NATUR VÅRDS VERKET

Plastic in Sweden – Facts about products and waste

Data from 2023

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NATURVÅRDSVERKET

This is a summary of the report
Kartläggning av plastflöden i Sverige 2023 –råvara, produkter och avfall
(Mapping Plastic Flows in Sweden – raw materials, products and waste),
which is available at: https://www.naturvardsverket.se/publikationer/7100/978-91-620-7191-2/

Detailed descriptions of methods, calculations and more information
about each mapped plastic flow is in the full report.

The full report was produced by Svenska MiljöEmissionsData (SMED)
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The SMED consortium was founded in 2001 to promote the long-term consolidation and development of Swedish expertise in environmental statistics. SMED is primarily commissioned to produce and develop environmental statistics by the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management. SMED's tasks include producing data and information, as well as different types of reports on environmental data.

More information is available on SMED's website www.smed.se.

Contents

Use plastics where they provide the most benefit

Plastics are of huge importance in contemporary society. We use plastics for almost everything in our everyday lives, and consumption is expected to increase. Because the properties of plastics can vary, they have many areas of use, from food packaging to medical products, toys and vehicle components.

Plastics are very beneficial, but our high levels of use lead to environmental impact throughout their lifecycle, from raw material extraction to waste treatment and the contamination of nature due to litter and the spread of microplastics.

The central element of plastics' environmental impact is their heavy dependence on fossil materials, as most plastic is produced from fossil oil and gas. Additionally, extraction and production processes require large amounts of power, often fossil in origin. Our high level of plastic consumption also leads to vast amounts of plastic waste, which is usually incinerated and the energy recovered. Waste incineration is responsible for around seven per cent of Swedish emissions of fossil carbon dioxide, which mostly comes from waste plastic.

Plastics are high on the agenda

Utilising the advantages of plastics while minimising their disadvantages is at the top of the agenda in Sweden, the EU and globally.

In Sweden, plastics is one of the prioritised streams highlighted in the strategy for a circular economy.[1] The national plastics coordination unit at the Swedish Environmental Protection Agency has produced an action plan for the use of sustainable plastics.[2] The Swedish government's action plan for plastics presents how work should be conducted to achieve a sustainable use of plastic.[3] The EU has chosen to highlight plastics as one of the seven prioritised product value chains in its action plan for a circular economy. In addition, negotiations are underway at the UN on a global agreement to combat plastic pollution, such as marine plastic pollution.[4]

Producers must take responsibility and increase circularity

Sweden and the EU have long had legislation on producer responsibility for some plastic products. This means that producers must report current volumes, as well as collecting and processing the products when they are no longer in use. Products that contain plastic and are covered by producer responsibility are packaging[5], PET bottles[6], vehicles[7] and electrical and electronic products[8]. There is a voluntary agreement for agricultural plastic.

To address the negative impact of plastics and contribute to more circular flows, additional legislation has recently been introduced or further developed in the EU. One requirement of the new Packaging and Packaging Waste Regulation (PPWR)[9] is that all plastic packaging that is sold must be recyclable. The law also prohibits unnecessary or excessively large packaging and places demands on the content of recycled plastic.

There is also a proposal that the updated Directive on End-of-Life Vehicles will require new vehicles to have some recycled plastic. To increase circularity, this plastic should come from the automotive sector. The Directive on Single-Use Plastics entails new producer responsibilities, prohibits various single-use plastic products and promotes reusable alternatives.[10]

Facts about plastics

There are lots of different types of plastic. Most common are polypropylene and polyethylene.

The four most common plastics

Type of plastic	Abbre-viation	Used in products such as:
Poly-propylene	PP	Food packaging, pipes, car parts, banknotes
Poly-ethylene, soft	PE or LDPE	Reusable bags, agricultural film, food packaging film
Poly-ethylene, hard	PE or HDPE	Toys, shampoo bottles, pipes, household products
Polyvinyl chloride	PVC	Window frames, profiles, flooring, pipes, cable insulation, garden hoses, inflatable pools

