

# SWEDISH WASTE MANAGEMENT



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## PREFACE

The total quantity of household waste increased slightly in 2012 compared with the previous year – a development that we are not satisfied about. Waste quantities need to be reduced, and it is a job in which the country's municipalities play a crucial role. For Avfall Sverige's members, waste prevention work has a high priority. The annual meeting of 2011 adopted the long-term vision of "zero waste". This vision has two goals for 2020: to break the relationship – decouple – between waste quantities and growth and to effect a clear, strong movement up the waste hierarchy. Municipalities have a key role to play as the dynamo of change and as the guarantors of long-term, sustainable waste management.

One-third of the material from household waste is recycled, but there is a potential to

increase this amount. Studies show that up to one-third of the contents of a regular waste bag consist of packaging and newspaper, which should have been left for material recovery. The waste investigation, which was presented in August 2012, proposes that municipalities should be made responsible for the collection of all household waste – including packaging and newspapers. Some municipalities have already on their own initiative developed methods for collecting packaging and newspapers, a service which has been warmly welcomed by the general public and has yielded excellent results.

Avfall Sverige has for two years been able to report on municipalities' collection and recycling systems for gypsum, flat glass and municipal plastic waste, also known as non-packaging plastic. This year we can also report on

corrugated board that is deposited in the municipal recycling systems. All fractions are included in the material recycling figures.

Swedish Waste Management is the publication for operators in the waste industry, decision makers, authorities, educational institutions, the media and all other stakeholders.

Here we present text, diagrams and tables illustrating household waste management practices in Sweden. Statistics in the publication are obtained from our web-based statistics system Avfall Web and from the producers' organisations.

Malmö, September 2013

**Weine Wiqvist**, Managing Director  
Avfall Sverige – Swedish Waste Management

## WASTE QUANTITIES 2012

In 2012 quantities of household waste totalled 4,398,680 tonnes, an increase of 1.1 percent compared with 2011. Broken down on a per capita basis Swedes produced 460.3 kg of household waste in 2012, compared with 459 kg per person in 2011.

Collected hazardous waste rose slightly by 5.3 percent to 66,100 tonnes. A large portion of hazardous waste consists of impregnated timber, which goes to energy recovery. Hazardous waste can be treated using different methods and is therefore included in the total volume of treated waste.

Material recycling increased slightly to 1,422,250 tonnes, 148.8 kg/person. 32.3 percent of household waste goes to material recycling. Municipalities today have systems for

collecting several types of material for material recycling. As of 2011, material recycling statistics also include gypsum, flat glass and non-packaging plastic, also known as municipal plastic waste. As of 2012 we can also report the figures for corrugated board that is deposited in municipal recycling systems.

Biological treatment rose by 3.0 percent to 673,180 tonnes or 70.4 kg/person. 15.3 percent of household waste went to biological treatment in 2012. Quantities of collected food waste increased by 15 percent to 318,220 tonnes. Food waste is increasingly treated via anaerobic digestion instead of composting. Food waste that goes to anaerobic digestion has increased by 40 percent while food waste that goes to central compost-

ing plants has decreased by 5 percent. Food waste undergoing anaerobic digestion at sewage plants totalled 59,310 tonnes, a decrease of around 8,700 tonnes.

Waste-to-energy rose by 1.6 percent to 2,270,650 tonnes or 237.6 kg/person. 51.6 percent of household waste went to energy recovery in 2012.

Landfill of household waste fell by 14.7 percent to 32,600 tonnes compared with 2011 or 3.4 kg/person. Landfill accounts for 0.7 percent of total amount of treated waste.

Quantities of waste in bins and bags decreased by 1.0 percent to 2,212,000 million tonnes. Bulky waste also fell by 1.0 percent, to 1,625,000 tonnes.

### COLLECTED VOLUMES OF WASTE IN BINS AND BAGS AND BULKY WASTE, 2008–2012 (TONNES)

	2008	2009	2010	2011	2012
Waste in bins and bags	2,226,700	2,167,800	2,152,000	2,230,900	2,212,000
Bulky waste	1,421,100	1,498,400	1,518,000	1,638 000	1,625,000

### (KG/PERSON)

	2008	2009	2010	2011	2012
Waste in bins and bags	241	232	229	235	231
Bulky waste	154	160	161	173	170

Source: Avfall Web

Waste in bins and bags consists of combustible waste, and source-separated food waste.

### TREATED VOLUMES OF HOUSEHOLD WASTE 2008-2012 (TONNES)

	2008	2009	2010	2011	2012
Material recycling	1,520,470	1,604,400	1,414,410	1,425,690	1,422,250
Biological treatment	597,280	617,680	623,200	653,300	673,180
Waste-to-energy	2,292,970	2,173,000	2,123,680	2,235,720	2,270,650
Landfill	140,250	63,000	42,000	38,200	32,600
<b>Total treated volumes</b>	<b>4,550,970</b>	<b>4,458,080</b>	<b>4,203,290</b>	<b>4,352,910</b>	<b>4,398,680</b>

### WASTE TREND 2008-2012 (KG/PERSON)

	2008	2009	2010	2011	2012
Material recycling	164.3	171.8	150.2	150.3	148.8
Biological treatment	64.5	66.1	66.2	68.9	70.4
Waste-to-energy	247.7	232.6	225.5	235.8	237.6
Landfill	15.2	6.7	4.5	4.0	3.4
<b>Total treated volumes</b>	<b>491.7</b>	<b>477.3</b>	<b>446.4</b>	<b>459.0</b>	<b>460.3</b>

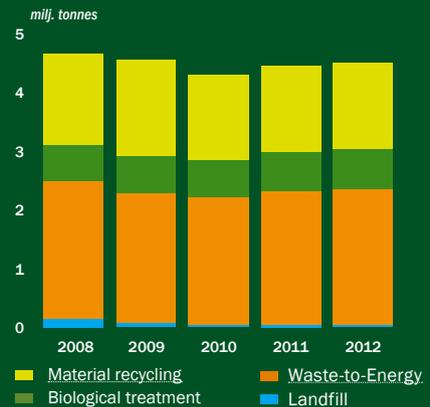
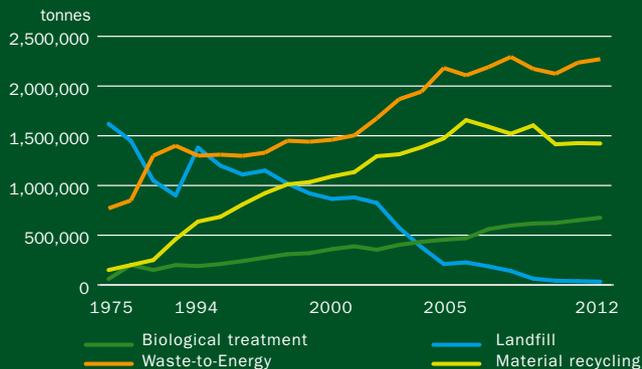
### WASTE TREND 2008-2012 (%)

	2008	2009	2010	2011	2012
Material recycling	33.4	36.0	33.7	32.8	32.3
Biological treatment	13.1	13.9	14.8	15.0	15.3
Waste-to-energy	50.4	48.7	50.5	51.4	51.6
Landfill	3.1	1.4	1.0	0.9	0.7
<b>Total treated volumes</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: Avfall Sverige

### WASTE TREND 2013

#### 1975-2012



## HOW SWEDISH WASTE MANAGEMENT WORKS

The regulatory frameworks for European waste management are established by the EU. Based on these frameworks, the Swedish Parliament decides how Swedish waste management should be structured. The environmental goals have steered Sweden towards greener waste management practices a process in which the country's municipalities have played a key role.

Waste management should be geared towards achieving the maximum environmental and social benefit. Everyone should participate in this endeavour: municipalities, producers, households and businesses.

Municipalities are responsible for the collection of household waste outside of producers' responsibility. Transporting waste to a treatment centre for recycling or disposal, landfill, is also the responsibility of the municipalities. This applies both to waste from households and similar waste from restaurants, stores, offices, etc. Waste must be handled in an environmentally friendly manner.

Every municipality is required to have its own sanitation plan which consists of a waste plan and regulations for waste management. The sanitation plan must include the regulations for waste management that apply in the municipality.

Among other things, the plan should include details about the municipalities' measures for reducing the quantity of waste and its harmfulness.

Producers are responsible for the waste that is subject to the statutory producers' responsibility for:

- » return paper such as newspaper and other printed matter
- » packaging
- » electrical and electronic waste
- » tyres
- » cars
- » batteries
- » pharmaceuticals.

