	**951,343**	**290.94**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling	184,781	56.51
Composting	64,725	19.79
Incineration with energy recovery	307,140	93.93
Landfilling	725,026	221.73
Total	**1,281,672**	**391.96**

Collection system

Responsible organisation: Fomento de Construcciones y Contratas (FCC)

Waste collection is done through on the one hand separate collection of paper, cardboard, glass and packaging material in bring banks (per 1000 citizens) and on the other hand the collection of residual waste. The residual waste streams end up at Technological Park Valdemingomez where it is processed through subsequent waste treatment operations.

Prevention policies/measures

A network of Environmental Education centres in major parks of Madrid where a variety of workshops are offered including those on recycling, responsible and sustainable consumption and more.

Financing system

EPR scheme for packaging waste (ECOEMBES). Revenues from the generated biogas from closed landfills and recycled glass sale.

Source: City of Source: City of Madrid; Memoria de Actividades, Parque Tecnologico de Valdemingomez, Department for Environment, Waste Division 2011

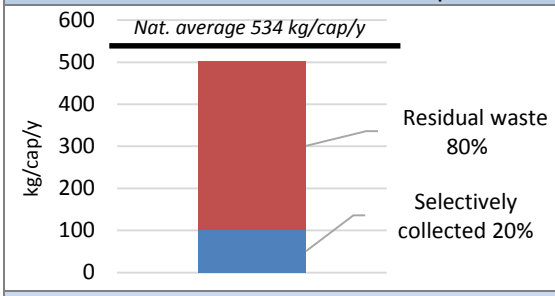
Paris (city) – FRANCE

2012

General data

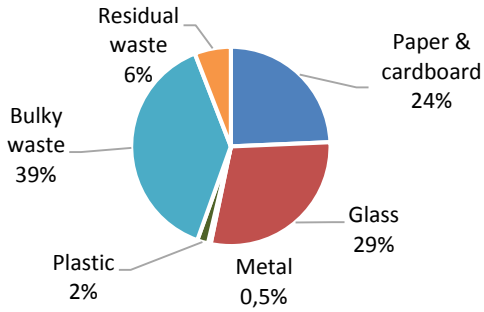
Population	2,268,265 inhabitants	**Administration**	Mairie de Paris, Direction de la Propreté et de l'eau www.paris.fr
Density	21,602 inhabitants/km²		
Area	105 km²		

Municipal waste generation and collection



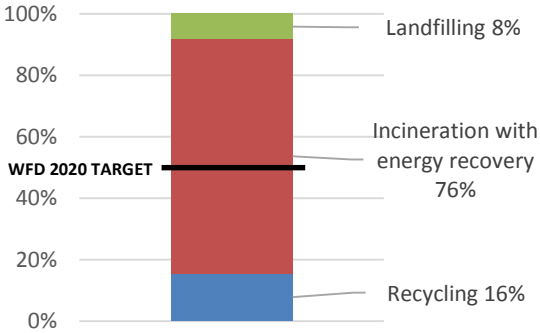
	Tonnes	kg/capita/y
Municipal waste	1,137,548	501.50
Selectively collected waste	229,401	101.13
Residual waste	908,147	400.37

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper & cardboard	55,800	24.60
Glass	66,383	29.27
Metal	994	0.44
Plastic & food packaging	4,073	1.79
Bulky waste (WEEE,…)	88,638	39.08
Refuse	13,513	5.96
Total	**229,401**	**101.13**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling	183,719	80.99
Incineration with energy recovery	899,520	396.57
Landfilling	97,201	42.85
Total	**1,180,440**	**520.41**

Collection system

Responsible organisation: Sytcom

Waste collection in Paris is shared between public and private companies. While public companies collect bulky items throughout Paris, private companies collect glass. Collection of street waste and packaging waste from households are shared in terms of the districts in Paris. Since 2012, selective and residual household waste is collected door-to-door. There are also 7 drop off points for bulky waste and hazardous waste.

Prevention policies/measures

The first waste prevention plan (2006-2010) reduced waste generation by 6.3%. The new plan is aimed at 7% reduction until 2015. In 2010 Paris launched a community and individual composting programme by providing composters.

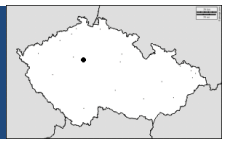
Financing system

Tax: based on the property paid by the owner
EPR schemes (packaging, graphic paper, WEEE) and income from the sale of recyclables

Source: INSEE; Annual report on the price and quality of public waste management service in Paris, Mairie de Paris, 2012

Prague – CZECH REPUBLIC

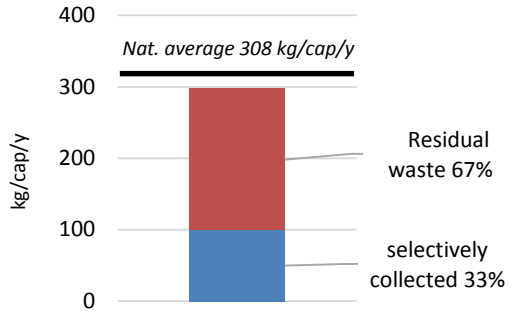
2011



General data

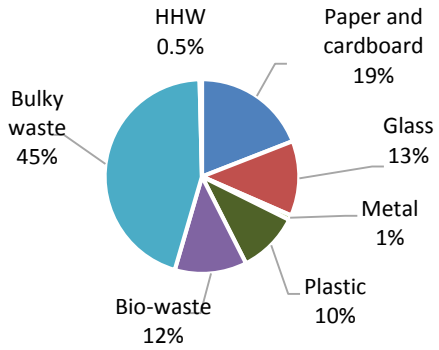
Population	1,246,780 inhabitants	**Administration**	City of Prague, Department of Urban Vegetation and Waste Management; www.praha.eu
Density	2,512.9 inhabitants/km²		
Area	496.15 km²		

Municipal waste generation and collection



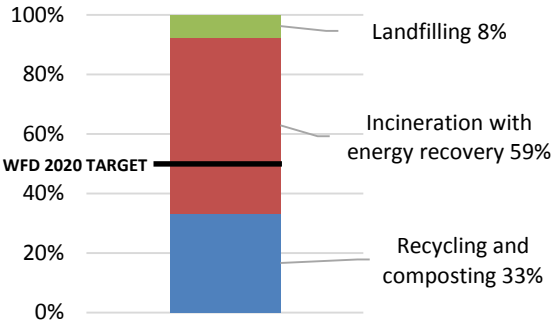
	Tonnes	kg/capita/y
Municipal waste	370,586	297.23
Selectively collected waste	123,786	99.28
Residual waste	246,800	197.95

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	23,541	18.88
Glass	15,401	12.35
Metal	980	0.79
Plastic	12,566	10.08
Bio-waste	14,797	11.87
Bulky waste (Wood, WEEE,…)	55,646	44.62
Hazardous household waste	486	0.39
Total	**123,417**	**98.98**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	123,786	99.28
Incineration with energy recovery	220,600	176.94
Landfilling	28,086	22.53
Total	**372,472**	**298.75**

Collection system

Responsible organisation: Pražské služby, Ipodec, Komwag, AVE CZ

Separate collection of paper, metal, glass and plastic are provided by door-to-door collection or by large containers provided for collective housing. Apart from this system, there are bring banks for the same types of waste including bulky waste.

Prevention policies/measures

Projects and campaigns aimed at reuse and home composting. Projects on environmental education of population.

Financing system

EPR schemes in place for WEEE, tyres, mineral oils, batteries, packaging and drugs.

