

SWEDEN – WORLD LEADER IN WEEE COLLECTION AND TREATMENT



SWEDEN – WORLD LEADER IN ELECTRIC AND ELECTRONIC WASTE COLLECTION

The producer responsibility for waste from electric and electronic equipment (weee) was introduced in Sweden the 1st of July 2001. At the same time, the cooperation, “Elretur”, between producers and local authorities was initiated. Swedish citizens have since then collected close to one million ton of weee. Every Swedish citizen leaves approximately 16 kilos of weee to collection every year, one of the highest collection rates, which makes Sweden world leader in collection of weee.

EI-Kretsen manages a nationwide collection and recycling system for waste from electric and electronic equipment. The system is called “Elretur” and is managed in collaboration with the Swedish local authorities. The collaboration means that:

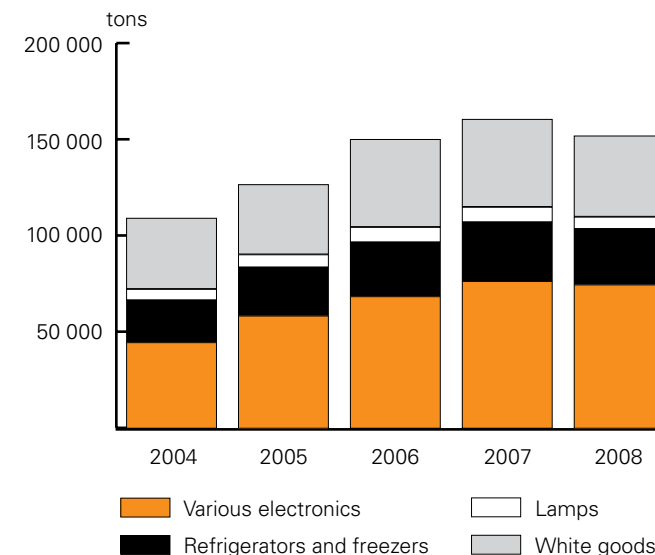
- the local authorities manage and fund manned collection points, such as recycling centers, where the households may leave the weee without charge.
- EI-Kretsen manages and funds transports of the weee to pretreatment and recycling in accordance with the prevailing laws.

The system is convenient for the households, who can leave the weee at the same collection points as other waste. It is also convenient for producers who are members of EI-Kretsen since they get access to a nationwide and well established system. “Elretur” is the only nationwide collection system in Sweden.

January 1st, 2009, a producer responsibility for batteries was taken into effect in Sweden, which also is a collection system managed by EI-Kretsen.

Weee collected by municipalities and businesses are transported to specialized recycling facilities that EI-Kretsen has contract with. Pretreatment of weee is regulated by the Swedish legislation,

by agreements between EI-Kretsen and the recycling companies, by certain developed standards, and by the code of conduct appended to all pretreatment agreements with EI-Kretsen. Controls and follow-ups at the facilities are made through audits as well as through reports to EI-Kretsen and to supervisory authorities. The control includes treatment at the facility as well as the downstream treatment. The reports to EI-Kretsen should account for how the weee have been treated, whereto the fractioned material, such as metals, plastic, and hazardous waste, has been sent, and how this material has been treated at the receiving facility.



RECYCLING 2004-2008

Collected quantities from all collection points, households and businesses.

tons	2004	2005	2006	2007	2008
Large white goods (excl. refrigerators and freezers)	36 800	36 300	45 500	45 500	42 000
Household appliances	10 200	12 300	11 900	12 600	10 100
IT, office equipment, telecom	17 700	22 700	27 600	30 800	28 100
TV, audio, video	15 700	21 000	26 300	30 400	32 900
Cameras, clocks, toys	200	300	300	300	600
Lamps, lightning equipment	5 800	6 700	7 900	7 900	6 300
Other waste	900	2 200	2 400	2 300	2 900
Total	87 300	101 500	121 900	129 800	122 900
Refrigerators and freezers	21 800	25 000	28 000	30 500	28 800
Total	109 100	126 500	149 900	160 300	151 700