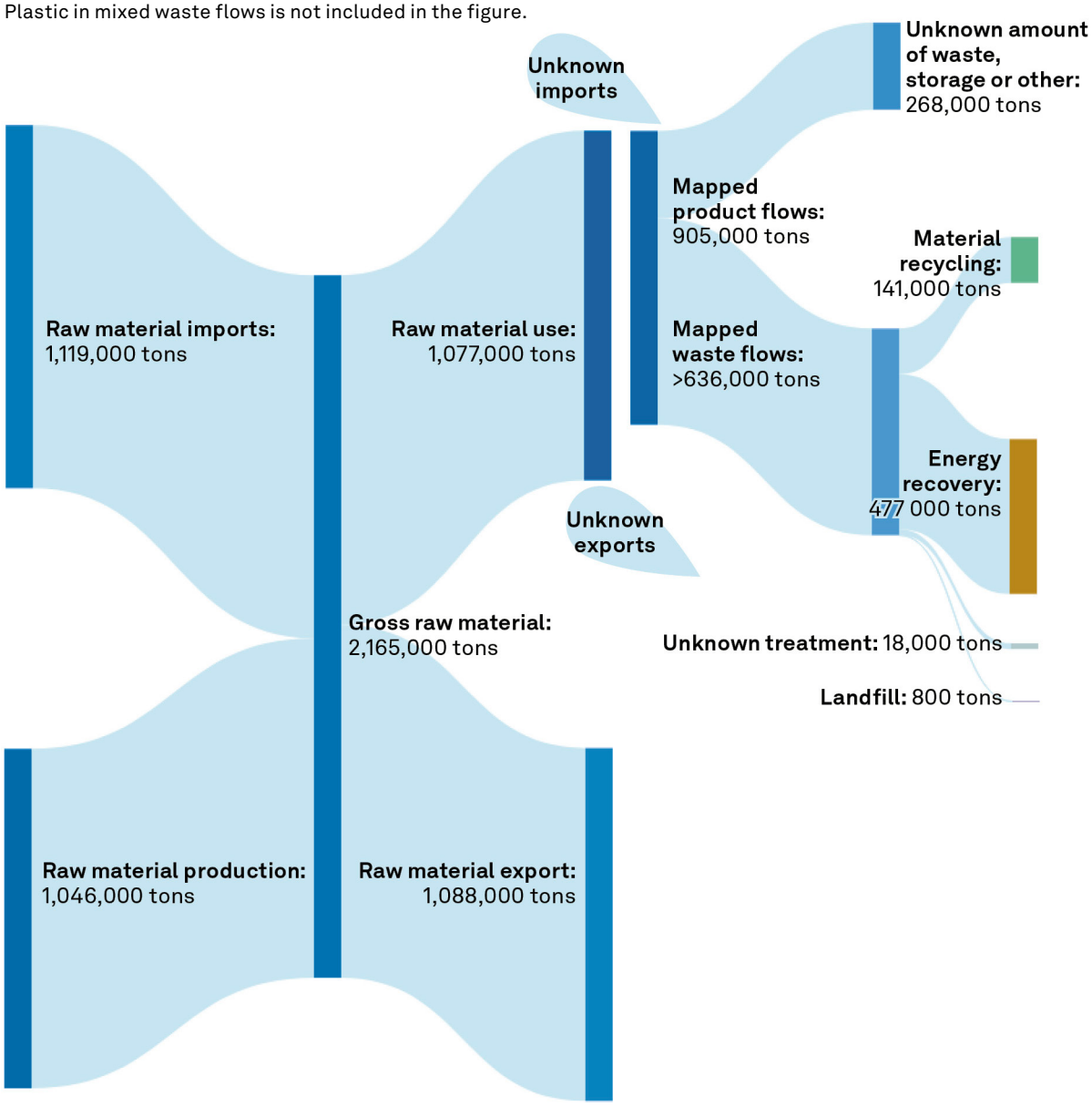
Other common plastics

Type of plastic	Abbre-viation	Used in products such as:
Polyurethane	PUR	Insulation, mattresses
Polyethylene terephthalate	PET	Drink bottles
Polystyrene	PS	Single-use items, glasses frames
Polystyrene, expanded	EPS	Insulation, takeaway food packaging

1. All footnotes refer to the references pages 28-29.

Overview of flows of plastic raw materials, plastic-containing products and waste in 2023.

Plastic in mixed waste flows is not included in the figure.