Source: Prague Statistical Yearbook, 2013; Prague Environment Yearbook, City of Prague, Department of Urban Vegetation and Waste Management, 2011

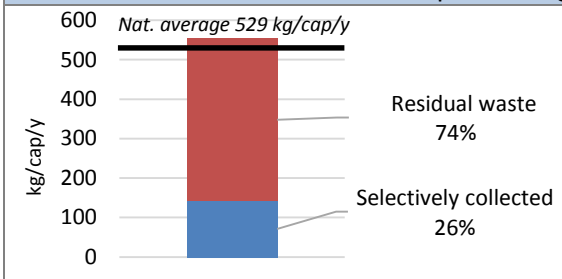
Rome – ITALY

2012

General data

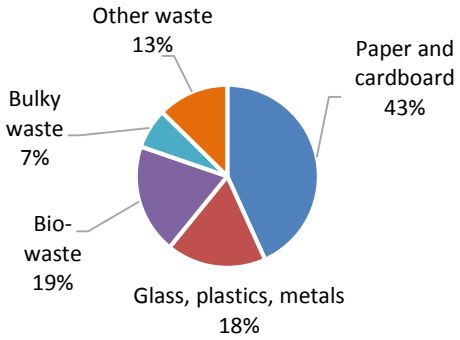
Population	2,885,272 inhabitants	**Administration**	City of Rome, Department for Environmental Protection and Urban Greenery www.comune.roma.it
Density	1,286 inhabitants/km²		
Area	2,244 km²		

Municipal waste generation and collection



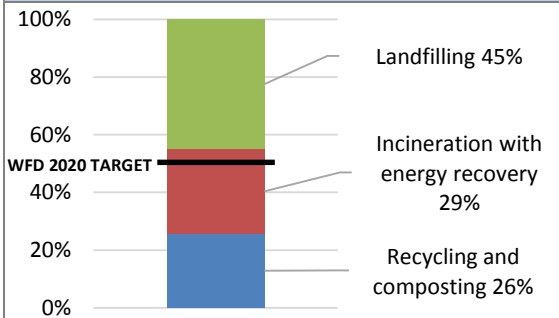
	Tonnes	kg/capita/y*
Municipal waste	1,753,508	553.33
Selectively collected waste	449,960	141.98
Residual waste	1,303,548	411.34

Composition of selectively collected waste



	Tonnes	kg/capita/y*
Paper and cardboard	206,573	65.19
Glass, plastics, metals	84,339	26.61
Bio-waste	92,714	29.26
Bulky waste (Wood, WEEE, Textiles,…)	33,935	10.71
Other waste (incl. scrap metal)	60,353	19.04
Total	**477,914**	**150.81**

Municipal waste treatment



	Tonnes	kg/capita/y*
Recycling and composting	449,960	141.99
Incineration with energy recovery	517,471	163.29
Landfilling	786,551	248.20
Total	**1,753,982**	**553.48**

Collection system

Responsible organisation: AMA S.P.A

The city of Rome is currently changing the collection system, introducing door - to - door collection. The change started at the end of 2012, involving a part of the city (IV Municipio) and it will proceed with other 5 districts during this year, to reach at the end of 2013 about 1,000,000 of inhabitants.

Prevention policies/measures

Prevention measures and campaigns include: compulsory use of reusable dishes in school canteens; promotion of home composting.

Financing system

Tax: the service costs related to the municipal waste management are fully covered by the waste tax (Ta.Ri.), collected directly by AMA SpA. The fee is calculated on the basis of the area of the property and the size of the household, for companies it is based on the area and the category of their activity.

* Population of the city of Rome is 2,885,272, but the data corresponds to the population served = 3,169,000

Source: City of Rome, Department for Environmental Protection and Urban Greenery

Sofia – BULGARIA

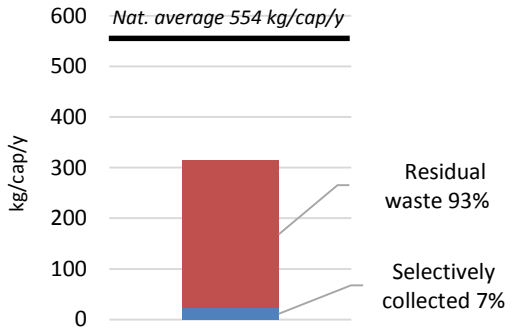
2010

General data

Source: City of Rome, Department for Environmental Protection and Urban Greenery

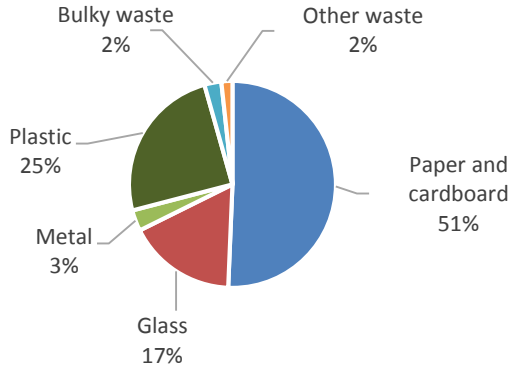
Population	1,201,448 inhabitants	**Administration**	Environmental Directorate of Sofia Municipality www.sofia.bg
Density	1,348.9 inhabitants/km²		
Area	891 km²		

Municipal waste generation and collection



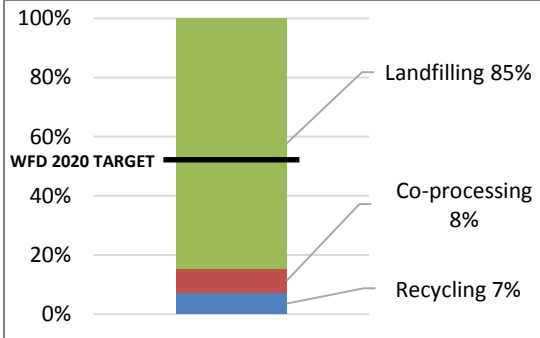
	Tonnes	kg/capita/y
Municipal waste	376,932	313.73
Selectively collected waste	27,222	22.66
Residual waste	349,710	291.07

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	13,791	11.48
Glass	4,630	3.85
Metal	892	0.74
Plastic	6,720	5.59
Bulky waste (Wood, WEEE)	720	0.60
Other waste (incl. batteries, tyres,…)	469	0.39
Total	**27,222**	**22.66**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling	27,222	22.66
Co-processing	30,284	25.21
Landfilling	319,426	265.87
Total	**376,932**	**313.73**

Collection system

Responsible organisation: 7 contracted private waste collecting companies, Chistota-Iskar Ltd. (municipal solid waste landfill operator), Sofinvest Ltd. (bulky waste and construction and demolition waste landfill operator)

Municipal waste is collected by 7 private waste companies and transported to sorting facilities. The outputs of the mechanical sorting plant is residual waste, RDF and recyclable materials. Coloured containers are deployed on the streets for packaging waste (glass, metal, plastic, and paper and cardboard).

Prevention policies/measures

Waste prevention programme by Sofia municipality, adopted on the basis of its participation in the Pre-Waste project; individual composters are distributed to family houses outside the urban areas of Sofia for kitchen and green waste.

Financing system

EPR systems exist for WEEE, batteries, and tyres (since 2010).