Producers must ensure that there are suitable collection systems and treatment methods. They also have an obligation to provide information about sorting and collection.

The purpose of producers' responsibility is to make sure that manufactured products consume the lowest possible amount of natural resources, that they can readily be recycled and are free from environmentally harmful substances.

Businesses are responsible for disposing of non-household waste and waste that is not inside the sphere of producers' responsibility.

Households are responsible for separating and depositing waste at available collection points. They shall also follow the municipalities' waste management regulations.

### TREATMENT METHODS

Waste treatment methods are

- » material recycling
- » biological treatment
- » energy recovery
- » landfill.

Hazardous waste can be treated using one or more of these methods, depending on the waste's characteristics.

The material recycling of packaging, return paper, scrap metal, waste from electrical and electronic equipment (WEEE) and batteries, etc. reduces their environmental impact, saves energy and economises on natural resources.

Biological treatment closes the eco-cycle and returns nutrients to the soil. Waste is treated via anaerobic digestion or composting. Anaerobic digestion produces biofertilizer and biogas which can be used as vehicle fuel. Composting produces long-lasting fertilizer which can be used as soil improver in gardens, parks and for ground installations.

Waste-to-energy is an efficient and environmentally safe method for recovering energy from waste providing both district heating and electricity. Waste-to-energy is a method ideally suited for waste which cannot be recycled in any other way.

Landfill is a treatment method for waste that cannot or should not be recycled. Landfill entails waste being stored in a manner that is safe in the long-term. Landfillings of organic or combustible waste is prohibited.

### HOW WASTE MANAGEMENT IS ORGANISED

Municipalities can decide how to organise their own waste management activities – the right of municipal self-determination is laid down in the Swedish Constitution – and there are several organisational forms available to them:

- » self-administration
- » municipal enterprises, independently or jointly with other municipalities
- » joint boards
- » municipal associations.

Collaboration is also conducted via the horizontal exchange of services between municipalities. Some municipalities also cooperate on specific issues such as joint procurements. Collaboration is a natural procedure that achieves the greatest possible environmental and social benefit, assures cost-efficient waste management and guarantees the supply of necessary competence, which benefits municipal inhabitants and the environment alike.

In around 73 percent of Swedish municipalities, household waste collection is outsourced to external players, i.e. private companies, while other municipalities provide it as a public service. Waste treatment is either performed by the municipalities themselves or by an external player, e.g. another municipality/municipal enterprise or private company. The ratio in the different operational forms depends on the treatment method.

### THE FUTURE

The waste enquiry, which was presented in 2012, may change the structure of responsibilities in Swedish waste management. The main proposal is for municipalities to take over the responsibility for the collection of packaging and newspapers. A government bill is expected in autumn 2013, and a parliamentary decision is due before the end of the year.



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## WASTE PREVENTION

Preventing the generation of waste is the first step in the waste hierarchy and is a priority concern in both European and Swedish waste legislation. The waste hierarchy's order of priority is:

- » waste prevention
- » reuse
- » recycling
- » other recycling, e.g. waste-to-energy
- » disposal.

Deviations from the hierarchy may be necessary for technical, financial or environmental reasons.

By 12 December 2013, all EU member states shall have established national waste prevention programmes to reduce waste volumes and reduce the quantity of harmful substances in waste. In Sweden the Environmental Protection Agency is responsible for this task. The agency has chosen to focus on four categories of waste that have a significant environmental impact:

- » textiles
- » food
- » electronics
- » construction and demolition waste.

These waste categories are also prioritised in the national waste plan. In the preventative waste programme the objective is to come up with measures to increase reuse in Sweden.

### **PREVENTING WASTE CREATES THE GREATEST ENVIRONMENTAL BENEFIT**

Sweden has a good track record when it comes to recovering material, energy and nutrients from waste. But we can go even further by preventing the generation of waste. The environmental benefit of a product is greater if it is never produced than if it is produced, used and recycled. Swedish municipalities have shouldered a large share of the responsibility for reducing waste and minimising the quantity of hazardous substances in waste that is generated. For Avfall Sverige's members, waste prevention work has a high priority. The annual meeting in 2011 adopted the long-term vision "Zero Waste". This vision has two goals for 2020: to decouple the relationship between waste quantities and growth and to effect a clear, strong movement up the waste hierarchy. Municipalities have a key role to play as the drivers of change and as the guarantors of long-term, sustainable waste management.

### **FOLLOW-UP TOOLS**

Until now there has been a lack of tools for following up trends in waste management and for checking that measures are geared towards set goals. Avfall Sverige and a number of other players have therefore initiated a joint project aimed at producing indicators for monitoring resource-efficient waste management and tools for following up trends and the work on Avfall Sverige's "Zero Waste" vision. The project will be presented at the beginning of 2014.

### **REUSE**

It is becoming increasingly common for municipalities to collaborate with different charity organisations by providing transfer stations at their recycling stations where clothes and other items can be deposited for reuse.

Avfall Sverige is the national coordinator of the EU project "European Week for Waste Reduction", which is also supported by the Swedish Environmental Protection Agency. The project runs one week in November when activities aimed at reducing waste and the quantity of hazardous substances in waste are arranged all over Europe. The project began in 2009 and runs until 2015.

## COLLECTION AND TRANSPORT

There are a number of different systems for collecting and transporting household waste. Household waste in bins and bags can be collected either as a mixed fraction intended for waste-to-energy or in separate fractions – one for food waste and one for combustible waste. Mixed combustible waste from single-family houses is mostly collected in 190-litre bins that are emptied every fortnight. There are also a number of different bag and bin sizes which are emptied at different intervals. Waste from apartment blocks is usually collected on a weekly basis.

The most common collection system for source-separated food waste is in a separate bin combined with a bin for combustible waste. There are also multi-compartment bins and optical sorting systems. Optical sorting requires households to separate waste into different coloured bags that are placed in the same bin. The bags are transported by the waste collection vehicle to an optical sorting facility where they are separated automatically for appropriate treatment. The waste can be sorted into a large number of different frac-

tions, including:

- » food waste
- » paper packaging
- » newspaper
- » metal packaging
- » plastic packaging
- » other household waste.

A growing number of municipalities have introduced curbside collection of packaging and newspaper. Packaging and newspaper is commonly separated into two four-compartment bins which are collected at different intervals.

One bin, which can be designated for e.g. food waste, combustible waste, paper packaging and coloured glass, is emptied every fortnight. The other bin, which is designated for e.g. clear glass, metal, plastic packaging and newspaper, is emptied every four or eight weeks.

Traditional rear-loading vehicles are still the most predominant waste collection vehicles, but the proportion of multi-compartment vehicles is growing and is becoming more technically advanced. Side-loading vehicles account for a more steady proportion of the vehicle fleets.

A growing number of vehicles use biogas as fuel, which municipalities can control through their procurement requirements. In addition, alternative fuels such as RME, and various hybrid technologies to reduce climate impact are also used. Through procurement, municipalities can also impose requirements on the work environment adaptation of waste bins and vehicles.

### MODERN COLLECTION SYSTEMS

Waste collection was previously marred by many work-related injuries. Daily heavy lifting was part of the job and waste collection required workers to be in good physical shape. Today bags have been replaced with bins or other types of containers. Manual waste handling is being replaced by new technology and automated systems such as vacuum collection and underground container systems.

Both these systems are becoming more prevalent, particularly in large cities and newly built-up areas. One advantage is that they do not require as much heavy manual handling. While work environments have improved in

many respects, there are still problems that the industry is continuously working to resolve.

Vacuum refuse collection and underground container systems are good systems from a work environment perspective as it is closed and fully automated. The system also reduces the need for transportation, particularly inside residential areas. There are two kinds of vacuum refuse collection systems: stationary or mobile. With the stationary system, refuse is collected by air into an automatic vacuum system. It is transported through underground tubes which connect the waste drop chutes to large containers that are placed in a terminal. The containers are collected by load carrying vehicles.

The mobile vacuum collection system also uses air to collect waste. A storage tank is positioned under each drop chute. The tanks are connected together via an underground pipe system. The vehicle connects to the docking point for emptying, the vacuum system is switched on and air propels the waste from the storage tanks to the docking point and into the vehicle.

Underground container systems are another growing collection system. Containers placed underground reduce the need for space at street level. The temperature below street level,

where the waste is contained, is relatively low, which prevents odour and the containers are easily emptied with a hook-lift vehicle. There are also underground containers that are emptied by front-loading vehicles. Since the underground containers carry larger volumes, the number of transports can be reduced.