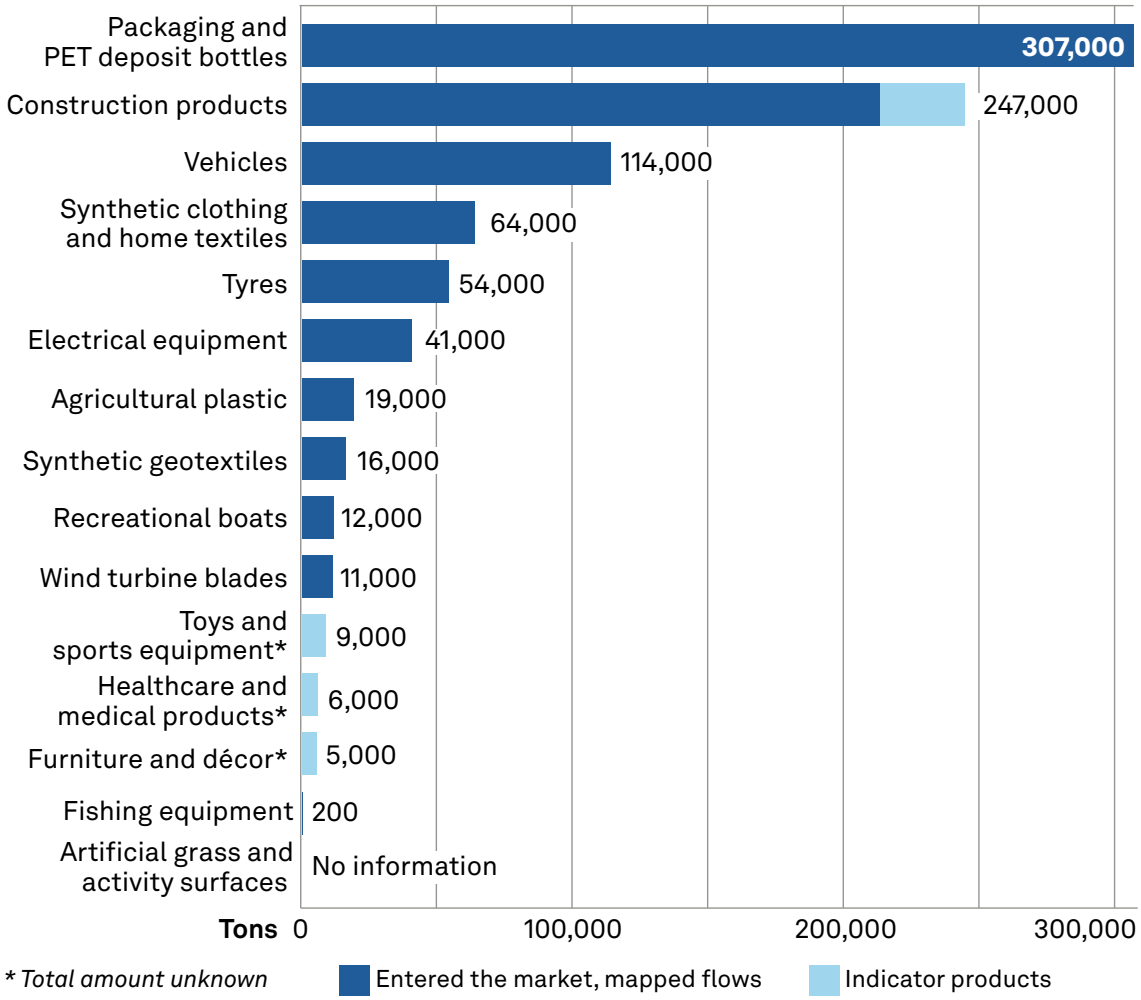
Plastics are used in many areas

In total, almost 1.1 million tons of plastic raw materials entered the Swedish market in 2023 (see diagram above). This is a decrease from 2020, when the corresponding figure was almost 1.3 million tons of plastic raw material. The biggest area of use is packaging, followed by the construction sector and vehicles and tyres. Many products that contain plastics are exported, while others are imported, so the amount of plastic raw materials is not the same as the amount of plastics in the products that enter the market in Sweden.