Source: National Statistical Institute; Sofia Municipality, waste management directorate

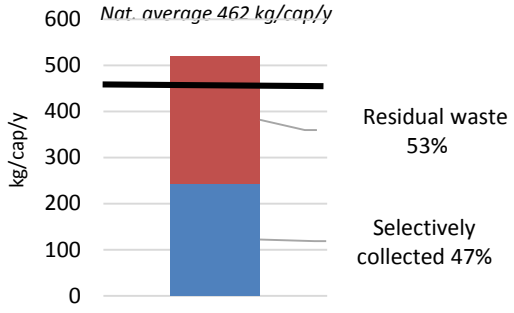
Stockholm – SWEDEN

2012

General data

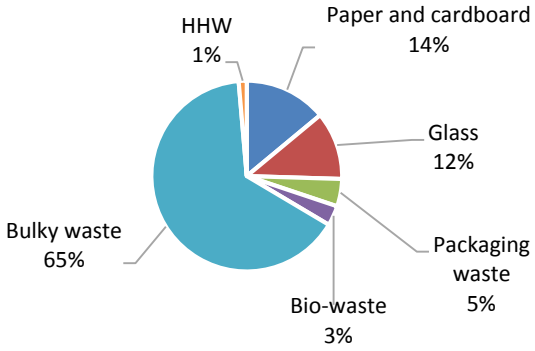
Population	881,235 inhabitants	**Administration**	City of Stockholm, Traffic Administration, Department of Waste Management www.stockholm.se
Density	4,694 inhabitants/km²		
Area	187.74 km²		

Municipal waste generation and collection



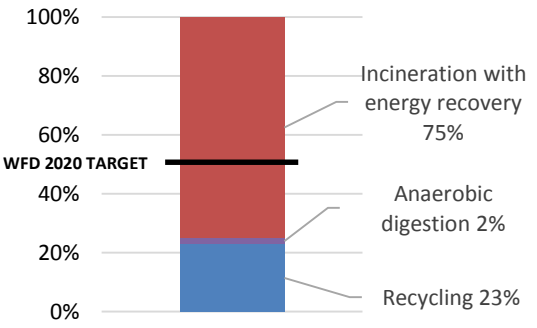
	Tonnes	kg/capita/y
Municipal waste	457,970	519.69
Selectively collected waste	214,603	243.53
Residual waste	243,367	276.17

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	29,988	34.03
Glass	24,700	28.03
Packaging waste	9,984	11.33
Bio-waste	7,277	8.26
Bulky waste (WEEE,…)	139,733	158.56
Hazardous Household Waste (HHW)	2,921	3.31
Total	**214,603**	**243.53**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling	98,879	112.20
Anaerobic digestion	8,849	10.04
Incineration with energy recovery	323,688	367.31
Total	**431,416**	**489.56**

Collection system

Responsible organisation: Private companies contracted through private procurements

There are 5 contractors for household waste, 1 for food waste and 13 for bulky waste operating in Stockholm. Door-to-door collection is provided for paper and cardboards, packaging waste, glass, bio-waste and residual waste. Civic Amenity Centers are available for bulky waste, WEEE, chemical waste and batteries. Hazardous waste is also collected at public collection points (paint shops, pharmacies, battery collection points ...). Test phase for food waste separation in a single bag.

Prevention policies/measures

No specific campaigns

Financing system

Property owner pays a fee according to the weight or volume collected. Fees include a basic fee for collection & treatment. EPR in place for packaging (plastic, paper, metal), glass, WEEE and newsprint

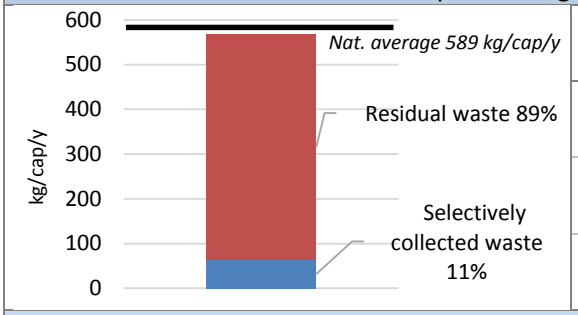
Source: Stockholm statistical office; Traffic Administration, Department of Waste Management

Valletta* – MALTA

2012

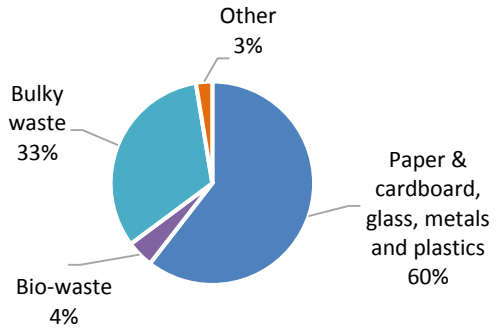
General data			
Population	421,364 inhabitants	**Administration**	MEPA, Malta Environment and Planning Authority www.mepa.org.mt
Density	1,333 inhabitants/km²		
Area	316 km²		

Municipal waste generation and collection



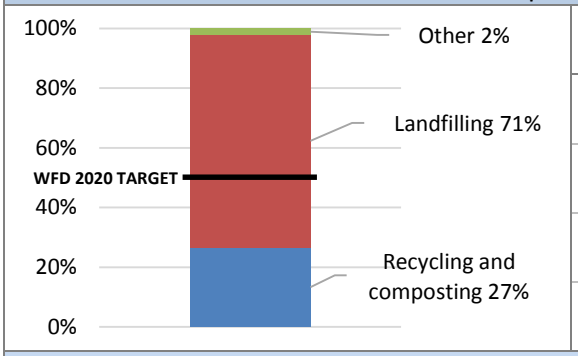
	Tonnes	kg/capita/y
Municipal waste	238,795	566,71
Selectively collected waste	26,782	63.56
Residual waste	212,013	503.16

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper & cardboard, glass, metals and plastics	16,206	38.46
Bio-waste	1,157	2.75
Bulky waste (Wood, WEEE,…)	8,723	20.71
Other	696	1.65
Total	**26,782**	**63.56**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling and composting	66,170	157.04
Landfilling	176,686	419.13
Other**	5,284	12.54
Total	**248,141**	**588.89**

Collection system

Responsible organisation: WasteServ Malta ltd.

Collection system consists of bring banks, civic amenity sites and grey bag collection from door to door. Bring banks serve for clean source segregated recyclables (glass, metals, plastic and paper). Civic amenity sites are destined for disposal of bulky waste and green waste. The door-to-door collection of mixed paper, plastics, metal from households (grey bags) happens weekly. Materials are sorted and sold to enterprises for recycling.

Prevention policies/measures

Examples of waste reduction: use of refillable bottles for drinks, all plastic bags are charged, reuse of packaging in certain industries for internal and external transport.

Financing system

Tax: the waste collection service (door-to-door and collection of bulky waste on request) offered to Maltese households by their Local Councils is free of charge to the Maltese citizens. All costs are borne by the Maltese Government which fully supports this service from the general tax income.

* The data provided represents the territory of the entire country

** Pre treatment is done by private companies. Portion of that waste is recycled, while the rest is landfilled. No data available.

