REGIONAL DISTRICT OF NANAIMO

# STAFF REPORT

| | | | |
|---|---|---|---|
| **TO:** | Larry Gardner<br>Manager, Solid Waste | **DATE:** | January 5, 2016 |
| | | **MEETING:** | RSWAC, January 14, 2016 |
| **FROM:** | Sharon Horsburgh<br>Senior Solid Waste Planner | **FILE:** | 5365-00 |

**SUBJECT:** Jurisdictional Scan Regarding Waste Diversion Programs

## RECOMMENDATION

That the Regional Solid Waste Advisory Committee (RSWAC) receive this report for information as part of the 2015 Solid Waste Management Review Process.

## PURPOSE

This report has been prepared in response to the RSWAC's request for information on other jurisdiction's accomplishments with regard to waste diversion. The report also considers how the Regional District of Nanaimo's (RDN) waste diversion performance measures up to other jurisdictions globally.

## BACKGROUND

The report gives a high level overview of solid waste programs and waste diversion achievements of Edmonton, San Francisco, Europe and the UK. Further the report discusses significant deviation in calculation methodologies and also draws some conclusions on the RDN's relative performance.

*Jurisdictional Overview*

- **EDMONTON** - The Edmonton Waste Management Centre (EWMC), owned by the City of Edmonton, is a unique collection of advanced waste processing and research facilities. The City of Edmonton is currently diverting over 50% of residential waste from landfill primarily through recycling and composting using a mixed waste Materials Recycling Facility (dirty MRF). Residual waste suitable for their Waste to Biofuels and Chemicals Facility will enable the City to increase that diversion rate to 90%. Other key elements of their program include:
    - Residential Blue Bag collection of recyclables
    - Residential waste is contracted by the City; commercial waste is through private haulers
    - EWMC drop off fee for householders is $60/tonne and $20 minimum charge
    - EWMC drop off fee for commercial waste is $90/tonne and $40 minimum charge
    - Monthly residential curbside collection cost is $43/household and $27.95/multi-family.
- **SAN FRANCISCO** – In 2012, San Francisco reported an 80% diversion rate of all waste generated in the City. This was achieved through source reduction, reuse, recycling and composting programs.

Under the City of San Francisco's Mandatory Recycling and Composting Ordinance (Appendix 1), the City has a contract with Recology as the sole provider of garbage and recycling collection for both residential and commercial sectors. This Ordinance compels mandatory recycling and composting with fines ($100) for non-compliance. Waste generators are encouraged to divert recyclable and compostable materials to avoid penalties. To incentivize source separation the contractor (Recology) is paid based on the volume of materials recovered for recycling and composting. Under this scheme, Recology receives an exclusive permit to collect residential & commercial refuse. To support mandatory waste diversion, material bans are strictly enforced and carry financial penalties. The City uses funds generated from disposal fees to finance its Zero Waste Programs. For a Summary of Zero Waste policies please see Appendix 2. These programs have helped San Francisco to achieve an 80% waste diversion rate which is the highest in North America.

- **EUROPE** – Table 1 below lists the following ten European Countries having highest municipal waste diversion:

| Country | 2004 Diversion | 2014 Diversion |
|---|---|---|
| Germany | 56% | 64% |
| Austria | 59% | 59% |
| Belgium | 57% | 57% |
| Switzerland | 50% | 50% |
| Netherlands | 47% | 49% |
| Sweden | 45% | 48% |
| Luxembourg | 41% | 47% |
| United Kingdom | 23% | 46% |
| Denmark | 34% | 45% |
| Iceland | 16% | 43% |

*Data Source: Eurostat. Municipality Waste Statistics.*

In a recent briefing the European Environmental Agency reported the following:

*"There is a clear link between increasing recycling rates and declining rates of landfilling. In countries with high municipal waste-recycling rates, landfilling declines much faster than the growth in recycling, as waste management strategies usually move from landfill towards a combination of recycling and incineration, and in some cases also Mechanical-Biological Treatment (MBT).*

*Almost without exception, the better-performing countries in terms of recycling have a wider range of measures and instruments in place than poorer-performing countries. Measures include landfill bans on biodegradable waste or non-pre-treated municipal waste; mandatory separate collection of municipal waste types, especially bio-wastes; and economic instruments such as landfill and incineration taxes and waste collection fees that strongly encourage recycling. Although the key drivers behind better municipal waste management are clearly EU and national policies and targets, regional and local policies within countries also play a significant role in the process.*

*Turning waste into a resource will require full implementation of waste legislation and additional efforts to reduce waste generation in absolute terms, removal of barriers to recycling, and limiting landfill to residual (i.e. non-recyclable and non-recoverable) waste".* [1]

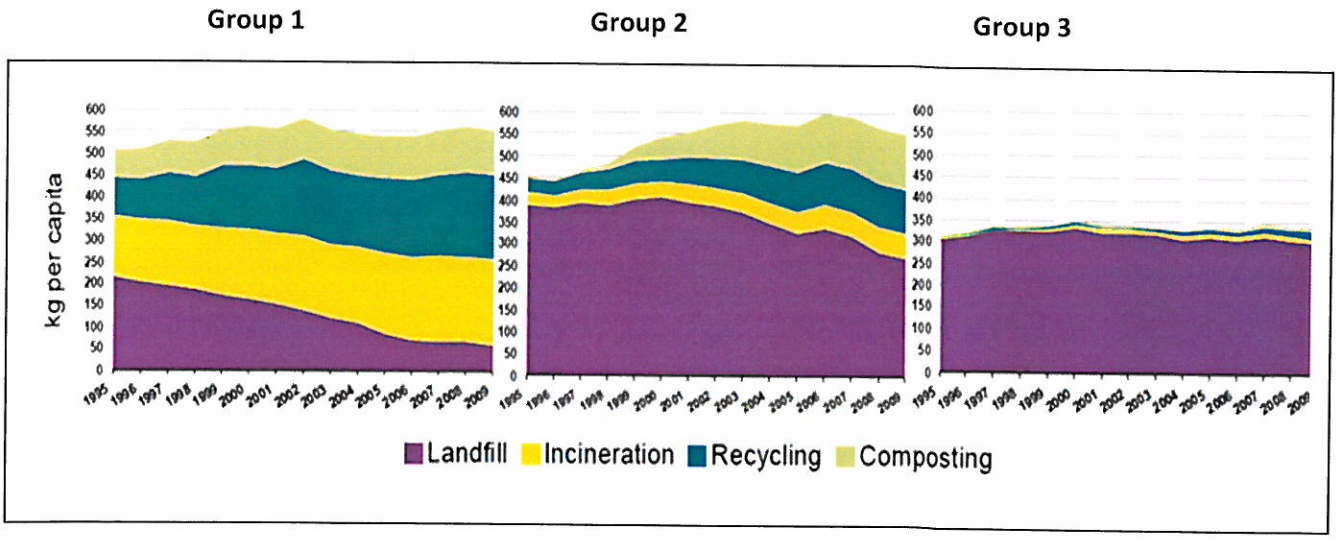
[1] *The European Environmental Agency briefing last modified on May 6, 2015*

In the European Commission's 2011 Eurostat Report: *Generation and Treatment of Municipal Waste,* (Appendix 3) grouped European countries based on the shares of incineration and materials recovery. The three groups are:

Group 1: Incineration >25% and recycling and composting >25%
Group 2: Incineration <25% and recycling and composting >25%
Group 3: Incineration <25% and recycling and composting <25%
*[Note that Group 3 represents primarily eastern European countries.]*

The population is fairly evenly distributed within the three groups, each representing roughly 200 million inhabitants. The following graphs show the per capita waste management distribution for each of the three groups.

**Figure 1. Per Capita Waste Generation and Treatment of Municipal Waste**




Eurostat concluded that several Group 1 countries had introduced measures to limit landfilling resulting in an increase in recycling, composting and incineration and, for Group 2, such measures have been introduced to a lesser degree.

There are also success stories on a smaller regional basis such as the waste diversion achievements of Capannori in Italy. In 2012, this 47,000 person community achieved an 82% diversion of municipal (household) waste and the 2011 per capita disposal rate for household waste was 146 kg/person/year. Their success is largely the result of a 'Pay As You Throw' waste tariff, where the frequency of collection per household is measured using microchips in stickers on residual waste bags, scanned by a reader on the collection vehicle. The tariff incentivized better separation and prevention, driving up local source separation. Capannori also introduced a reuse center which provided training for unskilled labour and

diverted 93 tonnes of material in 2012. They have also introduced a tax incentive for the sale of bulk products as well as education campaigns aimed at reducing the use of disposable products.