COLLECTION – TREATMENT - RECYCLING

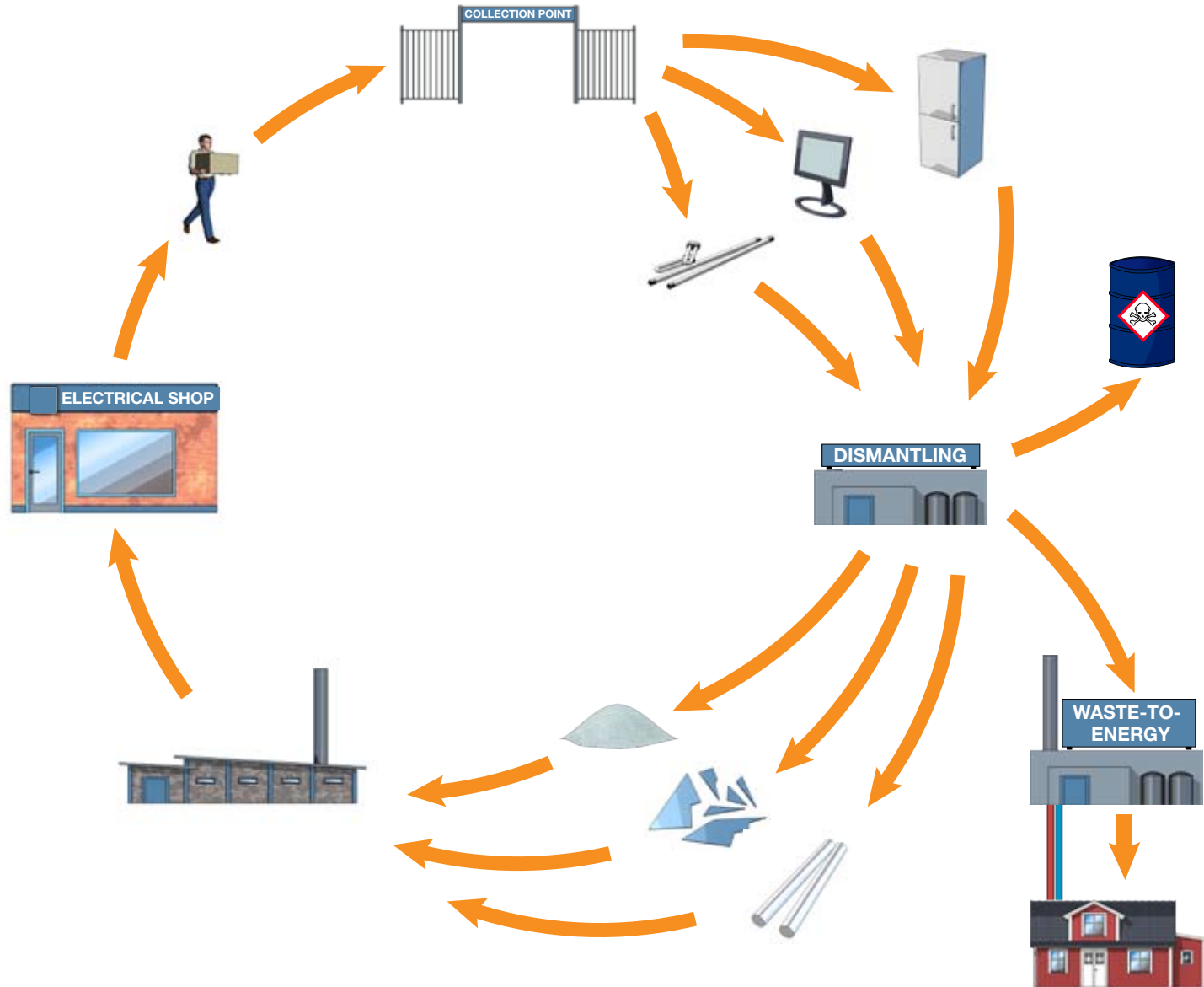
All waste from electrical and electronic products are collected and recycled for the benefit of the environment.

Weee are handed in to manned municipal collection points, in most cases a recycling station. The producers will then provide for its safe treatment. Hazardous substances are phased out of the environment.

Plastic materials which cannot be recycled are incinerated with energy recovery, which produce electricity and district heating. Wood and textile materials are also incinerated.

However, some plastic can be recovered and used as raw material for new products. Glass and metal is also recycled. Methods which would enable recycling of the fluorescent powder which contains mercury, and is found in for example fluorescent tubes, are currently being developed.

The eco-loop is closed when new products from recycled material reach the stores.



INFORMATION AND COLLECTION

The municipalities are responsible to inform the households of why waste from electric and electronic equipment must be separated, how to separate it and where it can be collected. They should also give information about the collection and recycling results, which the producers should provide them with.