In 2023, the total amount of plastics used in the mapped product groups was around 905,000 tons. The graph below illustrates the amount of plastics that entered the market in different product groups in 2023 and how much of this amount was mapped. This is followed by a brief description of uses in the areas that were mapped, as well as how the work was conducted and comparisons with mapping from 2020.

However, estimating the amounts of products that enter the Swedish market, such as through private imports, is difficult, because they are often not registered with Swedish Customs. There are also large amounts of plastics in complex goods that are not captured by the survey. The amount of plastics in products that enter the market is thus often underestimated.

Plastics that entered the market in 2022/2023 (tons, rounded)



Packaging and PET deposit bottles: 307,000 tons

Packaging is the largest area of use for plastics. In 2023, 307,000 tons of plastic packaging and plastic deposit bottles entered the Swedish market, of which 30,000 tons were PET deposit bottles

The total amount of plastic packaging has been calculated using national statistics for producer responsibility and adjusted up using Swedish Waste Management's random sampling of municipal residual waste. The upward adjustment compensates for the underestimation in the statistics, which is partly due to not all companies fulfilling their producer responsibility. Another uncertainty is that packaging waste from private imports is rarely reported. In 2020, 220,000 tons of plastic packaging entered the market, excluding PET bottles. This amount is not adjusted and can be compared to the 236,000 tons (excluding PET bottles) reported in the national statistics for 2023.

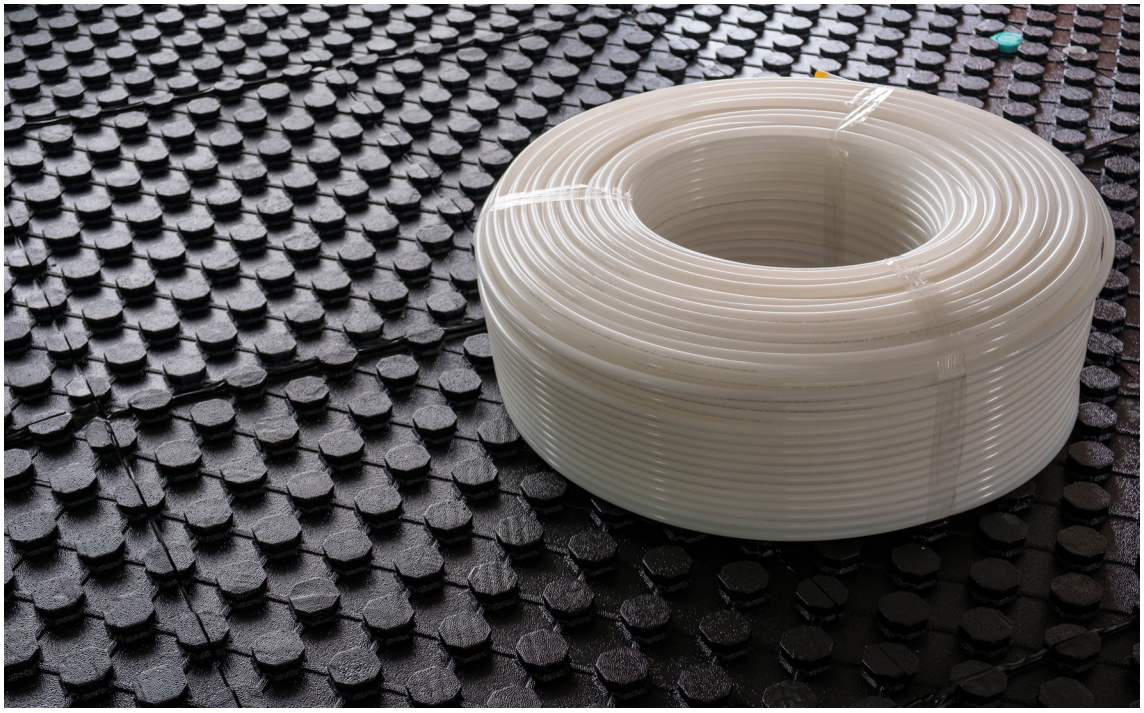
Businesses often use different types of packaging to households, like transport packaging in the form of shrink and stretch film, pallet covers, bulk bags, cans, drums, barrels and plastic straps. In 2023, there was a free market for the disposal of packaging waste generated by businesses, so they could hire a waste contractor of their choosing to collect packaging waste, which was then sold on a free market. FTI also provided reception points for commercial packaging, but in 2024 new legislation provided clearer regulations on how this should be collected. By 2026, there must be one collection point per municipality, and market-driven collection systems must register and report to the Swedish Environmental Protection Agency.