**Variations in Waste Calculation Methodologies**

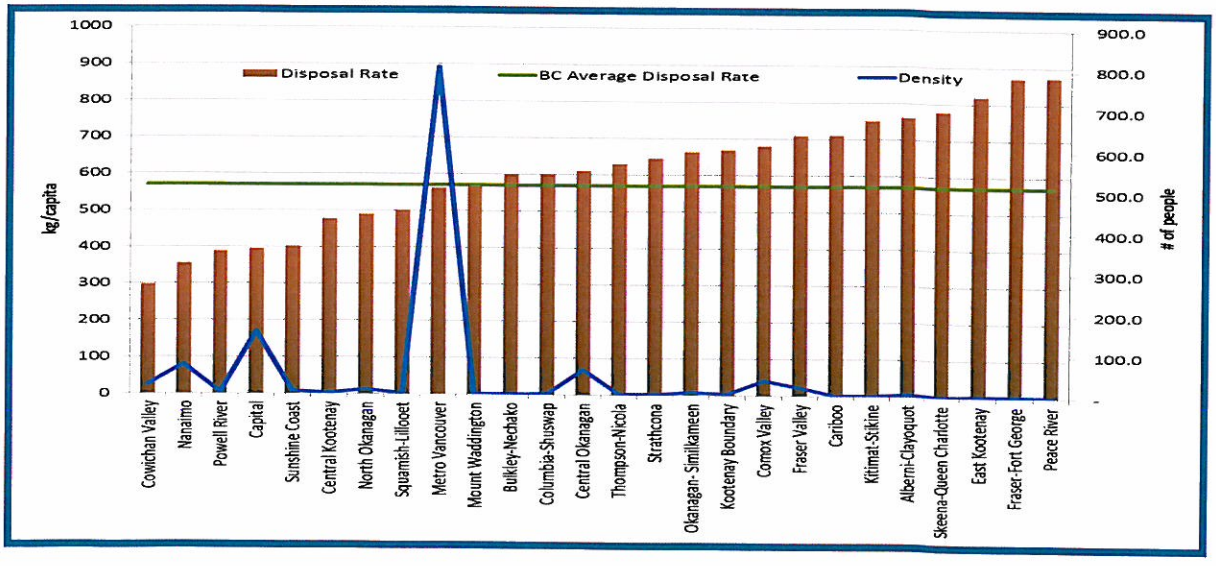
*1. Methodology in BC and Canada*

In British Columbia, the Ministry of Environment (MOE) has established the waste/diversion methodology and data is compiled using a Waste Diversion Calculator. The objective of this tool is to provide a transparent and consistent measurement for waste diversion and disposal in BC. This reporting procedure simply focuses on municipal solid waste (MSW) disposal only and does not attempt to calculate the recycled or diverted component. The MOE use waste disposal data provided by regional districts to determine disposal rates. Waste Disposal Calculator reports on all MSW that is accepted at authorized disposal sites within their boundaries, whether they are owned and/or operated by the regional district, a municipality or the private sector, as well as waste exported from their regional district.

For clarity, MSW is defined as waste from residential, commercial, institutional, demolition, land clearing or construction sources. It does not include hazardous waste, biomedical waste, agricultural waste, motor vehicles or components, contaminated soil, liquid waste (biosolids), landfill cover material, and materials recovered for beneficial use with a landfill site such as construction, renovation and demolition (CR&D) material used as road base or chipped and used for cover.

The BC Waste Disposal Calculator is consistent with Statistics Canada Waste Management Industry reporting requirements. Statistics Canada distributes surveys to the Government Sector nationally. Therefore, Canadian statistics on waste disposal/diversion are generally considered comparable. Population numbers are taken from the annual BC Stats Sub-Provincial Population Estimates.

**Figure 2: 2012 Kilograms disposed of per Capita and disposal Rates in BC Regional Districts**




As indicated in Figure 2, the 2012 per capita disposal rate ranges from 297 kg to 871 kg, and the average disposal rate in BC is 570 kilograms per capita. The RDN has achieved a waste diversion rate of 68 % and per capita waste disposal rate of 347 kilograms per capita. This is the second lowest in BC.

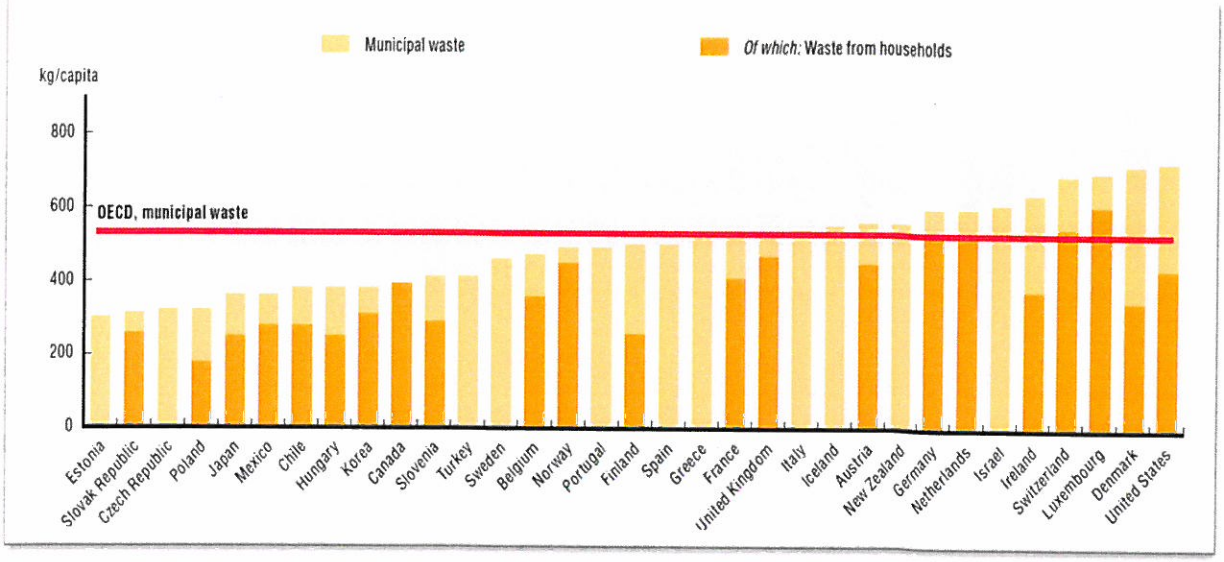
The City of Edmonton is currently diverting over 50% of residential waste from landfill primarily through recycling and composting using a MRF system. Currently, a system of two bags is used to residential curbside collection. A black bag is used to separate single stream material for recycling and a blue bag is used to separate compostable materials. The Waste to Biofuels and Chemicals Facility will enable the City to increase that diversion rate to 90%.

*2. Organization for Economic Development (OECD) Countries – Waste Diversion*

The OECD, to which Canada and the United States belong, defines municipal solid waste as waste collected by or on behalf of municipalities. It includes household waste originating from households and similar waste from small commercial activities, office buildings, institutions such as schools and government buildings and small businesses that treat or disposal of waste at the same facilities used for municipally collected waste ("Municipal Waste", in Environment at a Glance 2013: OECD Indicators, OECD Publishing. http://dx.doi.org/10.1787/9789264185715-15-en).

In effect, OECD disposal reporting is limited primarily to residential waste with some commercial and institutional wastes, while Statistics Canada reports on all sources of waste including industrial and CR&D wastes. The discrepancy is evident in the 2013 OECD report as indicated in the following Figure 3 below:

**Figure 3: Municipal Waste Generation per Capita 2011**




*Data Source: "Municipal Waste", in Environment at a Glance 2013: OECD Indicators*
http://dx.doi.org/10.1787/9789264185715-15-en.

As indicated in Figure 3, when ICI and CR&D wastes are excluded from the Statistics Canada disposal reporting data, Canada's residential waste disposal rate was 390 kg per capita compared to Japan at 250 kg per capita and the United States at 440 kg per capita.

The European Environmental Agency notes[1] in the Eurostat, please see Appendix 3, municipal waste constitutes only around 10% of total waste generated in Europe. It also recognizes: *"Improvements in waste data and harmonization of national reporting methodologies are required, as uncertainties relating to the comparability of national data is a barrier to assessment of progress and the effectiveness of policy measures."*

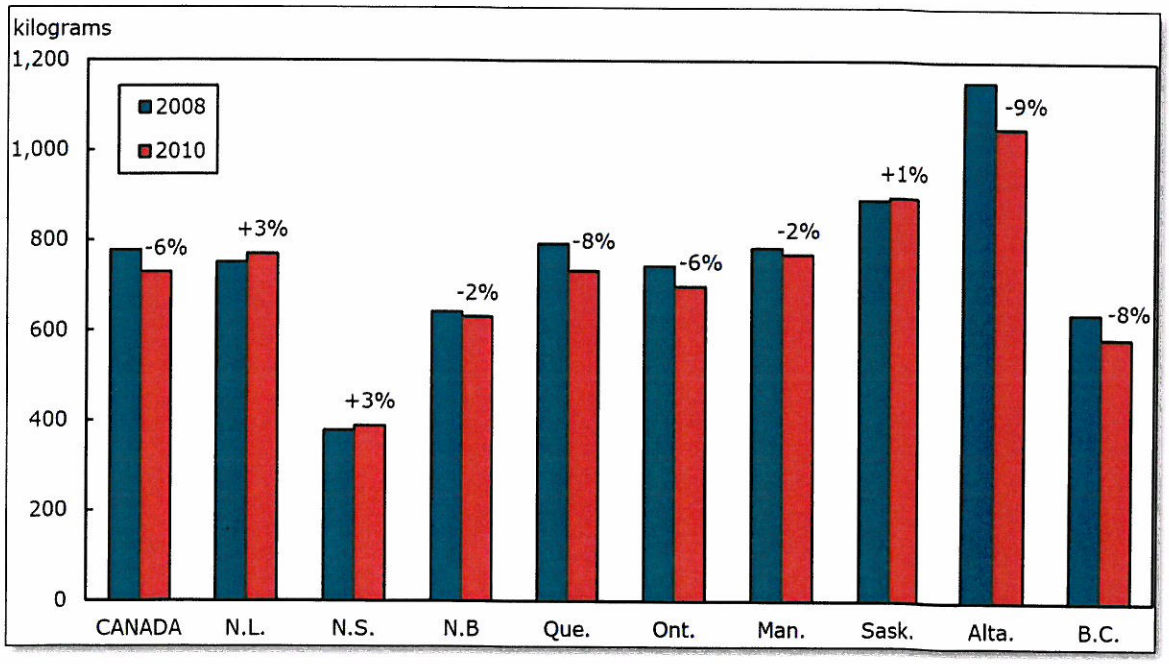
There is also limited comparability between Statistics Canada and the US EPA waste reporting data in that the US EPA definition of municipal solid waste does not include industrial or CR&D wastes. The only reporting system that is somewhat comparable to Statistics Canada, (and therefore the BC Waste Disposal Calculator) is the State of California's CalRecycle system which reports on solid waste disposed by all sources (residents, businesses, institutions, self-haul, construction and demolition sites, military bases, government agencies etc.).