#### **LIQUID WASTE**

Collecting liquid waste such as sludge, wastewater, grease separation sludge and frying is part of the municipalities' responsibility. The 180 municipalities that have reported data to Avfall Web have a combined total of 500,000 separate sewage treatment plants which handle around 1.2 million tonnes of sludge. 16 percent of municipalities use sludge dewatering vehicles, the rest use conventional sludge vehicles.

116 municipalities have reported that they handle 77,000 latrine waste removals per year and a total of 1,200 tonnes of latrine waste. It varies in scope from one latrine waste removal per year in certain municipalities up to some 11,000 removals in municipalities with many holiday houses.

The municipalities that have fed in data to our web-based statistics system Avfall Web

said that there are 8,200 grease separation plants that handle 48,000 tonnes. On average, each centre is emptied 2.3 times a year.

New solutions such as phosphorous traps and micro sewage works for reducing phosphorous in individual plants have been installed in recent years. This is because more stringent requirements have been imposed on the reduction of emissions that cause overfertilisation. In 2010-2011 the Swedish Environmental Protection Agency conducted a national supervisory campaign to increase the rectification of shortcomings in private sewers. In 2012 Avfall Sverige presented a new report about phosphorous traps which are a method for increasing phosphorous purification. Filter material from phosphorous traps and sludge from small wastewater treatment plants<sup>1</sup> is classed as household waste and it is the municipalities' waste management departments which are responsible for emptying and separation/treatment.

#### **RECYCLING CENTRES**

At the manned municipal recycling centres, households can hand in bulky waste, electronic waste and hazardous waste. Bulky waste is

1 U 2012:03 Fosforfällor. Fosforfiltermaterial – ett hushållsavfall

household waste that is too heavy, too bulky or otherwise inappropriate for collection in bags or bins.

In 2012, households handed in 1,625,000 million tonnes of bulky waste, mostly at manned municipal recycling centres. Bulky waste accounted for a volume equivalent of 170 kg per person.

There are around 630 recycling centres throughout the country which combined receive about 20 million visits annually. The quantities of bulky waste and hazardous waste dropped off at recycling centres have increased significantly in recent years. Many municipalities have therefore adapted and modernised their recycling centres. Many smaller recycling centres have closed as municipalities are building new, larger centres better-suited to current waste quantities and number of visitors.

The largest recycling centre in each municipality is, on average, available for a total of 46 hours per week, 12 hours per week during the evenings and weekends.

In some of Sweden's neighbouring countries a number of large cities have introduced small

recycling centres, also known as micro centres, in the city centres where for example electronic waste and small bulky waste items can be dropped off. Attempts to introduce micro centres are being made in Sweden. There are also mobile recycling centres, manned mobile centres that accept hazardous waste, some bulky waste and also electronic waste. The mobile centres visit a number of permanent collection points in accordance with a specific schedule.

The recycling centre in Timmersdala outside Skövde is the country's only centre where visitors can hand in their waste even when it is closed or unmanned. The only requirement is that visitors have a driver's licence, are residents in Skövde and have completed a short training programme. The driver's licence must first be registered, after which it can be used as an access card that is registered when the visitor enters the centre. The recycling centre at Timmersdala continues to be manned during certain hours.

Many of Sweden's recycling centres have in recent years had severe problems with burglaries and break-ins. Personnel have also been subjected to threats by visitors. Most of the

larger newly-built recycling centres have therefore installed electric fences or surveillance cameras which have considerably reduced the number of break-ins.

Several municipalities have also introduced a barrier gate system at their recycling centres which improves safety, provides a functional access control system and boosts visitor statistics. This system is often combined with an entry pass giving households a certain number of free visits. In some municipalities owners of small businesses may also use the services provided at the recycling centres for a fee.

## RECYCLING STATIONS

The producers' system of some 5,800 unmanned recycling stations for handling packaging and newspaper is designed to cover the entire country's needs. Collection systems should be designed by the producers in consultation with municipalities. The recycling stations have separate containers for newspaper and different packaging materials. A growing number of municipalities are introducing curbside collection of packaging and newspaper from apartment blocks and single-family houses.

## HAZARDOUS WASTE

In 2012, 66,100 tonnes of hazardous waste was collected from households. On average, Swedes handed in 6.9 kg of hazardous waste per person. This quantity also includes 37,180 tonnes of impregnated timber and 5,840 tonnes of asbestos. Hazardous waste can be treated using different methods and is therefore included in the total volume of treated waste.

In some products hazardous substances may occur in extremely small quantities, but collectively they can cause substantial damage if they end up in the wrong place. It is therefore important that hazardous waste is separated and handed in in the correct manner and at the right place. Hazardous waste can contain a number of substances that are toxic, carcinogenic, corrosive, toxic for reproduction, ecotoxic, infectious or flammable.

Local authorities are responsible for hazard-

ous household waste. This responsibility includes collection, transport and treatment. The responsibility is regulated by the Environmental Code, the Waste Collection and Hazardous Waste Disposal Ordinance and the Municipal Waste Regulation Ordinance.

Households have an obligation to separate hazardous waste from other household waste. Most municipalities have regulated this obligation in the municipal refuse collection regulations.

There are no exact statistics available for the amounts of hazardous waste from industry. According to official Swedish waste statistics reported to the EU by the Swedish Environmental Protection Agency, Swedish households and enterprises produced 2.5 million tonnes of hazardous waste in 2010, including scrap vehicles from households, electronic waste, etc.

### COLLECTION SYSTEMS

The most common collection system for hazardous household waste is to hand it in at manned municipal recycling centres. Approximately 40 percent of all municipalities in Sweden provide curbside collection of hazardous waste, often in combination with several other collection systems such as mobile hazardous collection vehicles and collection bins in stores.

### TREATMENT METHODS

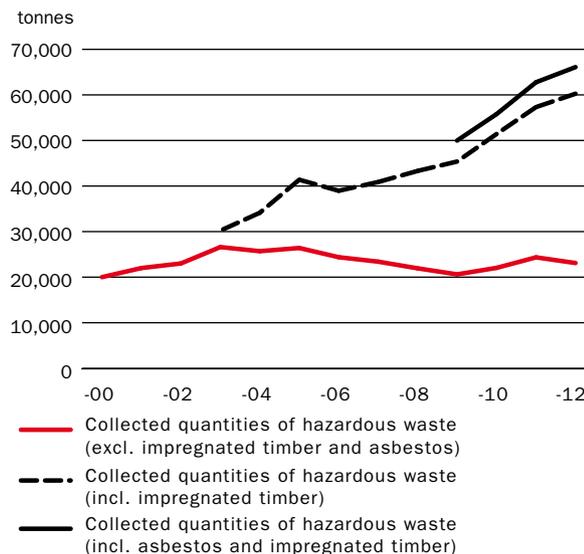
Hazardous waste handed in at collection or treatment plants often requires pre-treatment to facilitate further treatment.

Since hazardous waste may contain substances which should be phased out of the eco-cycle, treatment is often aimed at destroying these substances. Substances that cannot

be rendered harmless or reused are taken to landfill. In these cases it is important that the waste is chemically and physically stable so that hazardous substances do not leak out to surrounding areas.

To recycle material from hazardous waste, the hazardous substances are separated and the remaining parts are recycled. This method is used for disposal of paint tins and oil filters among other things. Toxic and non-degradable substances such as pesticides and other hazardous chemical waste are incinerated in special furnaces at high temperatures. Contaminated soil can be decontaminated through biodegradation, via thermal treatment or vehicle wash systems, among other things. Impregnated timber contains ecologically harmful substances such as arsenic, creosote and copper. Collected timber is chipped and incinerated in specially licensed waste-to-energy plants.

#### HAZARDOUS WASTE 1998-2012



Source: Avfall Web/Avfall Sverige

## WEEE

In 2012, 141,060 tonnes of waste from electronic equipment (WEEE ) was collected, a reduction of around 6 percent compared with 2011. On average, each person handed in 14.7 kg of WEEE in 2012, compared with 15.7 kg per person in the previous year.

In 2012, 2,950 tonnes of portable batteries and 500 tonnes of built-in batteries was collected. An average of 0.36 kg per capita. This represents an increase of 8 percent compared with 2011. In 2012, 6,450 tonnes of car batteries, an average of 0.67 kg per capita, was collected – 5 percent less than the previous year.