Sweden, like the EU, has a target that in 2025 at least 50 per cent of all plastic packaging, including PET deposit bottles, will be recycled for material. There is also a separate national target of 90 per cent recycling of PET deposit bottles. However, in 2023 only 154,000 tons of plastic packaging were collected for material recycling, of which 103,000 tons were recycled for material; 24,000 tons of the recycled waste was PET deposit bottles. This results in a recycling rate of 33 per cent for all plastic packaging and 80 per cent for PET deposit bottles (86 per ent in 2020).

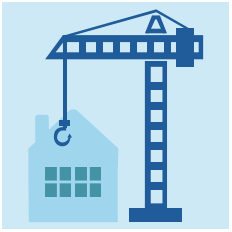
Instead of being sorted and recycled for material, large amounts of plastic packaging from households and businesses end up among residual waste. It is assumed that the final processing for all packaging waste that does not go to recycling, 204,000 tons in 2023, is incineration and energy recovery. This is because the quantities that go to landfill or are otherwise disposed of are considered negligible.

Plastic carrier bags

In 2023, 243 million plastic carrier bags entered the Swedish market, of which 171 million were thin bags. This is considerably fewer than 2020, when the number of plastic carrier bags was 1,091 million. It remains to be seen whether this will increase again after the tax on thin plastic carrier bags, which was introduced in 2020, was removed on 1 November 2024.



Construction products: Approximately 247,000 tons



Construction products are the second-largest area of plastics use among the mapped flows. Many plastics have properties that make them suitable for use in construction, as they are compact, light and relatively cheap, have high moisture resistance and good insulation properties. Construction products with plastics generally require little maintenance and have a long life, between 20 and 50 years.

The construction sector is estimated to account for about one fifth[11] of Sweden's plastics use, corresponding to around 247,000 tons. The estimate is based on the consumption of plastic raw materials at European level[12], which is assumed to reflect conditions in the Swedish market. In this survey, only the amount of plastics in selected product categories has been analysed in detail, including plastic flooring, door and window frames, tanks and bathroom products.

The amount of plastics in the selected product categories has been estimated at 26,000 tons, which cannot be compared to the 165,000 tons of plastics estimated in the 2020 survey, which used a different estimation methodology and partly included other product groups. The quantities in both cases are underestimated, as plastics are also used in construction products other than those that were mapped and often combined with other materials. The construction industry also uses large amounts of plastic packaging for its products (such as shrink and stretch film, bubble wrap, plastic straps and timber film). However, this is commercial packaging and is not reported separately here.

The various phases of building construction, remodelling and demolition generate three main categories of waste: construction waste, demolition waste and packaging waste. These have different potentials for reuse and recycling.

Plastic waste from new construction and remodelling often consists of clean streams of known quality and content, making them suitable for recycling. For some plastic products,

such as flooring and EPS insulation, there are schemes where manufacturers take back waste and use it when producing new products.

Demolition waste is generated during demolition and renovation. Due to the destructive methods usually employed in demolition, it is difficult to separate different materials from each other for recycling. Wear and tear, soiling and limited information about hazardous substances are other reasons why demolition waste is more difficult to recycle than construction waste.

Starting in 2020, plastics from construction and demolition waste must be sorted separately. Even if plastics are sorted separately at the construction site, recycling them can be challenging, as they first need to be separated into different grades, which adds costs.

Around 14.5 million tons of construction and demolition waste were generated in Sweden in 2023. This includes all types of waste, such as soil and rock, concrete, bricks, wood, metal, insulation, cables, plastics and mixed waste fractions. Fractions such as soil and rock, wood and metal may contain small amounts of plastics, while many mixed fractions have a high proportion of plastics. Random sampling[13] shows that the fractions 'mixed waste for incineration' and 'mixed waste for sorting' contain about 25 per cent plastics. The 'plastics' waste fraction, which is sorted at source on the construction site, contains only plastics; this fraction has good potential for material recycling.