Disposal statistics should be viewed with caution as jurisdictions may vary calculation methodology to meet local market conditions. For example, CalRecyle notes that when defining "per capita disposal" it is the total annual disposal, in pounds, from a jurisdiction divided by total industry employment in a jurisdiction. They also include qualifiers that where the per capita disposal rate does not reflect the jurisdiction's reduction, they can use an alternate method, and, where a jurisdiction is predominated by commercial or industrial sources, they may alternately calculate the per capita disposal. As a result, CalRecycle states: *"Remember that each jurisdiction is unique! Each one has its own 50 percent equivalent per capita disposal target, different demographics and industrial bases. You may be used to comparing your diversion rate with other jurisdictions in the region, but because the per capita disposal calculation is unique to each jurisdiction, it is impossible to compare targets and disposal rates across jurisdictions."*

*3. RDN's Waste Diversion Performance*

Due to the variables in waste calculation methodologies as discussed in the previous section, it is impossible to undertake a direct global comparison of the RDN's diversion performance. Comparisons within Canada can be considered valid and some inferences can be made with other jurisdictions. Figure 4 below presents per capita disposal rates for Canadian provinces.

**Figure 4: Per Capita Disposal of Waste for Canada and Selected Provinces, 2008 and 2010**




Data Source: Statistics Canada Waste Management Industry Survey: Business and Government Sectors 2010

Although only somewhat comparable numbers, California averaged a municipal disposal rate of 712 kg per capita in 2012. The BC average for the same period was 570 kg per capita. The City of San Francisco which claims to have the highest waste diversion in the country disposed of 482 kg per capita in 2012. The RDN's disposal rate was 347 kg per capita for the same period.

Table 2 below lists the 10 European countries with the highest diversion rate. The generation and diversion numbers are sourced from the European Environment Agengy[1] and the disposal figures using the two sourced values. The European Environment Agency notes that municipal waste only accounts for around 10% of the waste stream and, as such, the disposal figures in Table 2 in could be as much as 10 times higher. Such a high disposal amount is certainly erroneous and again points to the variances in methodologies. Nevertheless, comparing the RDN's total waste disposal rate of 347 kg/capita to only a portion of the waste stream to the European countries list, suggest the RDN's rate is lower than the average rated for any of these countries. No doubt there are European communities such as Capannori in Italy that far exceed national averages for diversion.

**Table 2. Top 10 European countries with the highest waste diversion rate.**

| | 2012 per capita Generation (kg) | 2012 % Diversion | 2012 per Capita Disposal (kg) |
|---|---|---|---|
| Germany | 611 | 64% | 220 |
| Austria | 552 | 59% | 226 |
| Belgium | 456 | 57% | 196 |
| Switzerland | 694 | 50% | 347 |
| Netherlands | 551 | 49% | 281 |
| Sweden | 462 | 48% | 240 |
| Luxembourg | 662 | 47% | 351 |
| United Kingdom | 472 | 46% | 255 |
| Denmark | 668 | 45% | 367 |
| Iceland | 338 | 43% | 193 |

## ALTERNATIVES

There are no alternatives for this report.

## FINANCIAL IMPLICATIONS

This report is presented for information only and therefore has no financial implications.

## STRATEGIC PLAN IMPLICATIONS

This report was prepared to provide information to RSWAC as part of the Regional District's Solid Waste Management Review Process.

## SUMMARY/CONCLUSIONS

This technical memorandum is intended to provide an overview of zero waste programs in other communities and metrics used to assess performance. Based on the comparison of other jurisdictions it is evident that early adopters of Zero Waste Programs such as the RDN, San Francisco and Capannori are

leaders in achieving high diversion and low per capita waste disposal rates. There are many commonalities amongst the programs such as ongoing education efforts, material bans and high cost waste disposal.

Communities globally are implementing initiatives to target organics to achieve the high diversion rates. Many communities (e.g. Edmonton) have made source separation less of a priority with the emphasis on energy recovery of the waste to achieve high levels of waste diversion. Communities that focus on source separation and that are targeting the highest diversion rates are moving beyond voluntary waste diversion and are either implementing regulatory instruments (e.g. mandatory waste separation and fines) or a monetary incentives (e.g. "pay as you throw") which drive high levels of diversion.

With the exception of Canadian jurisdictions, it is virtually impossible to derive valid comparisons of waste disposal rates from elsewhere in the world. Findings of this jurisdictional scan do suggest that the RDN has one of the lowest disposal rates within the developed nations of the world.

Report Writer

Manager Concurrence

General Manager Concurrence

A/CAO Concurrence

# San Francisco Mandatory Recycling and Composting Ordinance

## Everyone in San Francisco is required to keep their recyclables, compostables, and trash separate.

The City and your refuse service provider (typically Recology) offer a variety of free services and assistance including kitchen composting pails, consultations, bin labels, signs, commercial building toolkits, educational materials, multi-lingual trainings, and more.

**For help setting up permitted collection service and other assistance, call:**
**Recology Sunset Scavenger (415) 330-1300 or Recology Golden Gate (415) 626-4000.**

### Businesses

Property owners/managers, including of apartments, condos, TICs, food establishments, and events are required to provide color-coded, labeled bins in convenient locations: blue for recycling, green for composting, and black for trash. Education must also be provided to tenants, employees, contractors, and janitors on what goes in each bin.

Food vendors that provide disposable food service ware or to-go containers must provide blue, green, and black bins for use by customers and visitors. These must be placed in the establishment, near a main exit.

### Residential Property Owners

Property owners may be able to lower their refuse bill by recycling and composting more, and ordering a smaller black trash bin or decreasing frequency of collection.

Recology provides apartment starter kits and pails for kitchen food scrap collection. Food scraps can also be placed in paper milk cartons, paper bags, or wrapped in paper before being placed in green bins.

### Renters

Ask property managers to sign up for composting, recycling, and trash service. Renters can report unresponsive managers through the anonymous notification form at **SFEnvironment.org/mandatory**.

### Enforcement

Residents and businesses are required to subscribe for adequate recycling, composting, and trash service and use them properly. The Department of the Environment strives to educate and assist. Fines may be given in cases of non-compliance.

### Recycling Theft

It is illegal for a third party to mix or take materials out of the recycling bin provided by your collector. Please report recycling theft at **RecologySF.com** or by calling (415) 330-1300.

*SF Environment*
**Our home. Our city. Our planet.**
A Department of the City and County of San Francisco

**SFEnvironment.org/mandatory**
(415) 355-3700

Printed on 100% post-consumer recycled paper.

**APPENDIX 2**

## SUMMARY OF SAN FRANCISCO'S ZERO WASTE RELATED POLICES

San Francisco Environment, the Commission on the Environment, the Board of Supervisors, and the Mayor have all helped adopt policies to promote or require zero waste practices. Below is a list of the City of San Francisco's zero waste related polices. For more information on any of these specific policies please follow the link: http://sfenvironment.org/zero-waste/overview/legislation

### City Wide

**Resolution Adopting Zero Waste Goal**

- Adopted goals of 75 percent landfill diversion citywide by 2010 and zero waste.

**Resolution Setting Zero Waste Date**

- Set the date of 2020 for zero waste goal.

**Mandatory Recycling & Composting Ordinance**

- Passed by the Board of Supervisors in June of 2009, this ordinance requires everyone in San Francisco to separate recyclables, compostables and landfill -bound trash.
- Adequate Space for Trash, Recyclable and Compostable Materials
- Provides standards for adequate space requirements and chute design for recycling, composting and trash handling systems.

### Producer Responsibility

**Producer Responsibility Resolution**

- Supports statewide efforts to hold producers responsible for product waste and agencies to include producer responsibility language in city purchasing contracts.
- Producer Responsibility Framework Resolution
- Urges State to enact an extended producer responsibility framework.

**Marine Plastic Pollution Producer Responsibility**

- Supports a California Statewide producer responsibility program to minimize marine plastic pollution.

**Plastic Bag Reduction Ordinance (2007)**

- Requires the use of compostable plastic, recyclable paper and/or reusable checkout bags by supermarkets and drugstores.

**San Francisco's Extended Bag Reduction Ordinance (2012)**

- Requires the use of compostable plastic, recyclable paper and/or reusable checkout bags by all retail establishments starting October 1, 1012 and requires these establishments to charge a minimum of ten cents per bag.

**Food Service Waste Reduction Ordinance**

- Prohibits the use of Styrofoam or polystyrene foam food service ware and requires the use of food ware that is compostable or recyclable. Learn more with our FAQs.

**Cigarette Litter Abatement Fee Ordinance**

- Establishes a fee of $0.20 per pack of cigarettes sold in San Francisco to recover the cost of cigarette litter clean-up from city streets, sidewalks, and other public properties.

**Yellow Pages**

- Requires Yellow Pages distributors to get the approval, or opt-in agreement of all San Francisco residents before delivering phone book directories.

## Construction and Demolition (C&D)

**City Government Construction Recycled Content Ordinance**

- Requires recycled content materials to be used in public works and improvement projects.

**C&D Debris Recovery Ordinance**

- Requires C&D projects to use city-registered transporters and processing facilities to increase debris recovery. Learn more about this law with our summary.

**C&D Regulations and Forms**

- The regulation adopting the C&D Ordinance.

**Demolition Notice Ordinance**

- Provides notice of demolition to recycling companies.

**Disaster Debris Recycling Resolution**

- Policy for City Departments to maximize reuse and recycling of debris in the event of a disaster.

**Green Building Requirement for City Buildings**

- Requires City government construction to manage debris and provide adequate recycling storage space in buildings.

**Bottle Filling Stations**

- Requires new buildings that have drinking fountains to provide bottle filling stations.

## City Government

**Resource Conservation Ordinance**

- Requires city departments to prevent waste, maximize recycling, buy products with recycled content and appoint a Zero Waste Coordinator to lead these efforts.

**Mayor's Executive Order on Recycling and Resource Conservation**

- Summarizes existing zero waste legislation, expands on the role of the City's Zero Waste Coordinators and requires defaults on multi function devices to be set to double-sided printing.

**Mayor's Executive Order Enhancing Recycling and Resource Conservation**

- Requires Departments to purchase 100 percent post-consumer recycled content paper, to reduce paper usage, and to purchase only approved green products.

**Mayor's Executive Order on Bottled Water**

- Prohibits San Francisco city departments from using public funds to purchase bottled water.