The producers must consult the local authorities before introducing a new collection system, or upon demand of a local authority. The purpose of the consultation is to make the producers' collection system coordinated with the municipal waste management. The producers must consider the local conditions in each municipality and ensure that the collection is easily accessible and that both households and municipalities are given good service.

The municipalities fund information and collection, and the producers fund transports, treatment and recycling.

The cooperation between local authorities and producers are considered as a point of success for the Swedish system

Collection of weee at manned municipal recycling centers is the most common collection system. At these recycling centers most weee are collected. This nationwide collection system comprises approximately

1000 collection points around the country. In places it is complemented with different types of curb-side collection.

In some places, collection is also available in stores, and through bulky waste rooms in premises and at companies.

Avfall Sverige – Swedish Waste Management, and El-Kretsen run parallel projects to develop new collection systems, in cooperation with several local authorities. The aim is to compare if local solutions may be applicable on a larger scale. One solution could be to adjust the systems to the different regions, where the particular conditions in for example sparsely-populated areas, populated areas, and different types of housing areas, are considered. One of these projects is "The Collector", a special device for collection of electronic waste placed in stores for the public to hand in light bulbs, low-energy bulbs, small batteries and smaller weee.

El-Kretsen then transports the weee from these collection points. The amounts of collected waste are continuously reported to El-Kretsen's web based information system, which allows the carriers to plan and transport the waste effectively.

The logistics system is based on the best possible use of large vehicles, quick loading and unloading with specialized loading carriers. El-Kretsen's loading carriers are marked with bar codes which are read by the transporters and keeps statistics of the collected waste quantities from each collection point.

The weee is transported from the collection points to the so called pretreatment facilities. Transportation of hazardous waste, which is the category that most types of weee fall under, is strictly regulated in Sweden. All the haulage contractors working for El-Kretsen hold necessary permits. There are five categories of transports:

- White goods
- Refrigerators and freezers
- Lamps
- Batteries
- Various electronics

Larger white goods, such as refrigerators and freezers are transported as individual packages, while smaller and middle-sized products are transported in wire mesh cages containing 2 m³ or 400 kg of electronic waste. The wire mesh cages circulate in an exchange system between the municipal recycling centers and the recovery facilities. At collection, the filled wire mesh cages are replaced by empty ones. At some larger collection points where the inflow is high, smaller

and middle-sized products are loaded onto containers à 35-40 m³, which make loading and unloading more effective and reduce the work load of the staff. Picture tube products, such as TV receivers and monitors, are transported in wire mesh cages due to the damage risk. Exchange systems with special pans and boxes are used for the collection of batteries and lamps.

The improvement of loading carriers is an ongoing process, which is carried out in consultation with El-Kretsen's partners. Consideration is taken to, for instance, the market development regarding the types of products that are sold and the types of products that are collected.



The nationwide collection system for electronic waste comprises approximately 1000 collection points around the country. Weee from households are most commonly collected at the municipal recycling centers.



Avfall Sverige and El-Kretsen run, together with a number of local authorities, parallel projects to improve the collection systems. One of these systems is "The Collector," a special device which is placed in stores, where the public may turn in light bulbs and smaller weee.



More and more municipalities around the country complement collection at recycling centers with so called curb-side collection of weee.

TREATMENT AND RECOVERY

The waste collected at the collection points in Sweden is transported to specialized recovery facilities holding a contract with El-Kretsen. Different types of material is thereafter recycled, incinerated with energy recovery or treated as hazardous waste.

Swedish legislation as well as agreements between El-Kretsen and the recycling companies, particularly developed standards, and the code of conduct appended to all pretreatment agreements with El-Kretsen, regulate how the pretreatment is carried out. Controls and follow-ups are made through audits at the facilities. Moreover, the recycling companies are obliged to submit reports to both El-Kretsen and the supervisory authorities. The follow-up includes inspection of the treatment at the station as well as the downstream treatment. Reports to El-Kretsen should account for the recycling companies' treatment of the waste, where to the different materials – metals, plastic, hazardous waste etc. – are sent, and how these materials are treated at the receiving facility.