The above mixed and sorted fractions generated 208,000 tons of plastics in 2023. The 'plastics' waste fraction amounted to 15,900 tons in 2023 and is thus a small proportion of the total plastic waste from the construction industry. However, 62 per cent of this flow – or almost 10,000 tons – went to material recycling.

Vehicles and tyres: 168,000 tons

An ordinary family car is around 16 per cent plastics[14], but the amount varies with the manufacturer and model. The corresponding proportion for heavy goods vehicles and buses is about 5 per cent and 10 per cent of kerb weight respectively (according to data from heavy vehicle manufacturers). The total amount of plastics in the cars, light and heavy goods vehicles, buses, mopeds, motorcycles and ATVs that were added to Sweden's traffic in 2023 is estimated at 114,000 tons (109,000 tons in 2020), obtained by multiplying the proportion of plastic by the kerb weight (taken from Transport Analysis' statistics). The increase is mainly because of more newly registered light and heavy goods vehicles in 2023.

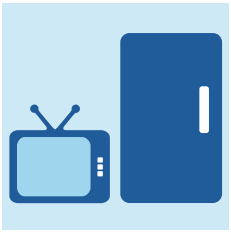
Rubber is a polymer, so is included in this summary. Car tyres contain about 43 per cent rubber and those on goods vehicles and buses about 47 per cent.[15] The amount of rubber in tyres that entered the market in 2023 (including tyres on new vehicles) is estimated to be about 54,200 tons. This is significantly more than the 31,000 tons in 2020, when tyres for heavy goods vehicles were not included. Statistics for imports, exports and domestic production of tyres were used for the calculation. A car tyre is assumed to weigh 10 kg and a goods vehicle tyre 59 kg, according to manufacturers' data.

Plastics in vehicles are of a high quality, but there are few incentives for reusing it or recycling it for material. Only a small amount from scrapped vehicles currently goes to material recycling, primarily bumpers and larger plastic fittings that are easily removed, while the rest is incinerated for energy recovery and a small amount goes to landfill. The

Bilretur network dismantled 15 tons of plastic fittings for material recycling in 2023. New EU legislation on end-of-life vehicles is likely to set tougher requirements on the content of recycled plastic in new vehicles, known as quota obligations.[17]

In 2023, almost 85,000 tons of car tyres were collected as part of producer responsibility for tyres and producer responsibility for vehicles. This is a decrease from 91,000 tons in 2020, mainly due to reduced tyre sales.[18] The majority, 71 per cent, went to incineration with energy recovery or as fuel in the cement industry, 27 per cent went to various types of material recycling and substitution, including 350 tons of whole tyres exported for reuse. Another 4 per cent were used as blast mats. Unlike 2020, no recycled material (granules) was used for artificial grass or fall protection. [19]

Electrical equipment: 41,000 tons



Electrical equipment is a broad category with many different product types, such as laptops, washing machines, vacuum cleaners and phones. Electrical equipment is covered by producer responsibility, with El-kretsen being the larger of two producer responsibility organisations in Sweden and, in practice, responsible for almost all collection of electrical equipment. The other is Recipo.

Based on how much electrical equipment of various types entered the market in 2022, the amount of plastics has been estimated at 40,500 tons, compared to 39,000 tons in 2020. The statistics come from Statistics Sweden's statistical database, which has not yet published the amount of electrical equipment that entered the market in 2023.

Uncertainties exist because different electronics products have different plastic contents, meaning that estimating the proportion that is plastics is difficult. For example, fridges and freezers are around 20 per cent plastic, while washing machines and tumble driers only contain about 3 per cent. In the absence of available data on plastic content, the estimate is based on El-Kretsen's information about the amount of plastics in the collected e-waste. This brings further uncertainties, because different types of electrical equipment have very different lifetimes, from around two years for mobile phones to 25 years for televisions. How long electrical equipment is used and kept in society, from purchase to disposal, thus varies greatly between products.