### COLLECTION SYSTEMS

Since producers' responsibility for WEEE was introduced in Sweden in 2001, municipalities and producers have cooperated on the management of electronic waste. Avfall Sverige, the Swedish Association of Local Authorities and Regions (SALAR), and the electrical producers' service company, El-Kretsen, created the "El-retur" system. In this collaboration, municipalities assume responsibility and receive compensation for the collection of WEEE from households, while the producers are responsible for its treatment.

Collection of WEEE from households is primarily carried out at manned municipal recycling centres, of which there are approximately 630 throughout the country. In around 80 percent of municipalities there are three or more municipally organised collection systems for WEEE. Curbside collection by municipalities or entrepreneurs covers around 1,200,000 households. Collection via stores, including the electronics industry's own collection system, is available at more than 1,500 collection points.

Avfall Sverige and El-Kretsen collaborate with several municipalities on different projects to develop these collection systems. One such system is the collection container for light bulbs and smaller items of WEEE. There are around 100 of these collection containers placed in stores and other public places all over Sweden. In 2012 Avfall Sverige and El-Kretsen conducted a joint campaign "Lysande återvinning" (literally: "Luminous recycling") to increase the collection of light sources and small items of WEEE.

The development of different recycling technologies has simplified the collection process for consumers, who can now put all their small

light sources into the same container. An additional 2,600,000 low-energy bulbs were collected in 2012 compared with the previous year.

Battery producers are responsible for the collection, treatment, recycling and disposal of all batteries regardless of when they appeared on the market. Producers are also responsible for conducting nationwide information activities. Producers' organisation El-Kretsen handles the collection of portable batteries in about 70 percent of municipalities, while the remaining municipalities handle the collection as a service in exchange for an agreed compensation from the producers.

### TREATMENT METHODS

WEEE is pre-treated, i.e. separated and dismantled, before being sent for further treatment. Pre-treatment is carried out at certified plants, after which the waste is forwarded for final treatment or recycling.

Components containing hazardous substances, i.e. hazardous waste, are treated at approved treatment plants. Once the hazardous substances are removed, a lot can be recycled. Plastic cases are incinerated in waste-to-energy plants and the metal is sent

to smelting plants for recycling. Recovered copper, aluminium and iron is used as raw materials in new products.

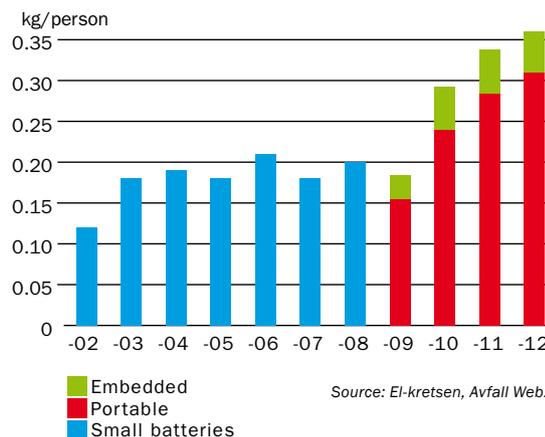
Computers, mobile phones and other IT products contain small amounts of precious metals that are also recovered. Some printed circuit cards, for instance, contain gold and/or silver.

Fluorescent tubes and low-energy bulbs contain mercury. These products are therefore separated and treated in a closed process. The fluorescent powder and mercury can be reused in production of new light sources. The glass is cleaned and reused.

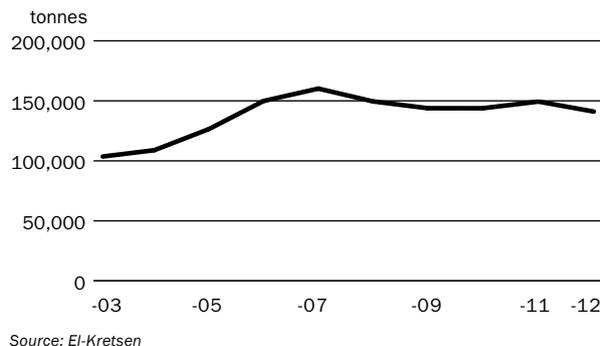
All collected batteries are processed and separated according to chemical content before being sent for recycling or disposal. All batteries should be collected and recycled as far as possible.

Sometimes used electronic products are donated to other countries as charity. But while it may seem a good cause, it is not an environmentally friendly practice. It is better to recycle these products in Sweden where there are methods for treating such waste in an environmentally sound manner.

#### COLLECTED QUANTITIES OF PORTABLE AND EMBEDDED BATTERIES 2002-2012



#### COLLECTED QUANTITY OF WEEE 2003-2012



## MATERIAL RECYCLING

Material recycling totalled 1,422,250 tonnes in 2012 or 148.8 kg per person. 32.3 percent of household waste went to material recycling in 2012, a decrease of 0.2 percent compared with 2011.

The total quantities include collected packaging and newspaper from households that has been handed in for material recycling. These fractions amounted to 731,750 tonnes or 76.6 kg per person.

### COLLECTION SYSTEMS

Packaging and newspapers are collected mainly via producers' unmanned recycling stations. Collection can also be performed via manned municipal recycling centres. Several municipalities have introduced curbside collection of packaging and newspaper.

Households and sometimes also small businesses can hand in their bulky waste, electronic waste and hazardous waste at manned municipal recycling stations. A lot of bulky waste, e.g. scrap metal, can be recycled. Wood can be

turned into fuel, garden waste can be composted or converted into energy though incineration, stones and soil becomes landfilling material, etc. Today there are also recycling methods for gypsum, flat glass and non-packaging plastic (also known as municipal plastic waste).

Material recycling plays a key role in a sustainable society. It is therefore vital that waste is seen as a resource and treated in the right manner. Material recycling leads to separated material being able to replace other production or construction materials. Material recycling not only precipitates a reduction in the consumption of virgin material; it also leads to energy savings. By using one tonne of recycled steel, for instance, we save on the same amount of virgin material and save more than one tonne in carbon dioxide.

### MORE CAN BE RECYCLED

According to a survey by Avfall Sverige<sup>2</sup>, about 60 percent of the contents of household trash bags can be recycled. In households where

there is no separation of outgoing food waste the figure is almost 80 percent. The survey has compiled 246 solid waste analyses carried out by Sweden's municipalities since 2007. Single-family houses are generally better at separating recyclable materials; about 30 percent of the contents of their waste bins consist of packaging and newspapers. In apartment households this figure is 36 percent. Half a percent of the contents of waste bins consists of hazardous waste, batteries and waste from electrical and electronic equipment (WEEE), but mostly WEEE. The chosen collection system also affects the degree of separation. Single-family houses with curbside collection separate waste most effectively, leaving half the amount of packaging and newspaper in the waste bin compared with other households.

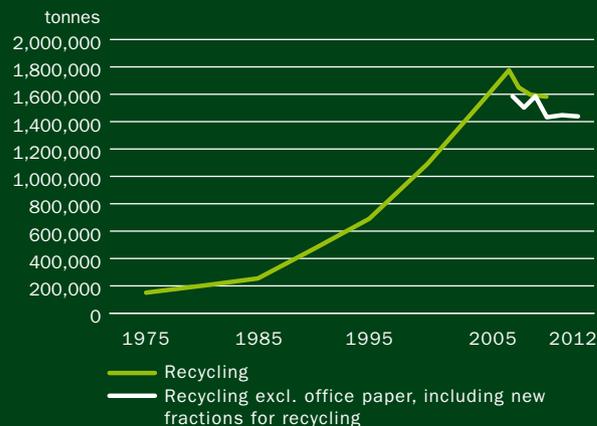
2 U2011:04 Nationell kartläggning av plockanalyser av hushållens käril- och säckavfall

**COLLECTED QUANTITIES OF PACKAGING AND RETURN PAPER FROM HOUSEHOLDS THAT HAS BEEN HANDED IN FOR MATERIAL RECYCLING 2012.**

	[tonne]	[kg/person]
Newspaper	358,070	37.5
Paper packaging	125,270	13.1
Metal packaging	15,760	1.6
Plastic packaging	49,390	5.2
Glass packaging	183,260	19.2
<b>Total</b>	<b>731,750</b>	<b>76.6</b>

Source: Avfall Web and Förpacknings- and tidningsinsamlingen (FTI)  
The information relates only to waste collected from households through recycling stations and curbside collection points