**Bottled Water Ordinance**

- Restricts the sale or distribution on City property of drinking water in plastic bottles of 21 ounces or less, set City policy to increase the availability of drinking water in public areas, and bar the use of City funds to purchase bottled water.

**Environmentally Preferable Purchasing Ordinance**

- Requires an environmentally preferable purchasing program for commodities purchased by the City.

**Precautionary Purchasing Regulation**

- Sets recycled content and other guidelines for commodities regularly purchased by city departments.

**Surplus Disposal Ordinance**

- Establishes a reuse and recycling hierarchy for redistributing excess city equipment and supplies.

eurostat
Statistics in focus
31/2011

Environment and energy

Author: Karin BLUMENTHAL

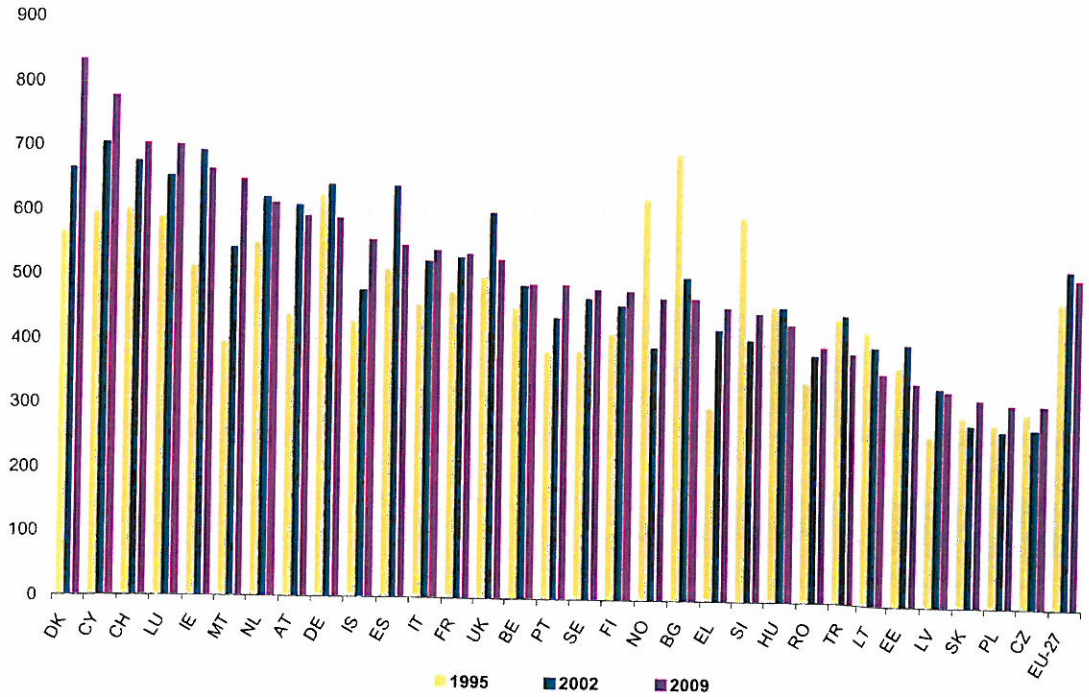
# Generation and treatment of municipal waste

## Municipal waste generation in Europe has slowed down and stabilised at about 520 kg per capita since 2002

Municipal waste constitutes only around 10% of total waste generated. However, the political emphasis on municipal waste is very high because of its complex character due to its composition, its distribution among many waste generators and its link to consumption patterns.

This publication shows the development of municipal waste generation and treatment from 1995 to 2009. Moreover, it includes an analysis of the evidence on decoupling, i.e. breaking the link between the production of material wealth and the production of waste.

**Figure 1: Municipal waste generated by country in 1995, 2002 and 2009, sorted by 2009 level (kg per capita)**




*Notes: FYR of Macedonia, Croatia and Bosnia and Herzegovina excluded due to the limited data available (only one or two reference years)*
*Relevant breaks in series:*
*Sharp decreases for Estonia (2001), Spain (2004), Lithuania (1999), Hungary (2000), Portugal (2002), Slovenia (2002) and Norway (2001).*
*Sharp increases for Latvia (2002) and Slovakia (2002).*

Source: Eurostat (online data code: env_wasmun)

## Municipal waste generated by country

Eurostat has been collecting and publishing data on municipal waste since 1995. These data are widely used for comparing municipal waste generation and treatment in different countries, and indicators on municipal waste are used to monitor European waste policies. The data on municipal waste expressed in kilogram per capita are part of a set of indicators which are compiled annually to monitor the EU's sustainable development strategy.

The data presented cover the period from 1995 to 2009 for the 27 EU Member States; for the Candidate Countries Croatia (only 2006 and 2008), the former Yugoslav Republic of Macedonia (only 2008) and Turkey, for the EFTA Countries Iceland, Norway and Switzerland, and the potential candidate country Bosnia and Herzegovina (only 2008 and 2009) data are presented as far as possible.

Figure 1 shows municipal waste generation by country expressed in kilogram per capita. To illustrate the developments, the graph contains the waste amounts generated in 1995, 2002 and 2009. The figure includes the EU-27 aggregates for comparison and the countries are sorted in decreasing order by municipal waste generation in 2009.

The totals of municipal waste generation in 2009 vary considerably, ranging from 831 kg per capita in Denmark to 316 kg per capita in the Czech Republic. The variation reflects differences in consumption patterns and economic wealth of the countries, but also depends greatly on the organisation of municipal waste collection and management. Differences between individual countries exist in particular with regard to the degree to which waste from commerce, trade and administration is collected and managed together with waste from households. In most countries, households generate between 60% and 90% of the municipal waste while the remainder can be attributed to commercial sources and administration.

In 23 of the 31 countries, the amount of municipal waste generated per capita increased between 1995 and 2009, rising steadily in 14 of these countries, with the highest annual growth rates recorded for Malta (3.9%), Greece (3.3%) and Denmark (3.0%). In the remaining nine countries the overall increasing trend was interrupted in the period around 2002. Of these, six countries showed an increase from 1995 to 2002, with the largest annual growth rates being in Austria, Ireland and Latvia, before the amounts stabilised or declined slightly between 2002 and 2009.

Conversely, three countries (Slovakia, Czech Republic and Poland) report decreasing waste generation for the period from 1995 to 2002 followed by an increase between 2002 and 2008.

Of the eight countries with an overall decrease from 1995 to 2009, only three (Bulgaria, Hungary, Lithuania) showed a decline in both periods before and after 2002. Bulgaria showed the largest reduction with a steady annual decline by 3.0% while in Hungary waste generation did not change significantly throughout the whole period (-0.5% per annum).

In the five other cases the decline was not steady. The figures for Turkey and Germany show a small increase until 2002 by less than 0.5% per annum, followed by annual decreases of 2.0% and 1.2%, respectively. Slovenia and Norway reported larger overall reductions; however, these developments are mainly due to a retrospective reassessment and methodological changes. Thus, the overall trend of these two countries is not assessable.

From 2002 on, the evolution of the methodologies was finalised in most of the countries, so that the waste generation time series of 2002 and later is more accurate and stable than that between 1995 and 2001.

## Municipal waste treated in Europe

In the following section, differences in the management of municipal waste are shown and the various countries' treatment strategies are identified on the basis of the reported amounts of municipal waste landfilled, incinerated, recycled and composted. For incineration, the countries are asked for a distinction between incineration with and without energy recovery. However, as no clear classification criteria have been applied so far, the comparability of results among countries and over time remains fairly limited[1]. Therefore, the current data allow only analysis of the total amount incinerated.

Table 1 shows the amounts of municipal waste treated in the European Union (EU-27) for the period 1995 to 2009 by treatment method in million tonnes and kg per capita. Figure 2 shows the amounts of waste generated at EU-27 level and the amounts of waste subject to the four treatment categories (landfill, incineration, recycling, composting).

[1] *The new Waste Framework Directive now offers in Annex II an energy efficiency criterion that is expected to objectify the classification of incineration facilities and to improve data comparability. The criterion came into force by 12 December 2010. During the next data collection process Eurostat intends to ask the countries to specify from which reference year the energy efficiency criterion will be applied.*

**Table 1: Municipal waste landfilled, incinerated, recycled and composted in the EU-27, 1995 to 2009**

| | 1995 | 2009 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Change 1995-2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | million tonnes | | | | | | | | |
| Landfill | 141 | 138 | 140 | 137 | 138 | 139 | 135 | 131 | 124 | 117 | 109 | 108 | 106 | 100 | 96 | -32 % |
| Incineration | 31 | 32 | 33 | 34 | 36 | 38 | 39 | 41 | 41 | 43 | 47 | 49 | 50 | 50 | 51 | 63 % |
| Recycling | 22 | 23 | 28 | 30 | 37 | 38 | 40 | 46 | 47 | 49 | 51 | 54 | 57 | 59 | 59 | 172 % |
| Composting | 13 | 15 | 16 | 18 | 21 | 27 | 28 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 45 | 239 % |
| | | | | | | | | kg per capita | | | | | | | | |
| Landfill | 296 | 290 | 293 | 285 | 287 | 288 | 278 | 269 | 254 | 239 | 221 | 219 | 213 | 201 | 191 | -35 % |
| Incineration | 65 | 66 | 70 | 71 | 76 | 79 | 81 | 85 | 84 | 89 | 95 | 99 | 100 | 99 | 101 | 56 % |
| Recycling | 46 | 48 | 58 | 62 | 77 | 78 | 83 | 95 | 97 | 100 | 105 | 109 | 116 | 118 | 118 | 159 % |
| Composting | 28 | 31 | 33 | 37 | 44 | 55 | 58 | 65 | 69 | 74 | 78 | 82 | 85 | 88 | 89 | 224 % |

*Source*: Eurostat (online data code: env_wasmun)

The 'other treatment' category was calculated as the difference between the sum of the amounts treated and the amounts of waste generated. This difference is caused mainly by those countries that have to estimate the waste generation in areas not covered by the municipal waste collection scheme and thus report more waste generated than treated. Consequently, increased coverage of the population at EU-27 level (89 % in 1995, 97 % in 2009) has led to decreasing 'other treatment'.