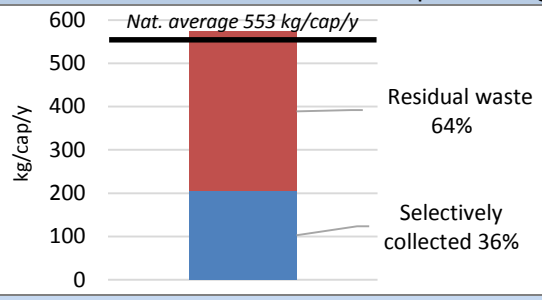
Source: NSO News – Solid Waste Management in Malta, 2014

Vienna – AUSTRIA

2012

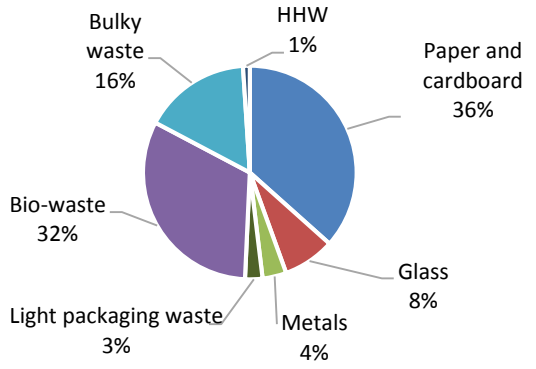
General data			
Population	1,717,084 inhabitants	**Administration**	MA 48 – Waste Management, Street Cleaning and Vehicle Fleet www.wien.gv.at
Density	4,173 inhabitants/km²		
Area	411.47 km²		

Municipal waste generation and collection



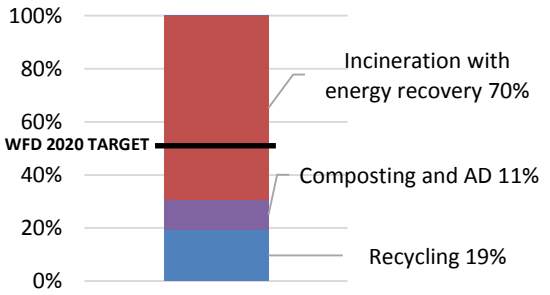
	Tonnes	kg/capita/y
Municipal waste	984,176	573.17
Selectively collected waste	351,902	204.94
Residual waste	632,274	368.22

Composition of selectively collected waste



	Tonnes	kg/capita/y
Paper and cardboard	128,810	75.02
Glass	27,690	16.13
Metals	12,711	7.40
Light packaging waste (incl. plastic)	9,296	5.41
Bio-waste	112,623	65.59
Bulky waste (Wood, WEEE)	56,035	32.84
Hazardous household waste (incl. used oils and tyres)	4,735	2.91
Total	**351,900**	**204.94**

Municipal waste treatment



	Tonnes	kg/capita/y
Recycling	190,800	111.12
Composting and anaerobic digestion	110,241	64.20
Incineration with energy recovery	682,808	397.66
Landfilling	325	0.19
Total	**984,174**	**573.18**

Collection system

Responsible organisation: MA 48

Bins for separate collection of paper, glass, metals, plastic bottles, bio-waste and residual waste are provided to households. Civic amenity sites provided for WEEE, hazardous waste, wood, used oil, bulky waste and fluorescent lamps.

Prevention policies/measures

The City of Vienna is running the “Less rubbish, of course”, formerly known as “Waste prevention in Vienna” founded in 2001, as a result of the Strategic Environmental Assessment. This initiative is in place along with ÖkoKauf Vienna (green procurement programme) and PUMA (Environmental management programme in the local council).The Department of Environmental Protection has numerous projects within this framework. Subsidies and grants for NGOs, clubs, educational and health facilities. Initiatives for events that organisers have to use reusable plastic cups or washable dishes.

Financing system

EPR schemes for packaging and WEEE.

Source: Statistics Austria; Performance report, MA 48, 2012

Results of the capital cities cross-analysis

This chapter brings together the outcomes of the city-level analysis. The indicators and criteria used in this report provide important information on the current state of municipal waste management in EU capital cities but do not present a comprehensive picture. The assessment would benefit from a more in depth analysis of the waste framework conditions and the policies applied by the cities.

The information presented in this chapter covers analyzed data on: municipal waste prevention, municipal waste generation, household waste versus assimilated waste, municipal waste selectively collected, performances of selectively collected waste streams, municipal waste treatment options, evolution of waste recycling performances and finally municipal waste generation in relation to the GDP.

The city information is complemented with national waste data (waste generated, waste recycled) and city economic data (Gross Domestic Product) extracted from various sources.

A wide span of various EU capital cities in terms of population and population density is covered,– ranging from cities with a population of less than 500,000 inhabitants, like Bratislava, Valletta, Ljubljana and Luxembourg, to those of more than 2 Million inhabitants like London, Berlin, Madrid, Rome and Paris. The same applies for population density varying from as low as 367 capita/ km^2 to 21.602 capita/ km^2. All these factors obviously affect waste generation and waste management options and performances, amongst others.

→ Municipal waste prevention

There is little evidence of increased waste prevention. Municipal waste prevention can be assessed by analysing trends in the amounts of municipal waste generated. If the amount of municipal waste generated is decreasing over time, waste is prevented - in line with the first objective of the waste hierarchy. This report does not provide such information but it is expected that in future reporting it will be possible to report on progress regarding waste prevention by analyzing those trends.

However, the factsheets showcase some of the actions undertaken by the different individual capital cities such as: no junk mail letterbox stickers (3x), home & community composting (6x), repair, rental, reuse systems (5x), participate in annual EWWR campaigns (2x), awareness-raising campaigns (10x), and others. Only one city, Paris, set a specific waste prevention target: 7% reduction by 2015.

→ Municipal waste generation

The waste generated per capital cities (bleu bars) varies from as low as 297kg/cap/y (Prague) to 878kg/cap/y (Dublin), the median value being 470kg/cap/y (EU28 average: 492 kg/cap/y). The red dots in figure 1 represent the average waste generated per capita at national level with data varying from 324kg/cap/y (Slovakia) to 668kg/cap/y (Denmark), the median value being 495kg/cap/y. Municipal Waste generation rates are influenced by several factors including economic development, population density, consumer behavior and local climate.
One may expect that the waste generation per capita in large cities would always be higher than the national average, since waste generation in urbanized areas, due to various reasons, is normally higher than in more rural areas or smaller cities. This is indeed very pronounced for Dublin and Luxembourg while the opposite (lower waste generation in the capital city as compared to the national average) is the case for Berlin, Copenhagen, Madrid and Sofia.

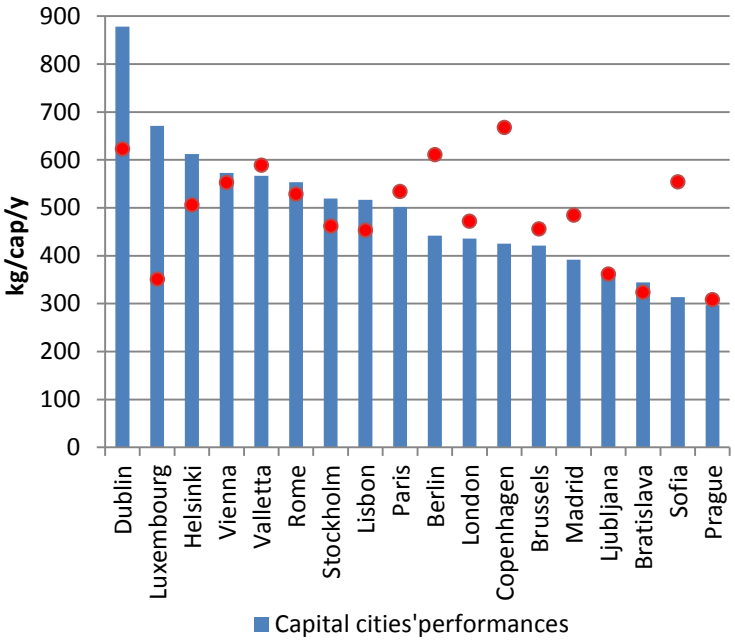


Figure 1 – Municipal waste generation in capital cities and national municipal waste generation in kg/cap/y

→ Household waste versus assimilated waste

All capital cities report on municipal waste generation. However, very few (6x) present figures distinguishing household waste and assimilated waste.