**MATERIAL RECYCLING HOUSEHOLD 1975-2012**



**COLLECTED HOUSEHOLD WASTE FOR MATERIAL RECYCLING 2008-2012 (TONNES)**

	2008	2009	2010	2011	2012
Return paper	459,000	420,000	386,000	383,500	358,070
Packaging made from cardboard, metal plastic and glass packaging	739,140	852,830	704,730	682,100	618,940
WEEE	122,900	117,770	117,100	122,530	116,440
Refrigeration units	28,800	26,080	26,730	26,760	24,620
Portable batteries	1,830	1,720	2,750	3,200	3,460
Car batteries	6,000	5,280	7,000	6,780	6,450
WEEE, non-producers' responsibility	5,000	5,000	5,500	5,050	6,610
Oil filters	1,800	1,800	1,800	1,820	1,690
Water-based paint	4,000	4,000	3,750	4,100	4,010
Scrap metal	152,000	169,920	159,050	164,730	153,000
Gypsum	-	-	-	18,090	17,520
Flat glass	-	-	-	1,630	1,250
Plastic, non-packaging	-	-	-	5,400	4,010
Corrugated board from recycling centres					36,320
Other material for recycling					69,860
<b>Total</b>	<b>1,520,470</b>	<b>1,604,400</b>	<b>1,414,410</b>	<b>1,425,690</b>	<b>1,422,250</b>

Source: Avfall Web, El-kretsen and Förpacknings- and tidningsinsamlingen (FTI)  
Packaging quantities also include collected packaging from businesses. A lot of this material is 'equivalent household waste'.  
Statistics about municipal material recycling of gypsum, flat glass and non-packaging plastic is collated as of 2011.  
Details about oil filters, water-based paint and WEEE not inside the producers' responsibility for 2008-2009 are estimates.  
As of 2012 corrugated board is included as material recovered from recycling centres



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## BIOLOGICAL RECYCLING

In 2012, 673,180 tonnes of household waste was biologically treated through anaerobic digestion or composting. This is an increase of 3.0 percent compared with 2011. 70.4 kg of the waste – green waste and food waste – was biologically treated in 2012 per person. Biological treatment now accounts for 15.3 percent of the total quantity of treated household waste.

The biological treatment of food waste, excluding home composting, totalled 318,220 tonnes in 2012. Food waste that goes to anaerobic digestion plants has risen by 40 percent while food waste that goes to central composting plants has fallen by 5 percent.

### INCREASE IN COLLECTION OF SOURCE-SEPARATED FOOD WASTE

The collection and treatment of source-separated food waste increased by 15 percent in 2012 compared with 2011. According to a survey that Avfall Sverige carried out, close to 60 percent of municipalities collect source-separated food waste. About 20 of them only collect food waste from restaurants and large-scale kitchens, while the remaining municipalities have systems for households as well.

The survey also shows that an additional 70 municipalities are planning to introduce systems for the source-separation of food waste.

Avfall Sverige has published a report<sup>3</sup> to help municipalities and enterprises get started with their collection of source-separated food waste. Among other things, the report

shows that it takes many years to introduce a collection system for source-separated food waste, from the initial planning until the system is up and running. It also shows that factors such as planning, adequate personnel resources, information and follow-ups and controls are more important for success than which collection system you choose. The report outlines which systems that are currently available in the market and describes the experiences of municipalities that have successfully introduced source-separated food waste collection.

Solid waste analyses of household waste show that single-family households generated around 90 kg of food waste per person each year. For residents in apartment blocks the figure is even higher, around 100 kg. This does not include food waste from restaurants, schools and similar.

### COLLECTION SYSTEMS

The most common collection system for source-separated food waste from single-family households is in two separate bins, one for food waste and one for combustible waste. A multi-compartment system is also available in which different fractions are disposed of into separate containers.

Another collection system sometimes used is optical separation of different coloured bags that are put into the same bin. The system is now being used in more municipalities than before.

### TREATMENT METHODS

Anaerobic digestion produces digestate, which is a fertilizer with a high nutrient content. In 2012 725,970 tonnes of digestate was produced, of which nearly 100 percent was returned to agriculture.

Using digestate instead of mineral fertilizer returns nutrients to the soil, including phosphorus, which is a finite resource. The anaerobic digestion of biological waste also produces biogas, which consists mainly of methane and carbon dioxide. Biogas is renewable and can, after upgrading, be used as an environmentally sound vehicle fuel, for heating or electricity production. Compost is used mainly in soil improvement agents or soil mixes.



### CERTIFIED RECYCLING

Treatment plants that produce compost or digestate from separated bio-waste, including food waste from the food industry, can put quality labels on their products after being certified.

The certification system has been developed by Avfall Sverige in consultation with the agriculture and food industry, compost and digestate producers, soil producers, authorities and researchers. The Federation of Swedish Farmers (LRF), the Swedish organic

3 U 2011:19 Hjälpmedel för introduktion av system för insamling av källsorterat matavfall samt Guide #2 Införande av system för insamling av källsorterat matavfall  
4 U 2011:04 Nationell kartläggning av plockanalyser av hushållens kär- och säckavfall

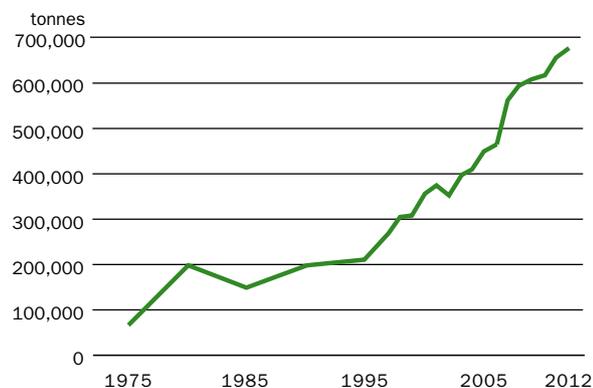
label "KRAV" and the Swedish Dairy Association (LRF Mjök) are some of the organisations that approve digestate that is based on source-separated food waste, which is certified in accordance with Avfall Sverige's system SPCR 120. The Technical Research Institute of Sweden (SP) is the inspection body of this certification system. Around 90 percent of all digestate used in agriculture today is certified. Certification imposes requirements on the whole handling chain from waste to end product. There are also requirements on how the process is conducted.

### MINIMISING METHANE EMISSIONS

Avfall Sverige is engaged in a voluntary initiative to minimise emissions from biogas and upgrading plants. Atmospheric emissions can arise at different stages of biological treatment through the anaerobic digestion of organic material and in biogas upgrading processes in treatment plants. Even though the emissions from biogas plants are low, they should be minimised for several reasons. Approximately 40 biogas and upgrading plants have signed up for the voluntary undertaking<sup>5</sup>.

5 U 2012:15 Sammanställning av mätningar inom frivilligt åtagande 2007-2012

### BIOLOGICAL TREATMENT OF HOUSEHOLD WASTE 1975 - 2012



Biological treatment of household waste (tonnes)	2011	2012
Food waste to joint anaerobic digestion plants	132,380	185,540
Food waste to public composting plants	77,520	73,370
Food waste that undergoes anaerobic digestion at sewage plants	68,000	59,310
Food waste that is home composted	51,500	51,800
Garden waste to public composting plants	323,900	303,160
<b>Total</b>	<b>653,300</b>	<b>673,180</b>

Food waste is household waste and therefore comparable with households, restaurants, food stores, schools and similar businesses. Waste from the food industry, slaughterhouses, etc. is not included.

Biological treatment total including household waste (tonnes) <sup>1</sup>	2008	2009	2010	2011	2012
Anaerobic digestion	405,580	535,930	661,620	555,050 <sup>2</sup>	695,940
Composting	568,700	630,500	566,210	690,100	558,830
<b>Total</b>	<b>974,280</b>	<b>1,166,430</b>	<b>1,227,830</b>	<b>1,245,150</b>	<b>1,254,770</b>

Resource economisation (tonnes)	2008	2009	2010	2011	2012
Digestate	389,350	498,720	582,750	594,310	725,970

Energy production (MWh)	2008	2009	2010	2011	2012
Vehicle gas	204,720	262,600	264,680	321,600	353,180
Electricity	700	0	0	60	0
Heating	48,740	41,280	50,980	17,380	15,540
Flaring	25,840	13,560	12,450	10,390	25,640
<b>Total (MWh)</b>	<b>280,000</b>	<b>317,440</b>	<b>328,110</b>	<b>349,430</b>	<b>394,360</b>

Source: Avfall Web, Avfall Sverige.

1) These quantities refer to plants that primarily treat household waste. They do not provide a complete picture of biological treatment in Sweden.

2) The decrease in 2011 is due to two plants which were previously included in our statistics but have since been removed.