In addition, the 'other treatment' category reflects the effects of import and export, weight losses, double-counting of secondary wastes (e.g. landfilling and recycling of residues from incineration), differences due to time lags, temporary storage and increasingly the allocation of pre-treatment such as mechanical biological treatment. This may even lead to a higher amount treated for a certain year. At EU-27 level, all of these effects contribute only marginally and tend to cancel each other out. However, at country level, the effects are considerable, and the treatment shares presented below are therefore always related to the total amounts treated and not to the amounts generated.

In spite of the increase in waste generation in the EU-27, the amounts of municipal waste landfilled have been reduced. In the reference period, the landfilled total in the EU-27 declined by 45.6 million tonnes, or 32 %, from 141.3 million tonnes (296 kg per capita) in 1995 to 95.7 million tonnes (191 kg per capita) in 2009, corresponding to an annual decline of 2.7 %. Since 2002, the landfilled amounts have fallen by as much as 4.4 % per year.

As a result, the share of landfilling in the EU-27 dropped from 68 % in 1995 to 38 % in 2008.

This reduction can partly be attributed to the implementation of European legislation, for instance Directive 94/62/EC on packaging and packaging waste[2]. By the year 2001, the Member States had to recover a minimum of 50 % of all packaging put on the market. With the revised recovery target of 60 % to be achieved by 31 December 2008, a further increase of separately collected packaging waste could be observed.

Furthermore, the implementation of Directive 1999/31/EC on the landfill of waste[3], which requires Member States to reduce the amount of biodegradable municipal waste going to landfills to 75 % by 16 July 2006, to 50 % by 16 July 2009 and to 35 % by 16 July 2016[4], has contributed to this development. This Directive has led to different strategies preventing the organic fraction of municipal waste from being landfilled, namely composting (including fermentation), incineration and pre-treatment such as mechanical-biological treatment (including physical stabilisation).

As a result, the amounts of waste recycled increased from 21.8 million tonnes (46 kg per capita) in 1995 to 59.2 million tonnes (118 kg per capita) in 2009, which corresponds to overall growth by a factor of 2.7 at an annual rate of 7.4 %. The share of municipal waste recycled overall increased from 11 % to 24 %.

The recovery of organic material by composting is the treatment method that has increased the most.

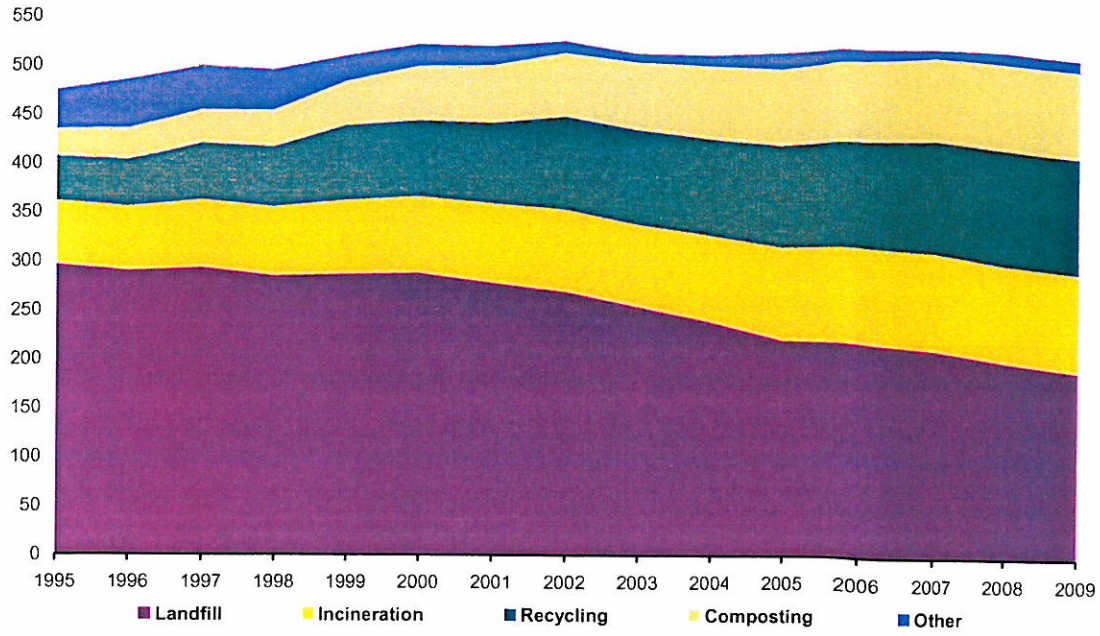
---

2 *European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste (OJ L 365, 31.12.1994, p. 10), last amended by Directive 2004/12/EC (OJ L 047, 18.02.2004, p. 26)*

3 *Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L 182, 16.07.1999, p.1), last amended by Regulation 1882/2003/EC (OJ L 284, 31.10.2003, p.1)*

4 *The reduction is calculated on the basis of the total amount of biodegradable municipal waste produced in 1995.*

**Figure 2: Municipal waste treatment, EU-27, (kg per capita)**




*Source*: Eurostat (online data code: env_wasmun)

This increase corresponds to an annual growth rate of 9.1 %. Recycling and composting together accounted for a share of 42 % in 2009 and have exceeded the landfill share since 2008.

Waste incineration has also grown steadily in the reference period, although not to the extent of recycling and composting. Since 1995, the amounts of municipal waste incinerated in the EU-27 have increased by 19.6 million tonnes or 63.1 %, and accounted for 50.7 million tonnes or 20 % of the total amount treated in 2009. This corresponds to an increase of municipal waste incinerated from 65 kg per capita to 101 kg per capita.

Mechanical-biological treatment as well as sorting of waste are not covered directly as a category in the reporting of municipal waste treatment. These types of pre-treatment require an additional final treatment of the waste. In practice, the amounts delivered to mechanical-biological treatment or sorting should be reported on the basis of the subsequent final treatment steps. However, the way these amounts are allocated to the four treatment categories (incineration, landfilling, recycling and composting) is, on a country scale, considerably different and some countries report only on the first (pre-) treatment step.

As a consequence, the reporting on the current set of variables often requires additional information in order to relate the amounts of municipal waste landfilled, incinerated, recycled and composted to the amounts generated at country level. Therefore, all percentages presented in the following are related to the total municipal waste treated.

## Municipal waste treated by country

Figure 3 and Figure 4 illustrate the huge differences between countries with regard to the state of their waste management systems.

Figure 3 presents the amounts of municipal waste landfilled, incinerated, recycled and composted in 2008 as a percentage of the total amounts treated.

Figure 4 shows the corresponding figures in kilogram per capita. Both are sorted by the percentage of waste amounts landfilled relative to the total amounts treated.

Several countries are very advanced in diverting municipal waste from landfills, often due to the implementation of national measures to reduce landfilling of municipal waste. Switzerland, Germany, the Netherlands, Sweden, Austria, Denmark and Belgium have reported landfill rates below 5 %.

In Sweden and Denmark, there has been a ban on landfilling combustible waste since 2002 and 1997 respectively. The waste has to be recycled, treated by anaerobic digestion or incinerated. This strategy gives these two countries the highest incineration rates for municipal waste in the EU-27, with 49 % and 48 % respectively, matched only by the incineration rate of Switzerland (49 %). These three countries, together

with France, were the only ones with landfill rates below 80 %, where the amounts incinerated equalled or exceeded the amounts recycled or composted. Mostly, the countries with low landfill rates had a larger combined share of recycling and composting than incineration.

Landfilling rates in the Netherlands fell in the 1990s as a result of recycling, composting and incineration of municipal waste. A further reduction occurred when the direct disposal of mixed municipal waste was banned as of 2003, resulting in only 4 kg per capita municipal waste directly landfilled in 2009.

In Sweden, the landfilled amounts dropped from 64 kg per capita in 2003 to 7 kg per capita in 2009 after the introduction of a landfill ban on organic material in 2005.

In Germany, landfilling was reduced steadily over the last decade mainly by recycling, mechanical-biological treatment and incineration. A considerable drop in landfilled amounts was due to the landfill ban for untreated municipal waste that entered into force on 30 June 2005.

Similarly, Austria has allowed landfilling only for pre-treated waste since 2004. As a result, the landfill share decreased from 28 % in 2003 to 1 % in 2009. The incineration rate increased accordingly from 11 % to 29 % in the same period. It should be noted, however, that some of the low landfill shares are also due to the exclusion of residues of other operations from reporting.

Landfill shares of between 14 % and 17 % were reported by Norway and Luxembourg. France, Italy, Finland and the United Kingdom reported amounts being landfilled in the range of 32 % to 50 %. If categorised by landfill rates, the fourteen countries with the lowest landfill rates belong to the former EU-15.

Among the so-called old Member States, landfill rates in 2008 were highest in Greece (81 %), Portugal (62 %), Ireland (62 %) and Spain (52 %).

The highest rates for recycling were reported by Germany (48 %, 274 kg per capita), Sweden (36 %, 171 kg per capita) and Belgium (36 %, 175 kg per capita), whereas Austria (40 %, 235 kg per capita) and the Netherlands (28 %, 144 kg per capita) reported the largest shares of composting.