Even though literature often refers to an equation of Household/ Assimilated of 80/20 to 70/30 we can see in figure 2 that Helsinki and Dublin (even more) deviate considerably from this pattern. Too little data and the lack of background documentation don't allow for the provision of a clear explanation for this. Besides the possibility of misinterpretation of the definition of household and assimilated waste, one assumption is/could be that other waste fractions such as sewage sludge, parts of industrial waste, street cleansing, and others are included in the assimilated waste data.

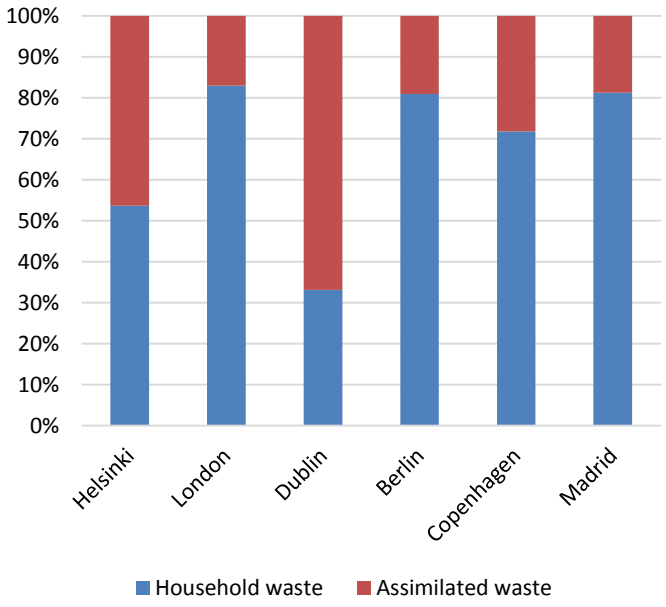


Figure 2 – Household waste versus assimilated waste in percentage

→ Municipal waste selectively collected

Selective collection consists in the separation of waste materials at source with the intention of recycling them. Most municipalities apply a variation of (separate) collection systems on their territory. Some methods implemented include door-to-door collection, bring banks, civic amenity centers, or a combination. Figure 3 presents the amounts of residual waste as compared to the amount of waste selectively collected in kg/cap/y. This graph provides as such an indication of the potential of waste recycling.

Since all cities have provided rates of selectively collected and residual waste, we can easily reflect on the current trends in municipal waste selective collection. Cities like Helsinki, Madrid and Dublin have these data for household waste only; therefore, these cities are marked with an asterisk in Figure 3. If we look at the collection systems in the best performing cities we can see that these systems are encouraging citizens to separate their waste at source for door-to-door collection of recyclables combined with additional bring systems. Helsinki provides its citizens besides door-to-door collection with the free collection of scrap metal, WEEE and hazardous household waste, while civic amenity sites are on disposal free of charge for all recyclable materials and garden waste. Ljubljana also has, on top of door-to-door collection, bring banks and civic amenity centres where citizens can discharge hazardous household waste, WEEE and bulky waste. Along with Ljubljana and Helsinki, also Stockholm, London and Berlin have a well-developed network of such bring banks and civic amenity centres; combined with door-to-door collection.

However, other factors might explain the differences: variation in statistical methods (data collection or aggregation), the scope of municipal waste (i.e share of assimilated waste), population density, national legislation, targets setting and the effectiveness of selective collection schemes.

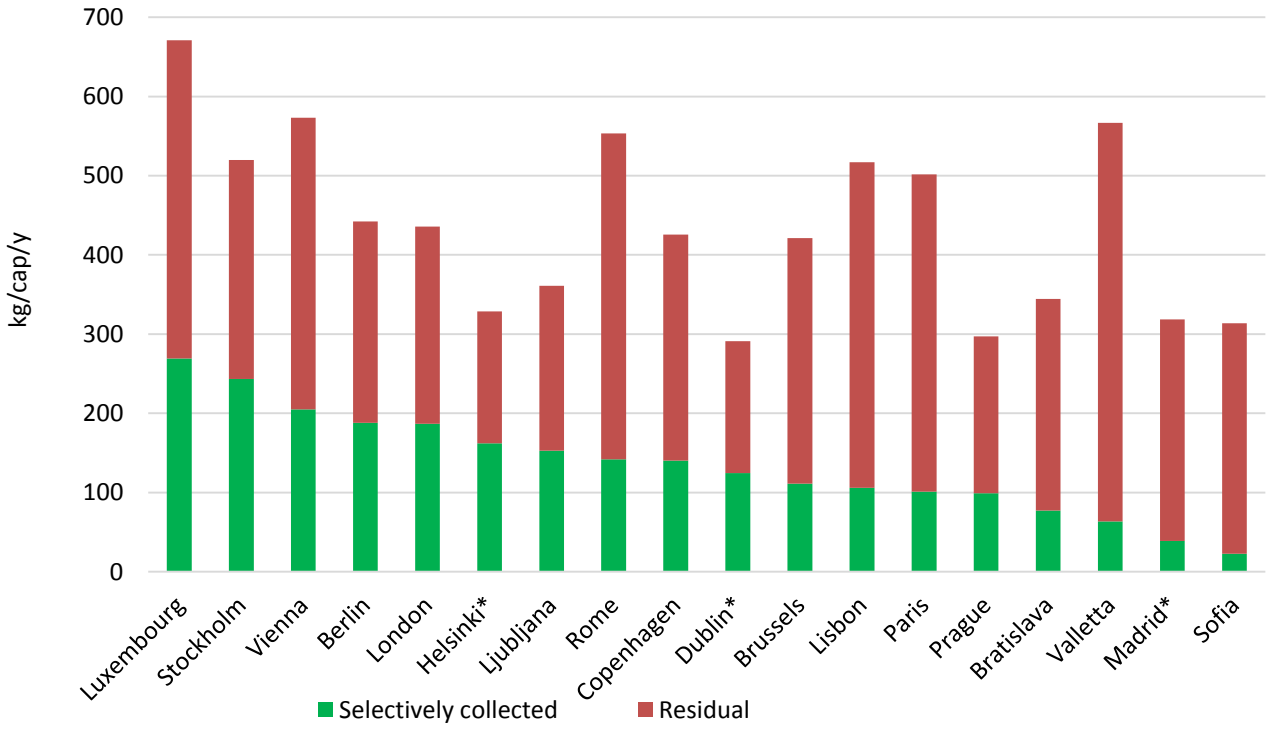


Figure 3 – Ratio between selectively collected and residual waste in kg/cap/y

→ Performances of selectively collected municipal waste streams

Figure 4 presents the main waste fractions as recorded by most cities; making a distinction between glass, metal and plastic as one fraction (sometimes presented separately but mostly presented as one fraction), paper and cardboard, bio-waste (no distinction between kitchen waste and green waste) and bulky waste (including mostly some of the following sub streams: wood, WEEE, furniture, textiles, and others). The cities indicated with an asterisk (Berlin, Copenhagen, Dublin and Helsinki) provide information on the selective collection of household waste only.