End-of-life electrical equipment from consumers that was collected separately in 2023 contained around 17,200 tons of plastics, based on data from El-kretsen. Another 1,200 tons of plastics were found in e-waste that was erroneously sorted as municipal residual waste. The amount of e-waste in residual waste is based on random sampling by Avfall Sverige; the proportion that is plastics comes from El-kretsen. For electrical equipment from professional use, the most recent available figures are from 2022, when collected waste contained around 830 tons of plastics. This can be compared to 2020, when waste collected from professionals and consumers contained around 23,000 tons of plastics.

Information about electrical equipment processing was retrieved from El-kretsen. Less than half (47 per cent) of the plastics in collected electrical equipment from consumers was recycled; 51 per cent was incinerated with energy recovery. The rest went to landfill, with a small amount destroyed by high-temperature incineration.[20] The proportion going to material recycling has fallen slightly since 2020, when more than 50 per cent of the plastic in collected electrical equipment was recycled and less than 40 per cent went to incineration with energy recovery.

Thermoset composite products: 23,000 tons

The survey has added together the total thermosets in wind turbine blades and recreational boats, as these products contain large amounts of thermoset composites.

Wind turbine blades usually contain fibreglass reinforced thermosets, but carbon fibre is also used. According to Svensk Vindenergi, 342 new wind turbines were commissioned in Sweden in 2023. Using data from a survey conducted by RISE for the Swedish Energy Agency, the amount of thermosets in the new turbines was estimated at around 3,900 tons.[21] Including fibreglass and carbon fibre provides the entire weight of the composite material, which corresponds to almost 11,200 tons. This can be compared to 2020, when 357 new turbines were installed and the amount of thermoset composites in these was estimated at 20,700 tons, with a further of 9,600 tons of other plastics in the wind turbines.

According to estimates from SweBoat, around 20,000 new recreational boats entered the market in 2023, 75 per cent of which are assumed to be plastic. A report from the Swedish Agency for Marine and Water Management[22] was used to estimate the amount of thermoset composite

per boat at 770 kg, which is almost 11,500 tons of thermoset composite in new boats in 2023.

Wind turbine blades are classified as construction waste. Today, less than 2,000 tons of composite waste comes from wind turbine blades in Sweden.[23] Compared to the estimated total amount of plastics in Swedish construction waste (120,000 tons in 2020[24] and 208,000 tons in 2023), wind turbine blades are currently a small stream, but this will increase over time as wind energy expands and more wind turbines reach the end of their working life. Because wind turbine blades are also made up of multiple, tightly bound materials, they are difficult to dismantle and recycle. Thermosets cannot be melted, so even the plastic itself is challenging to recycle.

In 2023, the Agency for Marine and Water Management mapped the amount of plastic waste from end-of-life recreational boats.[25] The plastic waste from now abandoned recreational boats, around 400,000 of them, is estimated to amount to 308,000 tons of fibreglass composite. Estimates are that 7,000-13,000 tons of composite from end-of-life recreational boats will be added annually from 2020 onwards.

Plastic boats are challenging to recycle, and only a small proportion of all end-of-life boats are sent for recycling. The SweBoat industry organisation, Stena Recycling and Båtskroten Sverige AB have built up a national take-back and recycling network, Båtretur, which has 37 centres. A total of around 700 boats were disposed of by Båtskroten in 2023, but there is no information on how many of these were plastic.

Agricultural plastic: 19,000 tons

Plastics have many functions in the agricultural sector, because they are relatively cheap, elastic, waterproof and durable. Around 19,000 tons of agricultural plastic entered the Swedish market in 2023, compared to 22,000 tons in 2020.[26] The majority, around 70 per cent, was silage film in LLDPE that was used to preserve (silage) and protect feed.

Under the voluntary industry agreement for agricultural plastics, 14,600 tons were collected in 2023 (almost 14,000 tons in 2020). Used agricultural plastics are often heavily contaminated with soil, stones and gravel. Around 10,000 tons (68 per cent) of these plastics were material recycled, compared to 75 per cent in 2020. The rest went to energy recovery.