**Figure 3: Municipal waste treated in 2009 by country and treatment category, sorted by percentage of landfilling, (% of municipal waste treated)**

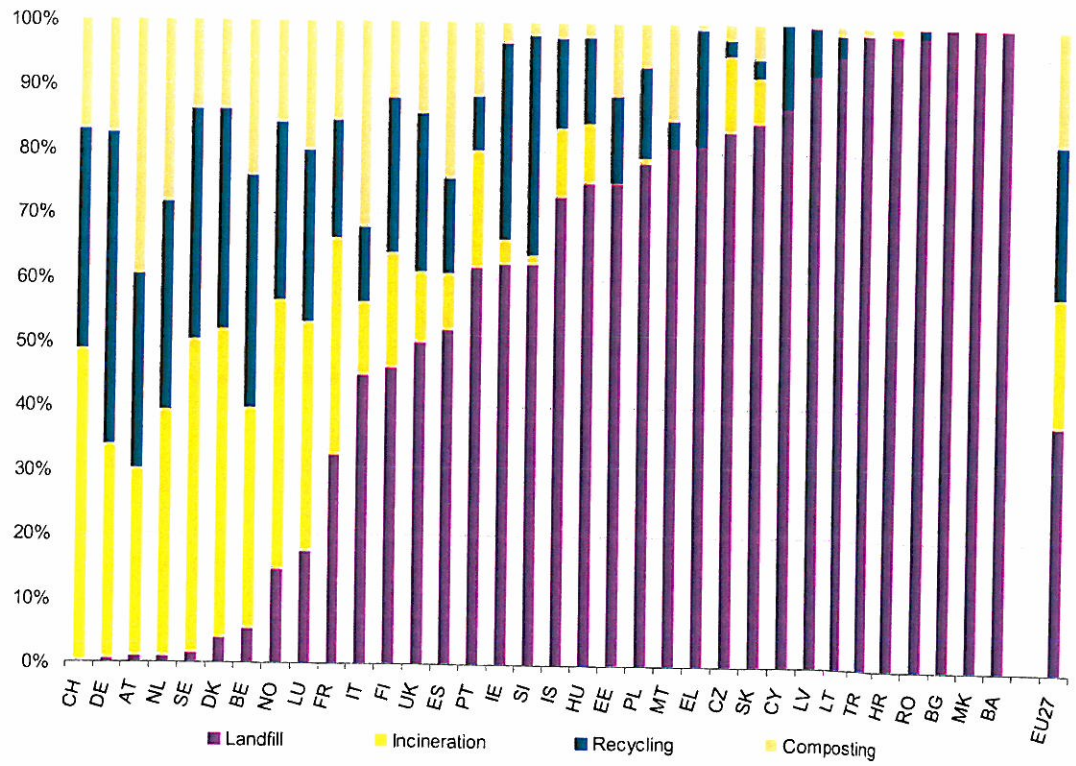
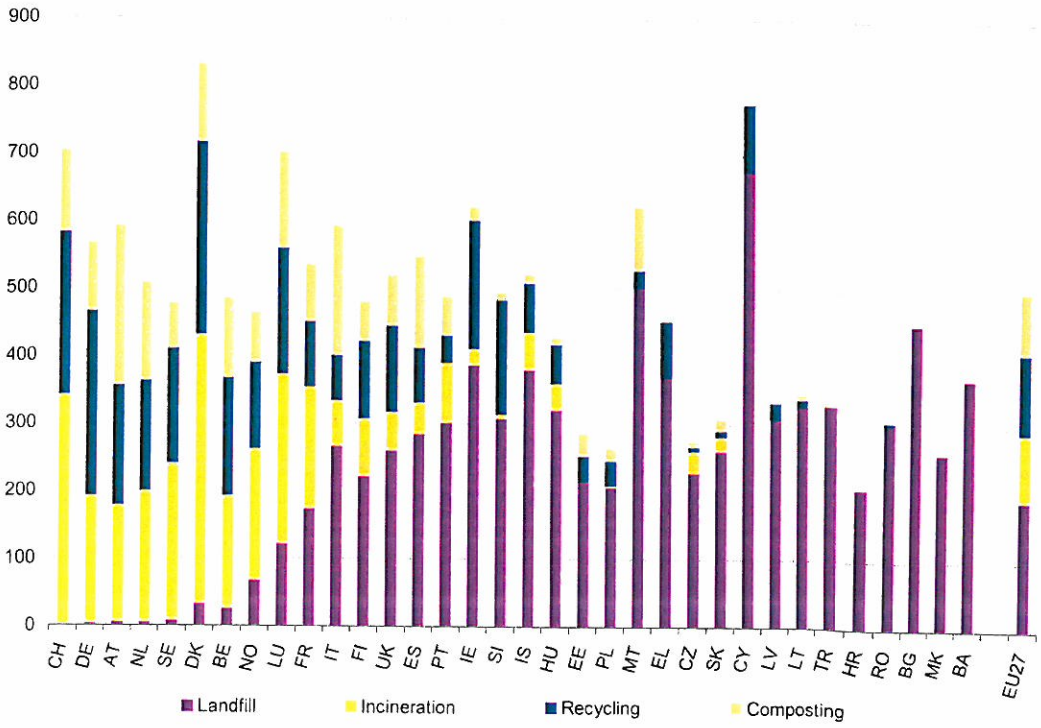


**Figure 4: Municipal waste treated in 2009 by country and treatment category, sorted by percentage of landfilling, (kg per capita)**




*Notes: Malta: data refer to 2006; Croatia and the former Yugoslav Republic of Macedonia: data refer to 2008; Several countries: exports for recycling included; Slovenia: 15-20% imports for recycling included; Italy: mechanical-biological treatment included in composting; Austria, Germany, Netherlands: Only amounts delivered to first treatment, i.e. residues from other processes (e.g. MBT, incineration) not included in landfill.*

*Source*: Eurostat (online data code: env_wasmun)

Italy's reported share of composting is the second highest (32 %), but national data for 2007[5] suggest that the Italian figure for composting contains more than 70 % amounts treated by mechanical-biological operations. Belgium was among the countries with the largest shares for both recycling (36 %) and composting (24 %).

Ireland and Greece are the only 'old' Member States without incineration facilities for municipal waste, although Ireland reported 4 % of incineration in 2009 which was almost exclusively attributed to co-incineration of refused derived fuel, but also use of wood as a fuel and use of edible oils and fats in biodiesel processing. Ireland has succeeded in reducing the amount of municipal waste going to landfills since 2001 considerably by about 25 % thanks to strong progress in recycling.

In the new Member States and the Candidate Countries as well as in Iceland, landfilling is still the predominant waste management option. Landfill rates in these countries range between 62 % in Slovenia and 100 % in Bulgaria. The situation is further characterised by a low number of waste incineration facilities on the one hand, and collection and recycling schemes that are partly still in their infancy on the other hand.

Incineration of municipal waste is reported by nine of these countries. The contribution of waste incineration to municipal waste management is highest in the Czech Republic (12 %, 33 kg per capita), Iceland (11 %, 57 kg per capita), Hungary (9 %, 41 kg per capita) and Slovakia (7 %, 22 kg per capita). In the other Member States the incineration rate is less than 2 %.

As could be expected from the figures on waste generation, Figure 4 shows that the amounts treated per capita vary to a large extent. The sorting by percentage of landfilling illustrates the trend that the countries with high landfill rates have generally lower total amounts treated than those with lower landfill rates.

---

[5] *Statistiche ambientali, Ambiente e territorio, 2009, Sistemastatistico Nazionale Istituto Nazionale Di Statistica (ISTAT), Annuario n 11, Roma 2009*

Except for Cyprus (775 kg per capita) and Malta (622 kg per capita), all countries displayed on the right side of Figure 4 show total amounts treated of far less than 500 kg per capita.

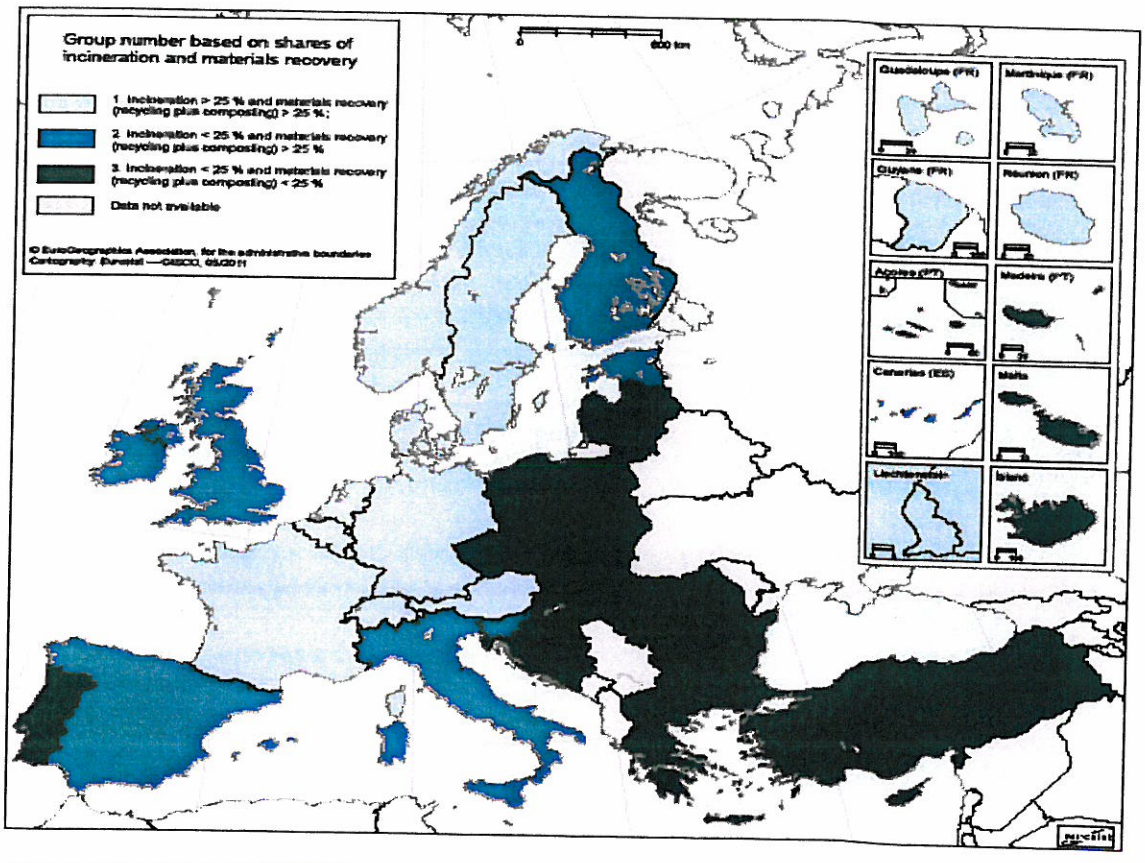
These countries report landfill rates of 75 % and more, as shown in Figure 3, whereas of the remaining 18 countries listed on the left side of Figure 4, only a few reported total amounts treated much lower than 500 kg per capita (e.g. Norway and Finland). The high figures for Cyprus and Malta can be attributed to a large share of commercial waste as well as to the impact of tourism, as these countries had by far the highest tourism intensity indicators in Europe in 2006.