Refers to facilities at waste purification plants and is included in the statistics that the Swedish Water and Wastewater Association produces.

Composting	Total (tonnes)	Household waste
Ale	1,340	550
Alingsås	2,750	2,700
Borlänge*	11,660	11,200
Eskilstuna	6,390	4,520
Eslöv	8,240	8,240
Fagersta	3,580	780
Filipstad	1,000	10
Gällivare	10,150	600
Gävle	15,390	15,390
Göteborg	32,660	3,550
Halmstad	6,270	6,270
Helsingborg	12,490	12,430
Huddinge	11,100	11,100
Hässleholm	9,190	7,740
Jönköping	8,640	8,640
Karlshamn	9,790	7,710
Karlskrona	7,500	7,500
Karlstad	32,000	0
Klippan	4,830	4,100
Kristianstad	7,760	7,760
Kristinehamn	24,070	0
Kungsbacka	4,110	1,540
Landskrona	5,300	2,900
Ludvika	11,480	3,580
Luleå	12,380	9,880
Malmö*	32,640	26,110
Mariestad	2,110	550
Motala	3,160	3,160
Sala	9,130	1,710
Simrishamn	7,090	5,670
Sunne	630	580
Söderhamn	6,610	1,020
Södertälje	3,210	3,210
Tranås	2,290	510
Trelleborg	5,930	4,740
Täby	22,820	9,530
Uppsala	13,690	12,060
Västerås	18,480	5,820
Växjö	7,300	7,300
Ystad	5,190	4,150
Årjäng	70	70
Örebro*	16,770	15,100
Östersund	11,790	6,700
Other plants	129,850	129,850
<b>Total</b>	<b>558,830</b>	<b>376,530</b>

Source: Avfall Web, Avfall Sverige  
\* Certified plant SPCR 152

Anaerobic digestion	Total (tonnes)	Household waste
Bjuv**	49,440	4,200
Borås**	40,700	28,800
Falkenberg**	83,570	6,050
Falköping	5,190	860
Helsingborg**	70,790	19,110
Jönköping**	15,390	10,930
Kalmar**	21,200	0
Kristianstad**	85,300	24,940
Laholm**	55,730	5,960
Linköping**	80,400	22,600
Norrköping**	17,600	0
Skellefteå	7,730	5,970
Skövde	49,020	0
Sävsjö**	46,460	0
Uppsala**	25,200	21,500
Vänersborg**	18,890	18,050
Västervik	2,550	0
Västerås**	20,780	16,580
<b>Total</b>	<b>695,940</b>	<b>185,550</b>

Source: Avfall Web, Avfall Sverige  
\*\* Certified plant SPCR 120



## WASTE-TO-ENERGY

In 2012, 2,270,650 tonnes of household waste went to energy recovery. This is an increase of 1.6 percent compared with 2011. On a per capita basis for the whole of Sweden, 237.6 kg of household waste per person went to energy recovery in 2012. Waste-to-energy accounts for 51.6 percent of the total quantity of treated household waste.

Waste has become an increasingly important fuel in Swedish district heating systems. In 2012, a total of 14.7 TWh of energy was produced through incineration, of which 13 TWh was used for heating and 1.7 TWh for electricity. Sweden is the country in Europe that recovers the most energy from the incineration of waste, approximately 3 MWh per tonne<sup>6</sup>.

In addition to household waste, 2,771,370 tonnes of other waste, primarily industrial waste, was also treated by Swedish plants. This is included in the statistics. Avfall Sverige's statistical information mainly refers to plants treating household waste. Energy recovery also takes place in plants where

household waste is not treated, but there is no comprehensive data on the total energy produced through the incineration of waste in Sweden.

### RESIDUES

The residue from incineration consists of slag (bottom ash) from the furnace, 15 to 20 percent by weight of the treated waste, and flue gas treatment residues (fly ash), 3 to 5 percent by weight. Some of the slag goes to landfill, while slag gravel may be used as substitute for natural gravel in road construction work and construction material at landfills, for example.

Flue gas treatment residues (fly ash) are either transported to landfills or used as a neutralization agent when refilling mines.

### EXPANSION AND IMPORT

There are 32<sup>7</sup> incineration plants for household waste in Sweden. According to a study by Avfall Sverige<sup>7</sup>, the capacity for waste incineration in Sweden is greater than domestic avail-

ability of combustible waste and is expected to continue to increase over the next few years.

174,600 tonnes of household waste was imported to Sweden in 2012, mainly from Norway. Total imports of waste for energy recovery was 555,500 tonnes<sup>\*\*</sup>.

Swedish waste-to-energy is helping Europe to climb the waste ladder by diverting waste flows from landfill to waste-to-energy plants.

Energy recovery is a hygienic and environmentally sound treatment method for waste that cannot or should not be treated in any other manner. Emission figures from Swedish incineration plants are reported to the authorities according to the stipulated requirements.

Swedish waste incineration plants more than comply with the energy production criterion in the EU Framework Directive on Waste, which is a requirement to be considered a recovery operation.

\* Mälarenergi in Västerås and Öresundskraft in Helsingborg were commissioned in 2013 and are therefore not included in the statistics.

\*\* Only plants that are members of Avfall Sverige contribute to the statistics.

6 U 2008:13 Energi från avfall ur ett internationellt perspektiv

7 E 2013:04 Kapacitetsutredning 2012. Tillgång och efterfrågan på avfallsbehandling till år 2020

Municipality	Plant	Supplied Waste (tonnes)		Waste to Energy (MWh)	
		Total	of which household waste from Sweden	Heat	Electricity
Avesta	Källhagsverket	59,260	26,240	185,160	0
Boden	Bodens Värmeverk	99,520	39,300	255,150	28,210
Bollnäs	Säverstaverket	54,480	53,520	121,830	27,180
Borlänge	Fjärrvärmeverket, Bäckelund	84,070	35,710	197,600	37,380
Borås	Ryaverket	116,880	23,640	232,000	51,760
Eda	Åmotsfors Energi	69,450	10,260	155,240	19,570
Eksjö	Eksjö Energi AB	50,430	20,860	98,070	14,300
Finspång	FTV Värmeverket	28,730	26,450	74,580	0
Göteborg	Sävenäs avfallskraftvärmeverk	542,520	248,730	1,472,250	273,240
Halmstad	Kristineheds avfallsvärmeverk	188,720	91,560	635,470	69,040
Hässleholm	Beleverket i Hässleholm	48,150	31,770	114,510	10,200
Jönköping	Kraftvärmeverket Torsvik	151,770	37,200	404,760	88,020
Karlskoga	Karlskoga Kraftvärmeverk	96,130	33,360	354,650	31,160
Karlstad	Avfallsvärmeverket på Heden	53,930	45,630	150,930	0
Kil	Kils Avfallsförbränningsanläggning	14,080	0	39,500	0
Kiruna	Kiruna Värmeverk	70,540	10,040	162,080	29,540
Kumla	SAKAB Förbränning	157,540	9,400	255,420	61,830
Köping	Norsa avfallsförbränningsanläggning	29,130	19,250	72,520	0
Lidköping	PC Filen	99,110	38,700	288,430	16,060
Linköping	Gärstadverket	419,760	147,360	1,070,200	112,020
Ljungby	Ljungby Energi AB	58,050	48,080	132,000	14,480
Malmö	Sysav förbränningsanläggning	549,980	221,790	1,388,060	247,430
Mora	Avfallsförbränningen Mora	21,590	16,210	60,940	0
Norrköping	E.ON Händelöverket	301,500	198,000	790,000	125,000
Skövde	Värmekällan	60,700	32,760	170,210	9,580
Stockholm	Högdalenverket	739,090	410,100	1,835,930	197,300
Sundsvall	Korsta kraftvärmeverk	191,970	95,790	477,510	61,350
Uddevalla	Lillesjö Avfallskraftvärmeverk	105,580	60,380	212,570	61,710
Umeå	Dåva kraftvärmeverk	166,600	64,560	365,640	85,510
Uppsala	Vattenfall AB Värme Uppsala	364,900	161,000	1,135,210	31,480
Västerвик	Stegholmsverket	47,880	13,000	122,820	0
<b>Total</b>		<b>5,042,020</b>	<b>2,270,650</b>	<b>13,031,240</b>	<b>1,703,350</b>

Avfall Sverige's statistics include waste incinerators receiving household waste. The majority also receives other waste.

The plant in Kil are included despite this definition.