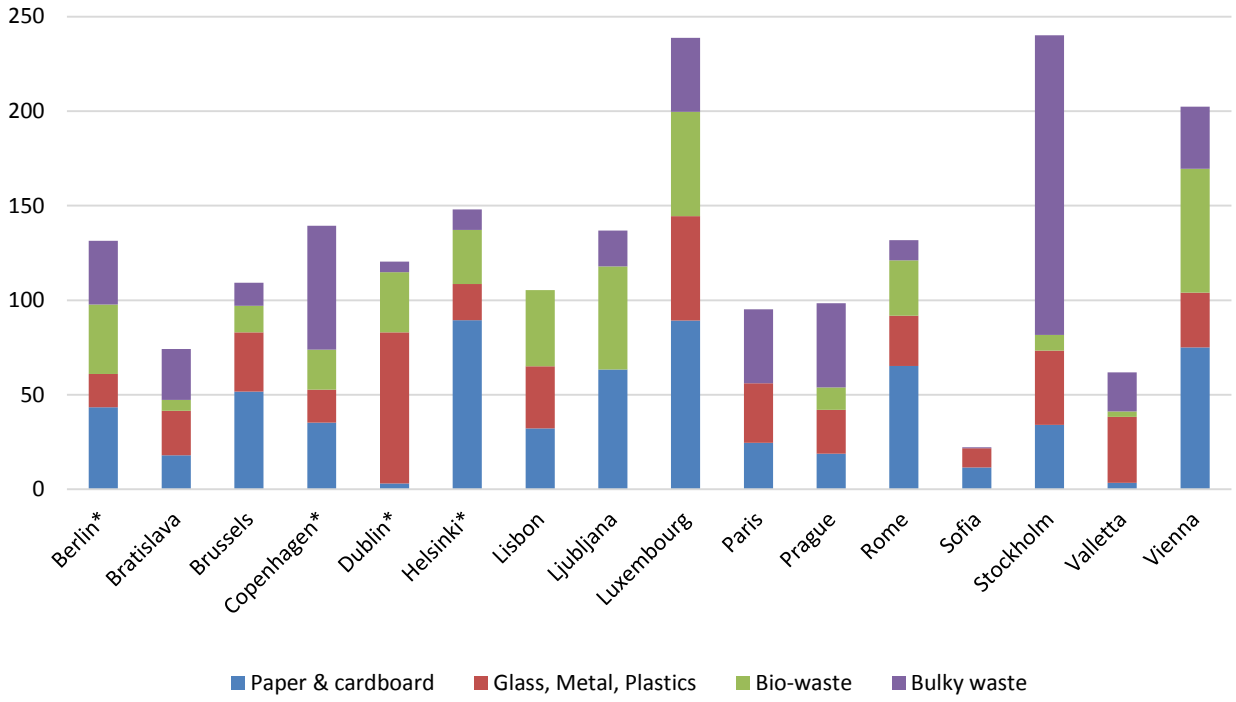


Figure 4 – Municipal waste selectively collected in kg/cap/y

Paper & cardboard is by far the most collected waste fraction ranging from less than 5kg/cap/y (Dublin and Valetta) to more than 80kg/cap/y (Helsinki and Luxembourg), the median being 34kg/cap/y.

Glass, metal and plastic too are fairly well collected ranging from +/- 10kg/cap/y (Sofia) to close to 80kg/cap/y (Dublin) with a median value of 31kg/cap/y.

Considering the potential for the selective collection of **bio-waste** (25 to 35% of the municipal waste generated), the quantities effectively collected are rather modest; ranging from 0kg/cap/y (Paris, Sofia) to more than 60kg/cap/y (Vienna), the median value being 21kg/cap/y.

Finally the collected **bulky waste** fraction is very high in Stockholm (>150kg/cap/y) and rather high in Copenhagen (65kg/cap/y) followed by a number of cities collecting between 20 and 45kg/cap/y of bulky waste, such as Prague, Paris, Luxembourg, Berlin, Vienna, Bratislava and Valetta. The median value here is 27kg/cap/y.

Above waste collection performances of separate waste fractions in kg/cap/y as presented here are taken off the context. The real performances therefore have to be assessed and compared with regard to the total municipal waste generated in kg/cap/y, the best performing capital cities (>40% selectively collected waste) being Helsinki, Stockholm, London, Dublin, Ljubljana, Berlin and Luxembourg.

→ Municipal waste selectively collected versus recycling performances

Figures 3 and 4 on selectively collected waste give us a good introduction to the potential of recycling. As explained above, the selective collection rate seldom corresponds to the recycling rate. Selectively collected waste always has a certain percentage of refuse that does not belong to the targeted waste stream collected. Obviously, the better the collection system and the more the citizens abide to the rules, the higher the performances will be.

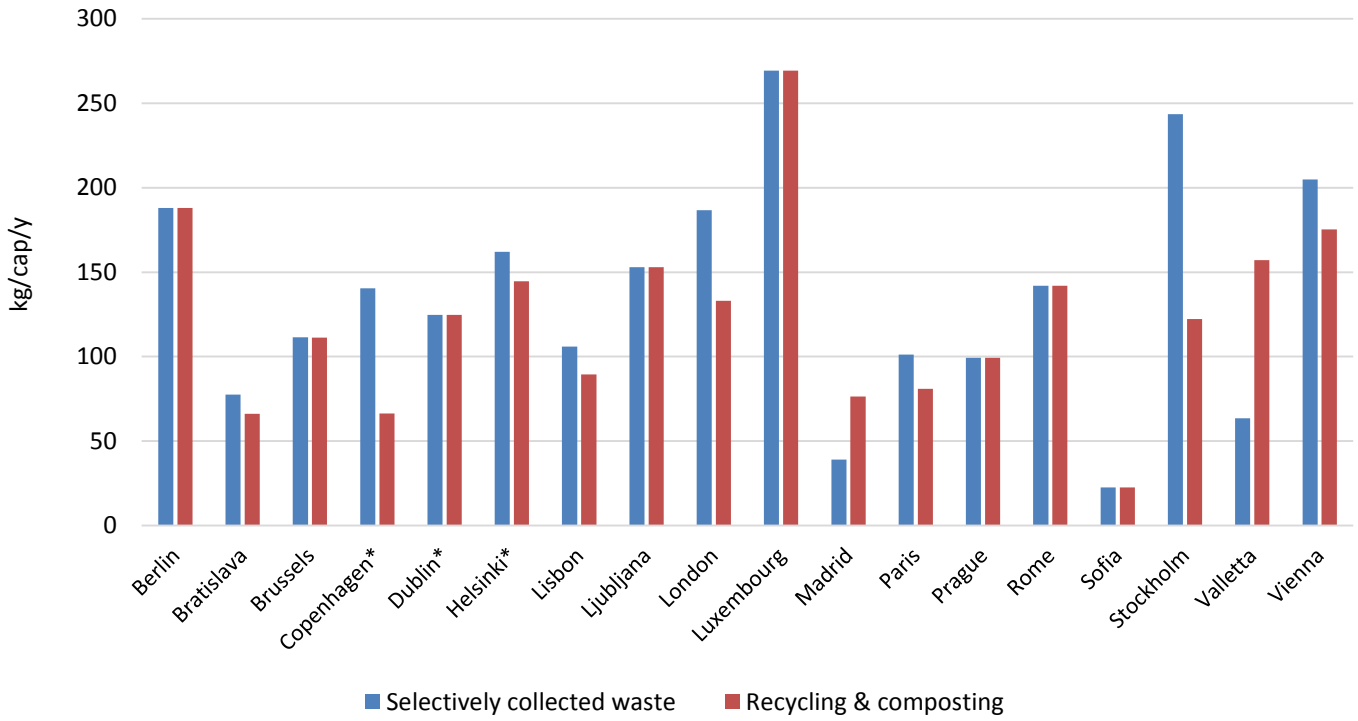


Figure 5 – Comparison between waste collected selectively and recycling in kg/cap/y

Figure 5 shows three tendencies: some capital cities report for recycling the same amount of waste selectively collected (Berlin, Brussels, Dublin, Ljubljana, Luxembourg, Prague, Rome and Sofia), others report more waste recycled as compared to waste selectively collected (Madrid, Valetta) while a certain number of them report recycling amounts lower than the waste collected selectively (Bratislava, Copenhagen, Helsinki, Lisbon, London, Paris, Stockholm and Vienna). Cities with an asterisk (Copenhagen, Dublin and Helsinki) refer to selectively collected and recycled household waste only.