## Municipal waste treatment strategies

As regards strategies for waste treatment, the European Environment Agency (EEA) offered a reasonable approach for a grouping that takes into account the combined rates of incineration and material recovery (represented as the sum of recycling and composting). The results of this approach were published in 2007, based on data up to reference year 2005[6].

The rationale of the EEA approach is that countries may follow different strategies to divert waste away from landfills. These strategies are characterised either by a combination of material recovery and incineration or by focusing mainly on material recovery and less on incineration. Either of these two strategies may be seen as quite effective in diverting waste from being landfilled.

**Figure 5: Waste treatment strategy by country groups, 2009**




Source: Eurostat (online data code: env_wasmun)

*Source*: Eurostat (online data code: env_wasmun)

[6] *European Environment Agency, 2007, The road from landfilling to recycling: common destination, different routes, Copenhagen.*

However, if material recovery is supplemented by incineration, a lower level of landfilling may be achieved, because incineration facilities have the advantage of being able to divert streams from being landfilled that may not be used for material recovery but contain a reasonable heat value. In addition, incineration may divert biodegradable material of lower heat value away from landfill after pre-treatment such as stabilisation and/or drying by mechanical-biological or mechanical-physical processes.

Figure 5 shows the results of this approach for the latest data of reference year 2009. The **first group** contains countries that apply a combined strategy with high rates of more than 25 % for material recovery (composting and recycling) as well as incineration.

The **second group** consists of countries where systems for recycling and composting are established to an extent that a high rate of material recovery of more than 25 % is achieved, but incineration rates fall short of 25 %. The **third group** relies mostly on landfilling as a treatment option with equally low rates of less than 25 % for incineration and material recovery.

Note that the percentages in Figure 5 were, in contrast to the EEA publication, calculated in relation to the total amounts treated.

It can be seen that group 1 covers the 10 countries with the lowest landfill rates (Figures 3 and 4). Groups 2 and 3 deviate from the strict order by landfill rate for the reason that Portugal and Iceland, despite landfill rates lower than 75 %, belong to group 3 on account of their low shares for material recovery (both below 20 %), while Estonia reported material recovery of just over 25 % with a higher landfill rate of 75 %. The high landfill rate in Estonia compared to the other two countries is due to the fact that Estonia reported almost no incineration, whereas the remaining two countries diverted shares of between 11 % (Iceland) and 18 % (Portugal) away from landfilling to incineration.

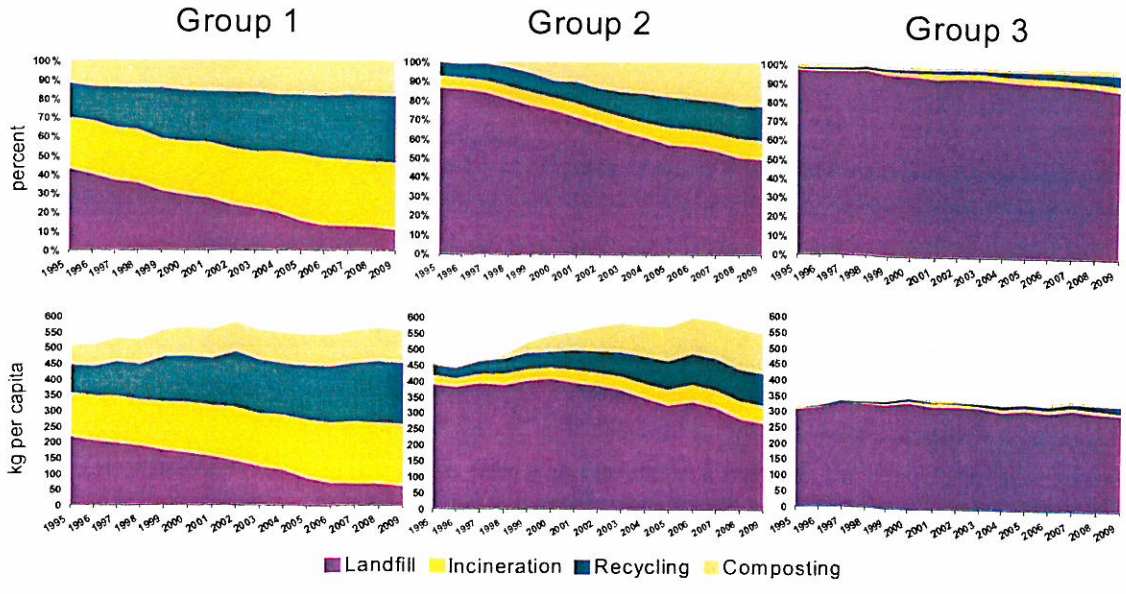
The population is fairly evenly distributed within the three groups, with each group representing roughly 200 million inhabitants, ranging from 181 million (group 2) to 210 million (group 1).

When considering the geographical distribution, group 1 with the 'most advanced' treatment strategy is concentrated in North-Western Europe. The other two groups are located stepwise around group 1 in all directions, except for the eastern direction, where countries belonging to group 3 share direct borders with countries belonging to group 1.

## Development of municipal waste treatment strategies since 1995

The developments in respect of waste treatment in the three identified groups of countries are presented in Figure 6. Note that for the evaluation of municipal waste treatment over time group 3 was calculated without the former Yugoslav Republic of Macedonia, Croatia and Bosnia and Herzegovina on account of the limited data available (only one or two reference years).

**Figure 6: Development of municipal waste treatment, 1995 to 2009 by treatment groups and category, (%, kg per capita)**



The type of treatment is shown as a percentage of total treatment and the treated amounts in kg per capita. The per capita values were calculated as a weighted average over all countries within each group, i.e. the total amounts treated per category were added for all countries per group in million tonnes and divided by the sum of the overall inhabitants per group and year. For better comparison, the graphs were scaled identically.

It can be seen that the figures in kg per capita confirm the finding mentioned above, i.e. that in countries with high landfill rates the total amounts treated in kg per capita in 2009 are lower than in countries with low landfill rates. In 2009, the treated amount per capita was 341 kg in group 3 compared with 554 kg in group 1 and 550 kg in group 2. The developments over time even suggest that the overall increase from 1995 to 2009 was larger in groups 1 (10%) and 2 (22%) than in group 3 (8%). Thus, group 2 shows the largest amounts in 2009 and the largest growth, while for group 3 the opposite is the case.

Groups 1 and 2 show a similar development with regard to the absolute reduction of the percentage landfilled. In group 1, the landfill rate decreased from 42% to 11%. In group 2, the share of waste landfilled fell from 86% to 49%, mainly due to the enormous increase in composting from 1% to 23%. However, this increase must be interpreted with caution as 51% of the value is from composting in Italy, known to contain largely amounts that were in fact treated by mechanical-biological facilities. Group 3 achieved an absolute reduction of 8% (from 97 % 1995 to 89 % in 2009).

Considering the much lower starting level of group 1 for waste landfilled, the relative reduction of the landfill rates was by far the highest in this group (73%, from 215 to 59 kg per capita). In group 2, the reduction in landfilling amounted to 30 % (from 387 in 1995 to 270 kg per capita in 2009), while in group 3, the amounts landfilled in 2009 (302 kg per capita) were almost equal to those in 1995 (304 kg per capita).

Although the total amount of municipal waste treated per capita in 2009 is much higher in group 2 than in group 3, the per capita amounts of municipal waste landfilled in 2009 are not very different in both groups, with 270 kg and 302 kg per capita respectively. In contrast to this, group 1 countries managed to reduce the already low amounts landfilled in 1995 further until 2009, mainly by recycling and composting with increases overall of 116 % and 68 %. Progress with regard to material recovery and incineration was low in group 3 in absolute terms and cannot easily be identified in the graph. The largest increase from 1995 to 2009 occurred for recycling by a factor of 8 from 2.4 to 19.3 kg per capita, followed by the amounts incinerated (2.7 to 10.1 kg per capita; factor of 3.7).

The results can be summarised as follows:

In several countries belonging to group 1 national measure were introduced to limit the landfilling of municipal waste, which has most likely contributed to the high increase in recycling, composting and incineration.

Countries belonging to group 2 have set up some measures to divert municipal waste from landfilling, and the trend is pointing into the right direction.

Except for Estonia and Slovenia, all 'new' Member States are in group 3, only limited progress in diverting municipal waste from being landfilled can be observed, however, the generated amounts of municipal waste are notable lower than in the countries of the other two groups.

Greece and Portugal lag behind the development in other 'old' Member States.