The pretreatment of waste includes dismantling of potentially hazardous components which are removed for separate collection. Some discarded products, such as TV receivers, are pretreated manually while other products may be pretreated in automatic processes. When hazardous components have been removed, metal parts may be recycled. Metal recycling is carried out in smelting plants. Copper, aluminum, and iron are used as raw material for new products. Computers, mobile phones, and other technology products contain small quantities of precious metals, such as gold and silver in printed circuit cards, which is also recovered. Some types of plastic and glass materials are recycled. Textile fabrics, wood, and certain types of plastic go to incineration with energy recovery. The energy produced is used as district heating or electricity. Potential pollutants are captured in the flue gas cleaning processes.

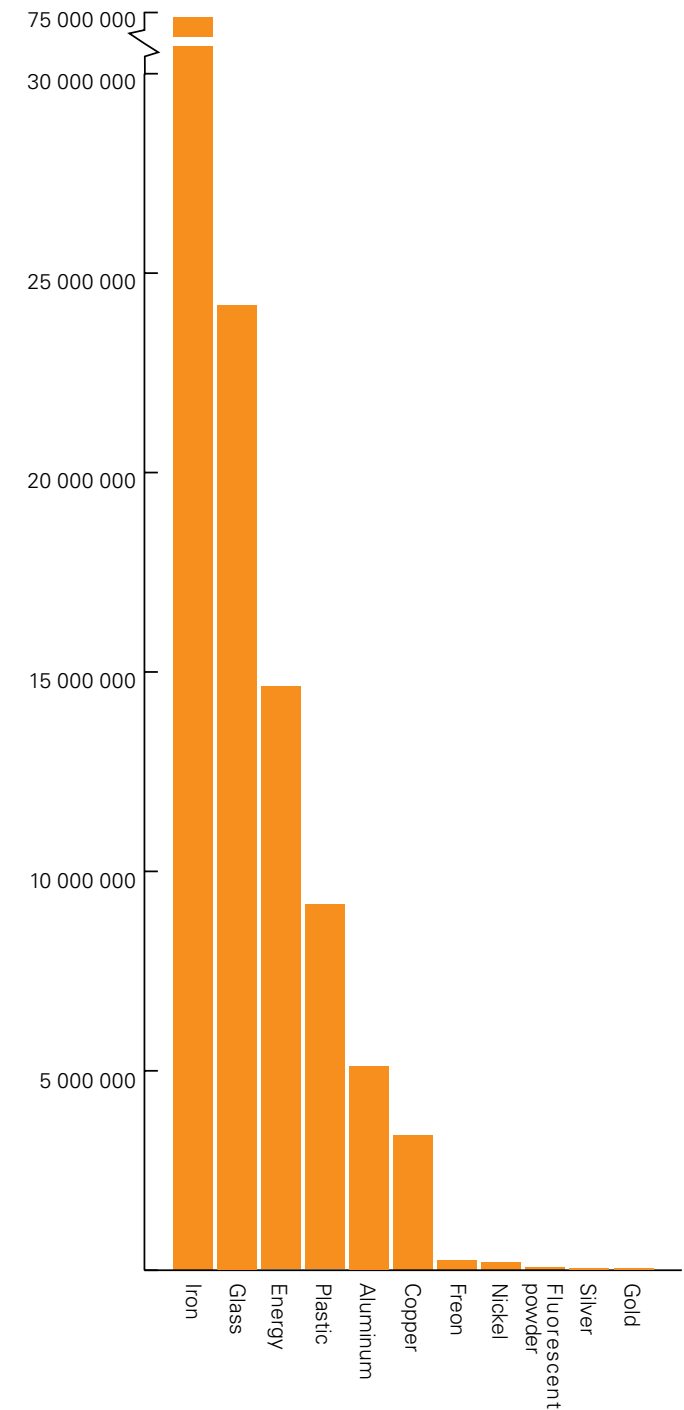
Fluorescent tubes and low-energy bulbs contain mercury which needs to be recovered. The ends of the fluorescent tubes are cut off, the fluorescent powder, containing mercury, is blown out and the remaining glass material is crushed and cleaned. Other sources of light, such as low-energy bulbs, halogen lamps, and light bulbs, are broken and grinded in closed processes, whereupon the fluorescent powder is separated.

The cleaned glass material is then transported from the recycling facility for smelting and recycling, which is used in the production of glass bottles and preserving jars. Metal and electronic waste is sent to specialized recycling companies, which recycle metal and recover energy from plastic. The separated fluorescent powder may be reused in the production of new fluorescent tubes and low-energy bulbs.