The case whereby the recycled waste is higher than the selectively collected waste can be explained by the fact that those cities send part of the collected residual municipal waste to Mechanical-Biological Treatment centres; thus allowing for an additional post-selection of some waste streams.

The difference between selectively collected waste and recycling is particularly high for Copenhagen and Stockholm. The reason here could be that the bulky waste selectively collected contains a lot of drop out in itself (up to 50% according to literature), therefore considerably reducing the recycling rate of initially selectively collected waste (see below).

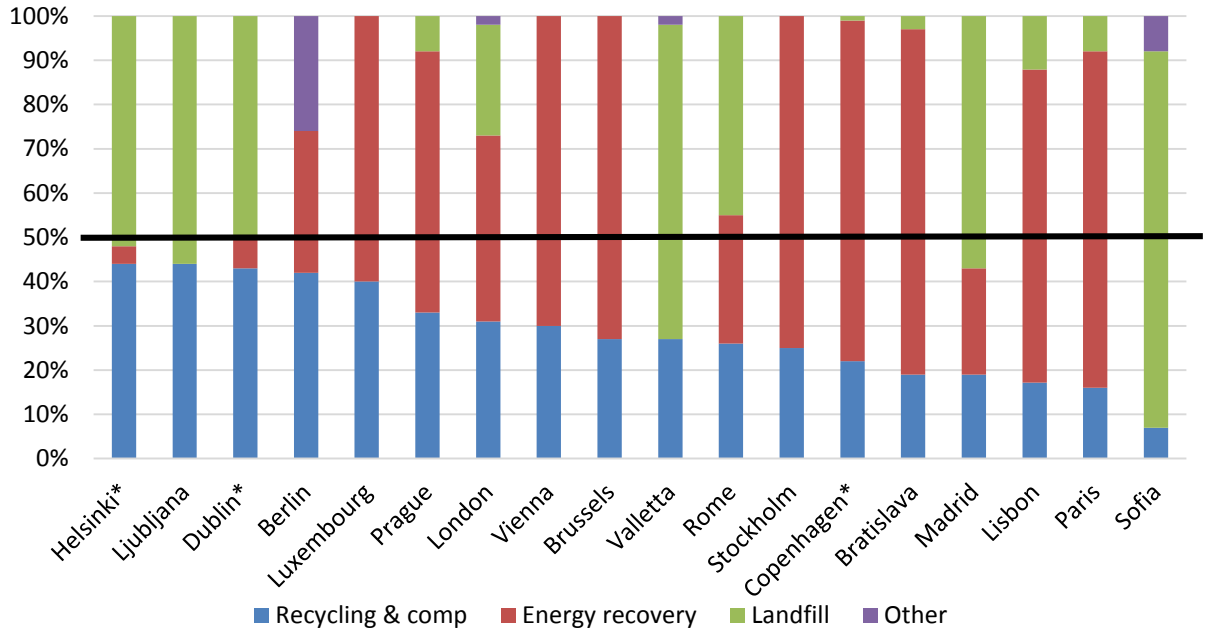
Bulky waste may contain a lot of recyclable fractions. In some regions, bulky waste is collected as one mixed fraction and sent to sorting facilities. The waste fractions sorted out will mostly go directly to recycling and can be counted as DREC (Destination RECycling). When the sorted fraction cannot be recycled (e.g. still too contaminated) or is collected to be sent to incineration (e.g. wood) and these waste fractions are disposed in an incinerator or on a landfill site, this amount has to be reported under the corresponding stream as going to incineration or landfill.

→ Municipal waste treatment options

Figure 6 illustrates the ratios between recycling and composting, incineration (with energy recovery) and landfilling of municipal waste (except the cities with an asterisk – household waste figures only) for the 18 capital cities.

As expected, the best performing cities with regard to selectively collected waste have the highest recycling rates. However, and as mentioned before, (large) differences in data on selective collection and recycling have to be acknowledged; assuming therefore that cities do not always distinguish between 'sorting rates' and 'recycling rates'. Figure 5 shows clearly those differences.

Figure 6 – Municipal waste treatment including recycling & composting, incineration with energy recovery, landfill and other presented in percentage.



A number of cities are still very reliant on landfilling (Helsinki, Ljubljana, Dublin, Valetta, Rome, Madrid and Sofia) despite some of them have achieved high recycling rates (Helsinki, Ljubljana and Dublin). Only 3 capital cities have no energy recovery plants showing thus that most cities, in varying degrees, have embraced incineration as a complementary option for municipal waste management. The future will determine in how far the existing energy recovery plants -on which most of the capital cities rely- will hinder the further development of recycling rates.

Figure 7 clearly shows that the tendency in most capital cities is towards recycling and incineration as complementary options. Recycling performances still need improvement, very much so for the few capital cities with levels lower than 25% (6x).

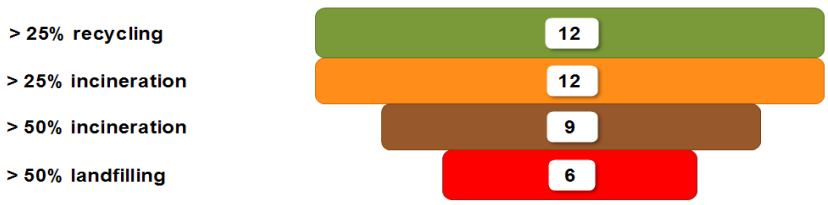


Figure 7 – Number of cities at different levels of the municipal waste management hierarchy[2]

[2] *Each city can be included in several waste management categories so the total number of cities is greater than 18.*

→ Municipal & national waste recycling performances comparison

Figure 8 provides the comparison of capital cities' recycling performances facing the national corresponding performance.

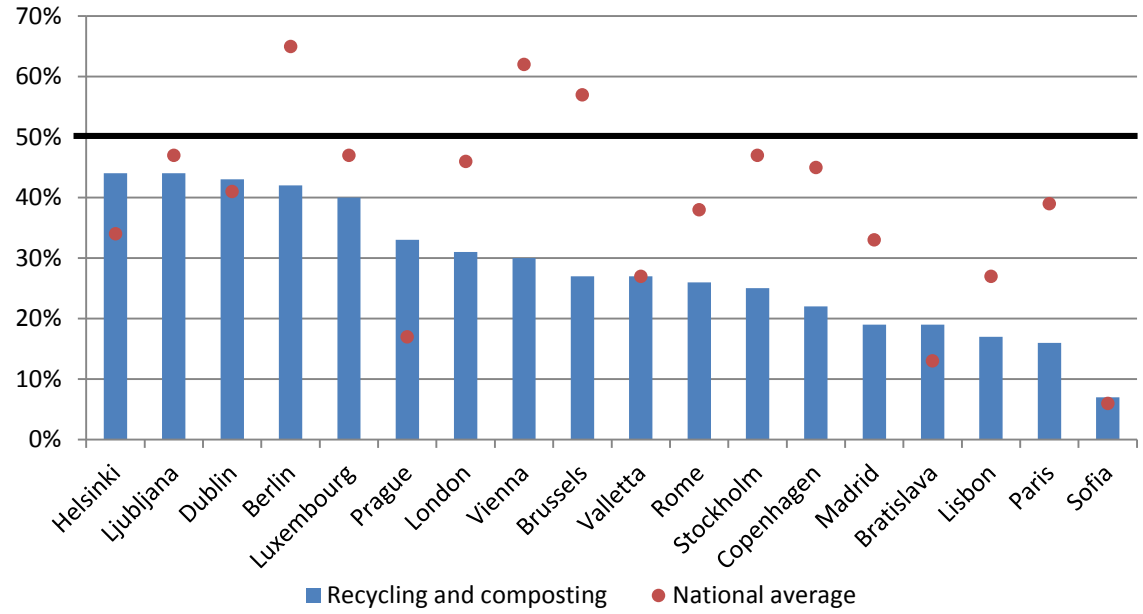


Figure 8 – Municipal waste treatment recycling rates for capital cities as compared to the national averages