## Municipal waste generated and economic development in Europe

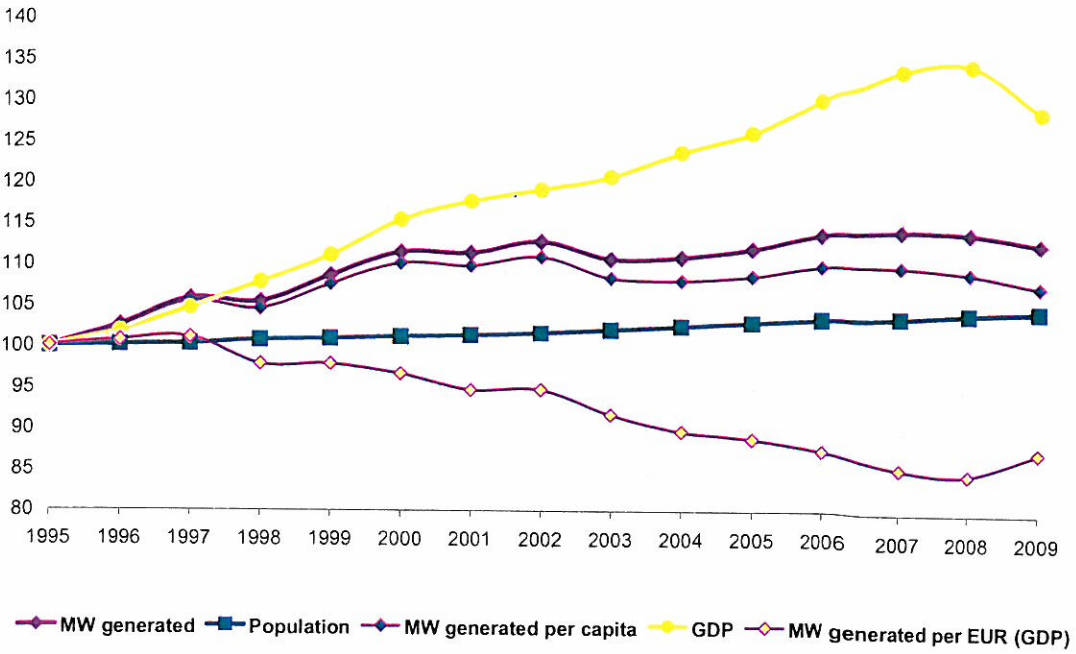
Table 2 shows the data aggregates for the 27 Member States of the European Union (EU-27) for municipal waste generation, population and selected economic parameters.

**Table 2: Municipal waste generated, population and GDP in the EU-27 from 1995 to 2009**

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | Change 1995-2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Municipal waste [million tonnes] | 227 | 232 | 240 | 239 | 246 | 253 | 252 | 256 | 251 | 251 | 254 | 258 | 260 | 259 | 256 | 13 % |
| Municipal waste [kg per capita] | 474 | 486 | 500 | 496 | 510 | 523 | 521 | 526 | 514 | 513 | 516 | 522 | 523 | 519 | 512 | 8 % |
| Municipal waste [kg per EUR] | 28 | 29 | 29 | 28 | 28 | 27 | 27 | 27 | 26 | 25 | 25 | 25 | 24 | 24 | 25 | -12 % |
| Population [million] | 477 | 478 | 479 | 481 | 482 | 483 | 484 | 486 | 488 | 490 | 492 | 494 | 496 | 499 | 500 | 5 % |
| GDP [$10^{12}$ EUR] | 8 | 8.1 | 8.4 | 8.6 | 8.9 | 9.2 | 9.4 | 9.5 | 9.6 | 9.9 | 10.1 | 10.4 | 10.7 | 10.8 | 10.3 | 29 % |

*Source*: Eurostat (online data codes: env_wasmun, demo_gind, nama_gdp_k)

**Figure 7: Municipal waste generated, population and GDP in the EU-27 from 1995 to 2009, (1995=100)**




*Source*: Eurostat (online data codes: env_wasmun, demo_gind, nama_gdp_k)

Gross domestic product (GDP) is used as an economic parameter and a driver of municipal waste generation. The table shows municipal waste generated in tonnes as well as per capita. The development since 1995 is illustrated in Figure 7.

Since 1995, the generation of municipal waste in the EU-27 has shown a steady increase until 2002. In this period, municipal waste generation grew by 29.1 million tonnes, or 13 %, from 226.5 million tonnes to 255.6 million tonnes. This corresponds to an average annual growth rate of 1.7 %. In 2003 and 2004, this growth trend was interrupted, which can to some extent be attributed to the changes of methodology and classifications which reportedly took place in many countries in the period around 2002.

This decrease was followed by a further rise from 2004 to 2007 by 8.1 million tonnes, to 260.0 million tonnes, followed by a decrease in 2008 (258.9 million tonnes) and another in 2009, to 256 million tonnes.

Up to 2002, the increase in waste generation exceeded the population growth. Accordingly, the population-related indicator on municipal waste generated also increased. The indicator grew at an average rate of 1.5 % per year from 474 kg per capita in 1995 to 526 kg per capita in 2002. In 2003 the indicator fell to 514 kg per capita. The subsequent increase to 523 kg per capita in 2007 did not raise the indicator above the level of 2002. Up until 2009, the indicator decreased to 512 kg per capita, i.e. approximately to the level of 2004.

The drop in 2009 after steady growth from 2003 to 2008 was also observed in many countries' series. It was explained by the positive economic development in this period until 2008 followed by the 2009 decline.

At the EU-27 level, GDP shows an increasing trend with an annual growth rate of 2.3 % in the period from 1995 to 2008. Annual economic growth thus clearly exceeded that of municipal waste generation in the same period (1.0 %). Particularly between 2002 and 2008, economic growth was much higher than that of municipal waste generation (0.2 %). The relation between economic development and municipal waste generation is illustrated by the line MW generation per EUR (GDP), i.e. a moderate decline until 2002 by 0.8 % per annum and a sharp decline by 1.8 % per annum between 2002 and 2008. In 2009, the economic decline was even sharper than that of waste generation, leading to an increasing value back to the level of 2006 (24.8 kg per EUR).

These figures are not yet sufficient to conclude that municipal waste generation in the European Union has reached its peak. This is particularly true because the aggregates for 2009 are to some extent based on provisional data or estimates. Nevertheless, the figures do indicate that municipal waste generation in the European Union has slowed down since 2002.

## Methodological Notes

### *Data source*

All the data presented here were collected by Eurostat. Since the beginning of the 1990s Eurostat has conducted surveys on European waste data using the OECD/Eurostat-Joint Questionnaire as the main source. Starting from 2004 as the first reference year, Regulation (EC) No 2150/2002 on waste statistics replaced in principle the data collection based on the Joint Questionnaire. In order to maintain the time series and to offer consistent data in an international context outside the EU (OECD, UN), the small set of variables on municipal waste presented in this publication is still collected annually on the basis of a subset of the OECD/Eurostat Joint Questionnaire.

The data were extracted from the Eurostat database on 12 April 2011. Average Population values (extracted on 21 April 2011) were used to calculate kilogram per capita. For the GDP, again extracted on 21 April 2011, the data were used in Euro as chain-linked volumes, reference year 2000 (at 2000 exchange rates).

### *Definitions*

The municipal waste classification is based on the definitions for the section on Waste in the OECD/Eurostat Joint Questionnaire, briefly summarised below (more extensive information is available in the SDMX Metadata sheet on municipal waste).

**Municipal waste** consists of waste collected by or on behalf of municipal authorities. 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 and municipal construction and demolition waste.

The term 'municipal' is used in different ways reflecting different waste management practices. Differences between countries are to some extent the result of differences in the coverage of these similar wastes.

**Incineration** means thermal treatment of waste in a waste incineration plant as defined in Article 3(4) or co-incineration as defined in Article 3(5) of Directive 2000/76/EC on the incineration of waste. It includes incineration with and without energy recovery.

**Landfilling** is defined as deposit of waste into or onto land and temporary storage of over one year on permanent sites.

**Recycling** is defined as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel.

**Composting** is defined as a biological process that submits biodegradable waste to anaerobic or aerobic decomposition and that results in a product used on land or for the production of growing media.

***MW generated / MW collected***: The data refer to the amount of municipal waste generated. In countries with complete (national) coverage of their municipal waste collection scheme the total of municipal waste generated is equal to the total of municipal waste collected. Some countries do not cover the whole territory with a collection scheme. These countries have added an estimation of the waste generated in the areas not covered. Only Lithuania was not able to offer such estimation for the latest data. The Lithuanian data only refer to municipal waste collected.

### *Country groupings and order of countries*

**Country groupings**:

EU-27: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom

EFTA Countries: Iceland, Norway, Switzerland (Liechtenstein is included in the data of Switzerland)

Candidate Countries: Croatia, the Former Yugoslav Republic of Macedonia, Turkey and Bosnia and Herzegovina (potential candidate)

**Countries' Abbreviations**

| | | | | | |
|---|---|---|---|---|---|
| BE | Belgium | CY[2] | Cyprus | SI | Slovenia |
| BG | Bulgaria | LV | Latvia | SK | Slovakia |
| CZ | Czech Republic | LT | Lithuania | FI | Finland |
| DK | Denmark | LU | Luxembourg | SE | Sweden |
| DE | Germany | HU | Hungary | UK | United Kingdom |
| EE | Estonia | MT | Malta | HR | Croatia |
| IE | Ireland | NL | Netherlands | MK | The former Yugoslav Republic of Macedonia(fYR) |
| EL | Greece | AT | Austria | TR | Turkey |
| ES | Spain | PL | Poland | IS | Iceland |
| FR[1] | France | PT | Portugal | NO | Norway |
| IT | Italy | RO | Romania | CH[3] | Switzerland |
| | | | | BA | Bosnia and Herzegovina |

*Notes:*

1. *Data include the overseas departments (département d'outre-mer or DOM) Martinique, Guadeloupe, Réunion and French Guiana*
2. *Data for Cyprus refer only to the area under effective control of the Government of the Republic of Cyprus*
3. *Data include Liechtenstein*

## Further information

Eurostat website: http://ec.europa.eu/eurostat

Data on 'Environment statistics':
http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/data/database
Select 'Waste statistics'

Further information about on 'Environment statistics'
http://epp.eurostat.ec.europa.eu/portal/page/portal/environment/introduction

**Journalists can contact the media support service:**

Bech Building, Office A4/125, L-2920 Luxembourg
Tel.: (352) 4301 33408
Fax: (352) 4301 35349
E-mail: eurostat-mediasupport@ec.europa.eu

**European Statistical Data Support:**

With the members of the 'European statistical system', Eurostat has set up a network of support centres in nearly every Member State and in some EFTA countries.

Their role is to provide help and guidance to Internet users of European statistics.

Contact details for this support network can be found on the Eurostat website at:
http://ec.europa.eu/eurostat/.

All Eurostat publications can be ordered via the 'EU Bookshop':
http://bookshop.europa.eu/.

*The SiF was prepared in cooperation with Volker Küchen from ARGUS GmbH, Berlin, Germany*

Manuscript completed on: 30.06.2011
Data extracted on: 21.03.2011
ISSN 1977-0316
Catalogue number: KS-SF-11-031-EN-N