Refrigerant and thermal insulation, which contain freon and are found in older refrigerators and freezers, need separate treatment. Refrigerating furniture which are no longer in use undergo treatment in two stages. In the first stage, the refrigerant is separated from the refrigeration circuit through vacuum suction. In the second stage, the refrigerating furniture is taken apart in a closed process in order to separate and treat the freon in the thermal insulation. And at last, metal and plastic materials are separated to be recovered as raw material for new products.

The new Directive for batteries means that batteries no longer can be landfilled, and therefore all types of batteries must be recycled. In this process, the batteries are first crushed, whereupon the metal casing and materials inside the batteries are safely separated. Mercury batteries are recycled in facilities specialized in mercury recycling. The separated materials are then either transported to smelting plants or sent back to the producers to be reused in the production of new batteries, for example cadmium and lead batteries.

Tons of recycled material



ENVIRONMENTAL CONTROL AND QUALITY CONTROL

WHITE GOODS

Material	kg/ton	2008
Iron	700	72,54%
Aluminum	200	20,73%
Copper	10	1,04%
Nickel	5	0,52%
Energy recovery	50	5,18%
Total	965	

VARIOUS ELECTRONICS

Material	kg/ton	2008
Iron	291	35,39%
Glass plate	270,9	32,90%
Plastic	80,0	9,71%
Copper	30	3,61%
Aluminum	29	3,49%
Silver	0,058	0,01%
Gold	0,0049	0,00%
Palladium	0,0023	0,00%
Energy recovery	123	14,90%
Total	823	

REFRIGERATORS AND FREEZERS

Material	kg/ton	2008
Iron	760	76%
Plastic	90	9%
Aluminum	20	2%
Copper	20	2%
Freon	9	1%
Energy recovery	90	9%
Total	989	

FLUORESCENT TUBES

Material	kg/ton	2008
Glass	850	85%
Aluminum	100	10%
Fluorescent powder	30	3%
Energy recovery	20	2%
Total	1000	

LOW-ENERGY BULBS

Material	kg/ton	2008
Glass	600	60%
Aluminum	200	20%
Fluorescent powder	50	5%
Energy recovery	150	15%
Total	1000	

The common collection system "Elretur" makes it easy for Swedish households and consumers to hand in their weee for collection. The simplicity and clear responsibility distribution of the Swedish system guarantee that recycling functions as required by law. It also contributes to ensure good service in the whole country. However, for the weee which falls outside the "Elretur" system, and weee which is not collected, there are no guarantees of environmental safe treatment.

In signing the Basle Convention, Sweden pledged not to export hazardous waste, including electronic waste, to developing countries. All weee collected within the "Elretur" system is recycled in Sweden, except from a small quantity of refrigerators and freezers which undergo treatment in Norway.

Swedish legislation as well as agreements between El-Kretsen and the recycling companies, particularly developed standards, and the code of conduct appended to all pretreatment agreements with El-Kretsen, regulate how pretreatment is carried out. Controls and follow-ups are made through audits at the facilities, but also through reports to El-Kretsen and the supervisory authorities. The control includes inspection of the treatment at the facility as well as of the downstream treatment. Reports to El-Kretsen should account for the treatment of the waste, whereto the different materials are transported, and how these materials are treated by the receiving facilities.

PARTNERS

Avfall Sverige, Swedish Waste Management, is the Swedish trade organization within the waste management and recycling sector. Local authorities and local authorities' associations are members, while private companies are associated members. In total, Avfall Sverige, has about 400 members. Avfall Sverige's primary task is to represent and develop their members by creating networks, to provide information, and to influence decision makers. Avfall Sverige's job is to look after the members' interests in waste management.

EI-Kretsen is the industry's service company, and was created in 2001 by the businesses in the sector for the purpose of collecting and recycling electronic products on the market. EI-Kretsen is a non-profit and ISO certified service company. EI-Kretsen's job is to help member undertakings – producers on the Swedish market – to assume the producer's responsibility. The companies which are members of EI-Kretsen are producers and/or importers of electrical and electronic equipment.

The Swedish Association of Local Authorities and Regions, SALAR, is the member organization of Sweden's 290 municipalities, 18 county councils and the regions Skåne and Västra Götaland. SALAR look after the interests of their members and offer them support and service. Their mission is to provide the municipalities and county councils with better conditions for local and regional self-government.