None of the capital cities has yet reached the 50% recycling rate (EU target set in the 2008 Waste Framework Directive – however not a binding target at city level, only national) as compared to three countries (Germany, Austria and Belgium). In fact most capital cities are well behind this target. There is no real pattern that can be extracted from the data displayed above. Some capital cities perform better than the national average (Helsinki, Prague, Bratislava) while others underperform when compared to national averages (Berlin, London, Vienna, Brussels, Rome, Stockholm, Copenhagen, Madrid, Lisbon and Paris). All in all national performances are better than the capital cities performances.

This report does not allow data comparison over a period of time. However, ACR+ published in 2009 a book on: 'Municipal waste Management in Europe' including an annex that represented a first attempt to provide some municipal waste data per capital city. The reliability of the 2005 data is lower than the currently collected 2012 data and as a result, figure 9 below can only be seen as an indication of the recycling performances' evolution in those 7 years.

In this period of 7 years– for which 2005 and 2012 data were available - all capital cities have increased their recycling rates. This clearly indicates significant improvements in recycling performance, although the numbers also show enormous differences in performance between those capital cities.

The further from the centre in the radar chart, the higher the recycling rate. The recycling rate is presented in kg/cap/y. Total recycling includes material recycling as well as bio-waste recycling. The 2005 and 2012 data presented for Copenhagen and Dublin refer to household waste only.

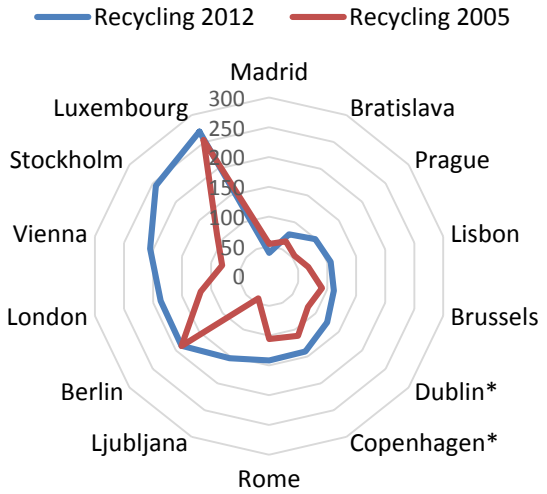


Figure 9 – Municipal waste recycling rates evolution for selected capital cities, 2005 and 2012 in kg/cap/y.

→ Municipal waste generation in relation to GDP

Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced. The income level and urbanization rates are highly correlated and as disposable incomes and living standards increase, consumption of goods and services rises correspondingly, and so does the amount of waste generated. Figure 10 below does not fully support the above statement. The points in the graph are relatively distant from the trend line.

Waste generation varies as a function of affluence. However, regional and country variations can be significant, as generation rates are within the same city (e.g. Dublin waste being mostly assimilated waste). Besides the economic development, MSW generation rates are influenced, by population density, unemployment rate, geographical location, public habits, and local climate.

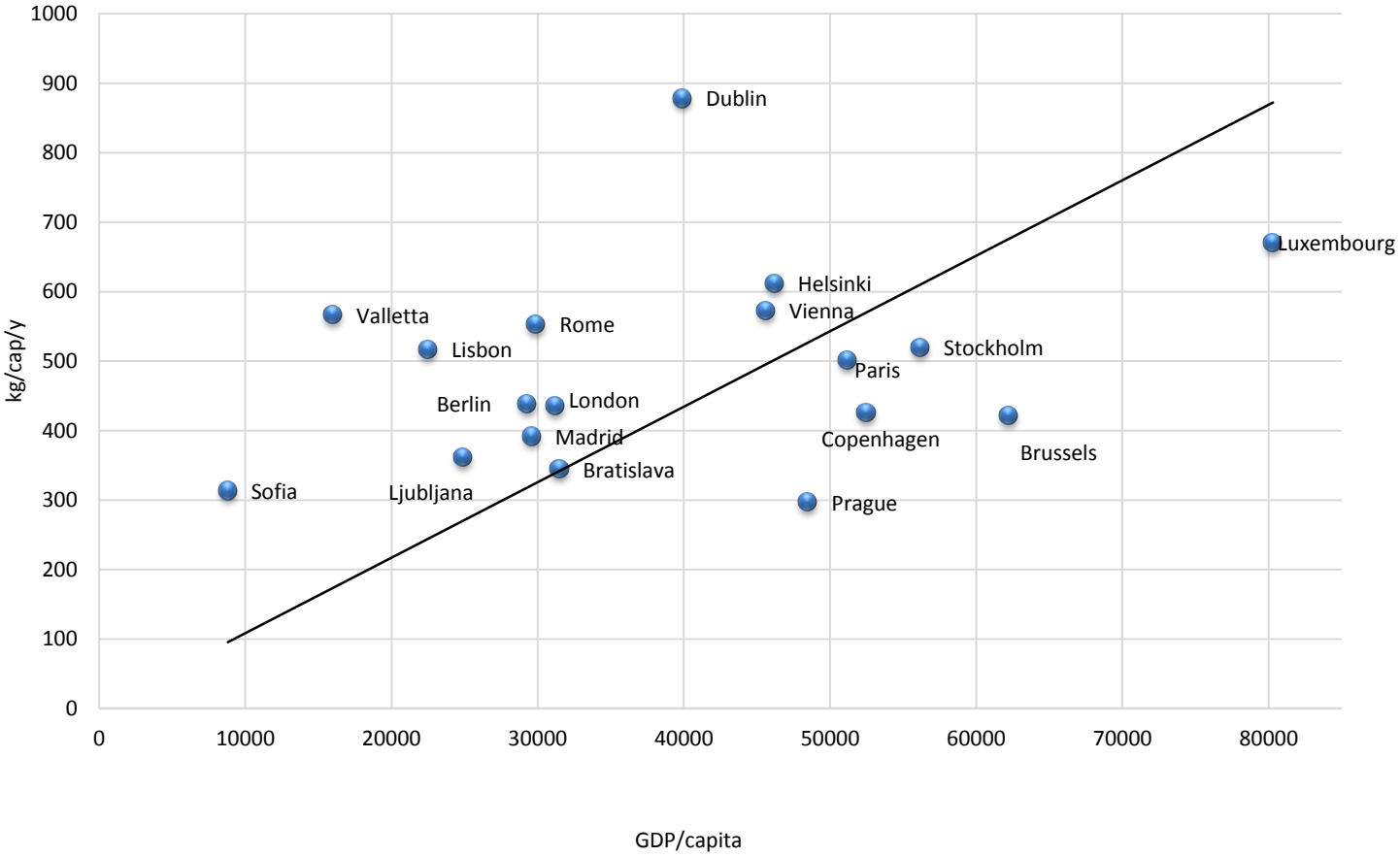


Figure 10 - Municipal waste generation (kg/cap/y) and Gross Domestic Product (GDP) per capita

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