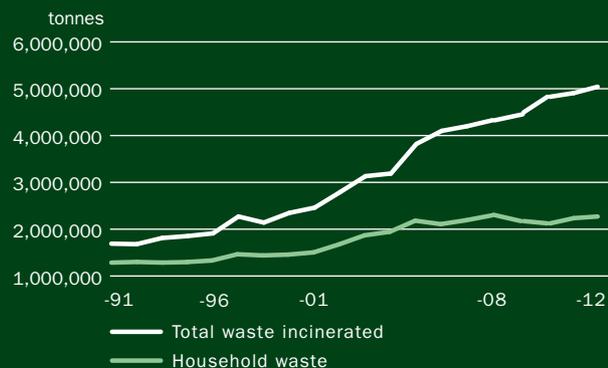
The amount of household waste includes household waste only from Sweden

The total amount of waste also includes imported waste.

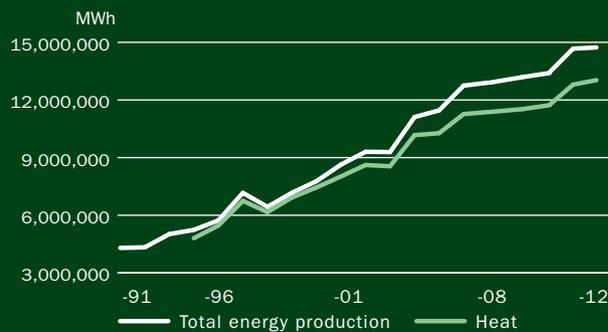
In the energy recovery stated above, the energy of support fuels is included, 240GWh

Waste-to-energy	2008	2009	2010	2011	2012
<b>Incineration (tonnes)</b>					
Household waste	2,292,970	2,173,000	2,123,680	2,235,720	2,270,650
Other waste	2,034,560	2,322,120	2,704,370	2,671,760	2,771,370
<b>Total</b>	<b>4,327,530</b>	<b>4,495,120</b>	<b>4,828,050</b>	<b>4,907,480</b>	<b>5,042,020</b>
<b>Production (MWh)</b>					
Heating	11,373,172	11,502,820	11,752,870	12,798,018	13,031,240
Electricity	1,527,598	1,637,360	1,696,400	1,872,204	1,703,350
<b>Total</b>	<b>12,900,770</b>	<b>13,140,180</b>	<b>13,449,270</b>	<b>14,670,222</b>	<b>14,734,590</b>
Slag, bottom ash (tonnes)	693,140	736,020	850,200	879,640	850,120
RGR, fly ash (tonnes)	202,920	216,660	239,050	256,880	217,380

WASTE TO ENERGY 1991 - 2012



ENERGY RECOVERY 1991 - 2012



## LANDFILL

In 2012, 32,600 tonnes of household waste went to landfill, a decrease of 5,600 tonnes or 15 percent, compared with 2011. On a per capita basis for the whole of Sweden, it represents 3.4 kg per person. 0.7 percent of household waste went to landfill in 2012. In 2012, a total of 1,555,300 tonnes of waste was deposited at Swedish landfill sites for municipal waste, an increase of 40,000 tonnes compared with the previous year. At individual plants, however, the total quantities of landfilled waste can vary significantly from year to year depending on the varying amount of polluted material that needs to be landfilled.

Landfill is the treatment method used for waste that cannot be treated in any other way, e.g. tiles, porcelain, ceramics and window glass.

Landfill is only part of the operation at a modern waste management site. Most sites also separate waste materials going to treatment, for transportation to reuse, recycling and energy recovery plants. Sometimes landfill sites also serve as temporary storage for large quantities of waste that fall under the producers' responsibility, such as paper and glass.

Plants also often treat biodegradable waste and contaminated matter. Final capping of closed landfills and landfill cells can also take a long time.

### MORE STRINGENT EU REQUIREMENTS

On 31 December 2008, much stricter EU landfill regulations took effect, and almost half of all landfill sites for municipal waste were closed. In 2012 household waste was landfilled at 78 waste management plants.

Most of the landfill sites that continue operating accept non-hazardous waste.

Landfill sites that are closed must be capped with a final cover. Together these landfills cover an estimated area of 25 km<sup>2</sup>, and the estimated total cost for the final covering of the sites is about SEK 6 billion. Every year, approximately 6-8 million tonnes of material is used for the final covering of landfill sites. The capping of the majority of the landfill sites and landfill cells at operational plants that were closed as a result of the tighter regulations on landfills will continue until 2030. After this the need for final capping material will fall significantly as it is geared to the continuous end-capping of the limited waste quantities being landfilled.

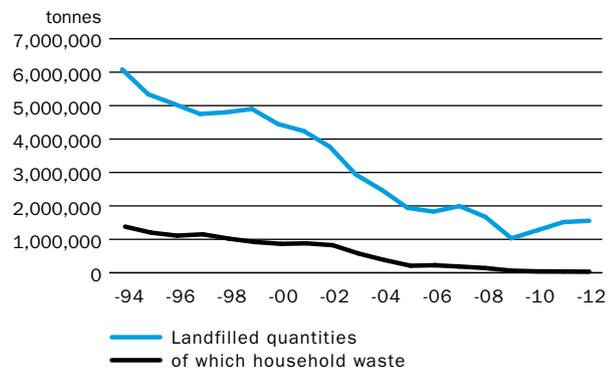
Today, residues such as slag, sludge, ashes and contaminated soil are used in the different layers in closed landfills. The possibilities for using residues for closing landfill sites can vary significantly from one region to the next due to the variation in the availability of residues and authority requirements.

### GAS AND LEACHATE RECOVERED

In 2012, approximately 255 GWh was collected from recovered landfill gas at 55 waste management plants, of which 206 GWh was used for energy. Energy recovery consisted of 11 GWh in the form of electricity and 195 GWh in the form of heating. In all, 49 GWh of landfill gas was flared. Flaring does not produce energy but reduces methane emissions. Waste is still landfilled at 42 plants with gas recovery. Gas and leachate is still being collected from closed landfill sites.

In 2012, 110 waste management plants treated almost 10.3 million cubic meters of leachate, including polluted surface water from storage, separation and treatment areas. Only 69 of these plants are still landfilling waste. Dilution due to leakage of groundwater and surface water can also vary significantly at the different plants.

Just under half the plants (47 percent) divert leachate to municipal wastewater plants after various degrees of local treatment. Other plants treat leachate locally before releasing it to the recipient. At some plants leachate can be released both to the treatment plants and to the recipient. The reason could be that different types of water with different degrees of pollution are collected separately and that the treatment capacity at local treatment plants vary during the course of the year.

**LANDFILLED QUANTITIES 1994 - 2012****LANDFILLED QUANTITIES 2008-2012 (TONNES)**

	2008	2009	2010	2011	2012
Landfilled quantities	1,670,000	1,030,000	1,271,000	1,515,500	1,555,300
of which household waste	140,000	63,000	42,000	38,200	32,600

Avfall Sverige's landfill statistics do not provide a complete picture of landfill in Sweden. Initially the idea was to keep statistics of plants that accepted household waste. Today, many of these plants no longer accept household waste. There is some uncertainty about the figures for household waste as it is not always possible to distinguish flows of household waste from other waste.

**ENERGY RECOVERY AT LANDFILL SITES (MWH)**

	2008	2009	2010	2011	2012
Useful energy	310,800	294,240	262,200	237,400	205,900
of which electrical energy*	23,700	17,400	20,400	16,000	10,500
Flaring	65,100	43 600	36,600	32,200	49,300

\* Other energy is used for heating  
Source: Avfall Web

## CUSTOMERS, FEES AND COSTS

Municipalities and producers handle the management of household waste. The municipal costs are charged as a separate waste collection fee while the producers' costs as a fee included in the price of the product.

The local councils set the municipal waste collection fees and the producers decide on the amount of the product fee.

As a rule, waste collection fees cover the total costs for the municipal waste management, but deficits are tax-funded. Administration, such as waste planning, customer service, invoicing and information are included in the costs. The fee must also cover the service costs at the recycling centres for the collection and handling of bulky waste and hazardous household waste. The fee is often based on one fixed and one variable fee, e.g. one fee for waste collection and one for waste treatment.

According to the self-cost principle in the Local Government Act, the municipalities' revenue from fees may not exceed the costs of the municipal waste management.

### AVERAGE FEE

The average annual waste collection fee of a Swedish single-family house is SEK 2,004 according to data from Avfall Sverige's statistics system Avfall Web. Apartment households pay an average of SEK 1,254 and the average fee for second homes is SEK 1,144 a year.

Many municipalities which introduced the voluntary collection of food waste, use the fee as a means of control. Those who choose a food waste subscription, for instance, pay a lower fee than those who choose to drop off mixed waste.

To achieve a higher recycling rate for waste, several municipalities have introduced a fee based on weight, where households pay an additional rate per kilo of waste collected on top of the basic fee. In 2012, 30 municipalities had implemented weight-based rates. In these cases, the collection vehicles are equipped with a scale and equipment to identify each individual bin. The total annual cost for weight-based fees varies depending on the quantity of waste deposited for collection. The fee varies between SEK 1.30-3.90 per kg for bins and bags, combined with different types of bin fees and the fixed basic fee. Some municipalities with food waste collection have lower weight charges for the food waste bin. The normal system, however, is to have the same weight charges for combustible waste and food waste.

The cost for waste management is on average SEK 730 per person each year, excluding VAT. The municipal cost for collecting waste in bins and bags is on average SEK 223 per person each year. Treatment of the waste is not included in the cost. The annual basic fee of SEK 305 per person covers the cost of the

recycling centres, treatment of hazardous waste from households, planning, information and administration. The statistics are provided by Avfall Web and are based on data from around one-third of Sweden's municipalities.

There are several ways to reduce the environmental impact of waste management, improve resource efficiency and increase recycling. They can either be information-based or administrative or financial means of control. Examples of administrative control include regulations and prohibitions such as emission limit values and prohibition against the landfill of organic waste.

Financial means of control can either be an incentive, e.g. tax relief and subsidies, or a penalty, e.g. taxes and charges. One ground rule is that the polluter should pay. Tax on landfilled waste was introduced in 2000 as a way to reduce landfill. The tax was initially SEK 250 per tonne, but has since been raised several times. Since 1 July 2006, the landfill tax has been set at SEK 435 per tonne of waste. The landfill site operator is liable to pay the tax.

Municipalities often pay a fee to get their waste treated. Treatment fees can vary greatly. The incineration and landfill fees have declined slightly compared with 2011. The fees for anaerobic digestion have fallen by around 13 percent.

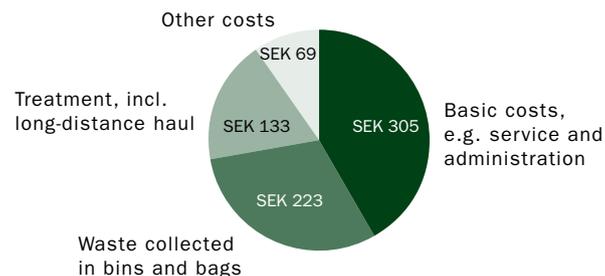
## SATISFIED CUSTOMERS

At Avfall Web municipalities can also feed in the results from their customer satisfaction surveys.

The surveys show that

- » 80 percent of customers are satisfied or very satisfied with the waste management in single-family houses
- » 81 percent are satisfied or very satisfied with the waste management in apartments
- » 74 percent are satisfied or very satisfied with the waste management in second homes
- » 87 percent are satisfied or very satisfied with the collection of waste in bins and bags
- » 85 percent are satisfied or very satisfied with their visit to the recycling centre
- » 70 percent are satisfied or very satisfied with the accessibility of the recycling centre
- » 72 percent are satisfied or very satisfied with the recycling stations
- » 83 percent said they handed much or all of their hazardous waste to the collection system
- » 88 percent said they handed much or all of their electronic waste to the collection system

## WASTE MANAGEMENT COSTS PER PERSON, EXCL. VAT 2012



## TREATMENT FEE FOR HOUSEHOLD WASTE (EXCL. VAT) 2012

SEK/tonne	Anaerobic digestion	Composting	Incineration	Landfill
Average	515	660	500	810
Interval	390-750	360-860	370-710	550-1,170

Source: Avfall Web

The treatment fee refers to the median in Avfall Web. Intervals show the normal distribution of treatment fees.

Fees for composting and anaerobic digestion refer to food waste

## NON-HOUSEHOLD WASTE



Industries are responsible for managing their own non-household waste. Some have their own landfill sites at their disposal or can recover energy from waste in their own incineration plants.

The collection and handling of waste generated from construction, renovation, rebuilding or demolition of buildings, or from more extensive ground installation projects in gardens do not fall under the responsibility of the municipality. Waste from minor maintenance work and house repairs counts as household waste. Some construction and demolition waste is classified as hazardous waste, asbestos and impregnated timber, for example and must be handled accordingly.

Collected data on non-household waste can be found in the official statistics presented to the EU by Sweden through the Swedish

Environmental Protection Agency. According to the EU's Waste Statistics Directive, each member state must report its country's statistics once every two years. The latest statistics concern waste quantities for 2010.

- » Quantities of waste generated by businesses: 113.5 million tonnes, of which 89 million tonnes was mining waste.
- » In-house waste treatment by businesses: 96.7 million tonnes, of which 87.4 million tonnes was mining waste.
- » Other treatment: 16.7 million tonnes.
- » Hazardous waste: 2.5 million tonnes, of which 2.1 million tonnes is accounted for by industry/the service sector.

The entire EU generates 3 billion tons of waste each year. Sweden accounts for a relatively large proportion of waste, because of its mining waste.

# WASTE AGENDA

Major changes in laws, ordinances and regulations governing the waste industry.

## 2013

- » By 12 December 2013, EU member states shall have established national waste prevention programmes to reduce waste volumes and make the waste less harmful. The programs shall either be part of waste plans in accordance with the directive or other environment policy programs. The requirements are laid down in the Waste Framework Directive 2008/98/EC.

## 2014

- » Waste containing a minimum of 0.1 percent by weight of mercury and which is not land-filled in accordance with authorisation given by the Environmental Code, or with regulations laid down in this code, shall be disposed by means stated in the Waste Collection and Disposal Ordinance (with some exceptions given in the regulation (EC) 1108/2008).

## 2015

- » By 2015, the EU member states shall have established, as a minimum, separate collection of paper, metal, plastic and glass provided that it is practicable from a technological, environmental and financial point of view. The requirements are laid down in the Waste Framework Directive.

## 2018

- » The objective for greater resource economisation in the food chain means that measures must be implemented by 2018 to ensure that resource economisation in the food chain manifests itself by at least 50 percent of food waste from households, large-scale kitchens, stores and restaurants is separated and treated biologically to recover plant nutrients, and by at least 40 percent being treated to recover energy.

## 2020

- » The EU has the objective of reducing emissions of greenhouse gas by 20 percent by 2020, compared with the emission rates in 1990. The Swedish Parliament has called for a reduction of Sweden's emissions by 40 percent compared with 1990. The overall target is to produce a total of 20 percent renewable energy within the EU and that 10 percent of all vehicle fuel shall be produced from renewable resources.
- » The Waste Framework Directive means new recycling goals for the member states. By 2020, 50 percent of the total amount of paper, metal, plastic and glass in household waste and equivalent waste shall be reused or recycled. For construction and demolition waste the figure is 70 percent.
- » The objective concerning construction and demolition waste requires the implementation by 2020 of measures to ensure that the preparation for reuse and material recycling and other material utilisation of non-hazardous construction and demolition waste is at least 70 percent by weight.

## ABOUT AVFALL SVERIGE – SWEDISH WASTE MANAGEMENT

Avfall Sverige is the municipalities' body of experts in waste and recycling. Our members are municipalities and municipal enterprises and we have a number of private companies as associated members. In total we have approximately 400 members.

Our primary task is to represent and develop our members by creating networks, providing information and influencing decision-makers.

Avfall Sverige's objective is to promote the development of green, sustainable waste management with a clear social responsibility.

Avfall Sverige's vision is "Zero Waste". Concrete goals for 2020 are to decouple relationship between waste quantities and growth and to achieve a clear, strong upward movement in the waste hierarchy. Municipalities are the engine for achieving the 2020 targets and for attaining our long-term vision. The municipalities are also the guarantors of long-term sustainable waste management for the common good and for Sweden's inhabitants.

Avfall Sverige looks after the interests of its members in waste management, a task which encompasses

separation, collection, recycling, waste disposal, and by handling issues regarding administration, economy, information, planning, training and development.

We are Sweden's largest environmental movement. It is Avfall Sverige's members who ensure that Swedish waste management functions smoothly at all stages from collection to recycling. We work for the common good: environmentally safe, sustainable and for the long-term. Together with Sweden's households and businesses we perform one of Sweden's most important tasks.

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