Toys and sports equipment: Over 9,000 tons

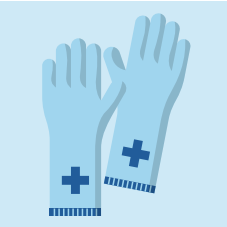
The amount of plastics in toys and sports equipment that entered the Swedish market in 2023 has been analysed using data from Statistics Sweden's statistical database: industrial production of goods[27], and foreign trade in goods.[28] Product types assumed to contain a lot of plastic were selected, which makes the figures an underestimate. The mapped products include dolls, building blocks, skis and different kinds of balls. Based on this sample, around 7,100 tons of plastics in toys and 2,100 tons of plastics in sports equipment entered the market in Sweden in 2023. This can be compared to the 4,200 tons of plastics in toys and 3,000 tons of plastics in sports equipment that were estimated for 2019.

When toys and sports equipment are disposed of, they usually end up among municipal residual waste and are incinerated with energy recovery.

Medical plastics (in healthcare regions): Over 6,000 tons

Healthcare uses large amounts of single-use plastics, from cups to surgical equipment, gloves, aprons and nappies, etc.

This survey maps seven selected product groups that are used in large quantities and contain a lot of plastic. These 'indicator products' are:



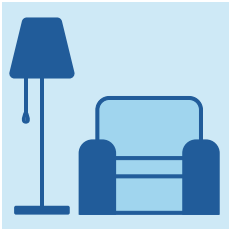
- Gloves
- Aprons
- Syringes
- Nappies, mattress protectors, incontinence products
- Medicine cups, mugs (with lids)
- Hazardous waste containers in plastic
- Protective non-woven clothing (single use)

Purchasing data was collected from the three largest regions and adjusted up to national level based on population. In total, the regions' estimated use of the products amounted to at least 5,700 tons in 2023, of which almost 3,500 tons is gloves and aprons. For 2020, just under 4,000 tons of gloves and aprons were mapped.

Because single-use products are what are primarily used, the amount of waste plastics is assumed to be the same as the amount of plastics that enter the healthcare market. Waste is mainly managed through energy recovery, but there are examples of successful recycling projects for medical plastics.

As plastics are also used in private and municipal healthcare and are found in many more healthcare products, this survey only includes a subset of the sector's total plastics use.

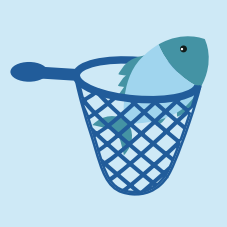
Furniture and décor: Over 5,000 tons



In 2019, at least 5,200 tons of plastic in furniture and décor entered the market in Sweden. Amounts are based on Statistics Sweden's statistics for two product groups, mattresses and plastic furniture, which consist solely of plastic. Similar amounts were reported for 2020, when 5,000 tons of plastic-only furniture were mapped. Both quantities are underestimated and be regarded as the minimum possible. The amount of plastics in mixed-material furniture is thus unknown.

Furniture can be used for many years before becoming waste, and there is little information about how much furniture is disposed of each year. Further uncertainties about the amount of plastics in various furnishings and waste management for furniture and décor mean that quantification of the amount of plastic waste and type of waste treatment has not been possible.

Fishing equipment: 200 tons



In 2023, just under 200 tons of plastics in fishing equipment entered the market, according to statistics from the Swedish Environmental Protection Agency and assumptions about plastic content based on the composition of waste fishing equipment. In 2020, the corresponding estimate was 100 tons.

Data about plastic waste from fishing equipment was collected from

Sweden's only maritime recycling centre in Sotenäs. They processed at least 100 tons of plastic waste from fishing equipment in 2023, of which at least 30 tons went to material recycling and at least 70 tons were sent for energy recovery. In 2020, 40 tons of these plastics were sent to material recycling.

The total amount of end-of-life fishing equipment in 2023 could not be estimated. In line with the EU's Port State Control Directive, professional fishers must be able to deposit discarded fishing equipment free of charge at ports in Sweden, but how much is collected is unknown. Additionally, consumers may have disposed of old equipment in municipal residual waste or at municipal recycling centres. According to the producer responsibility regulation for fishing equipment, equipment that contains plastic must be collected separately from 1 January 2025, which will improve access to reliable data.

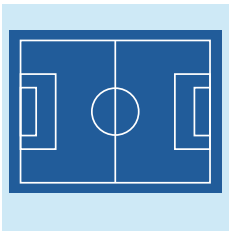
Single-use mugs and lunch boxes: 13,000–79,000 tons (partly included in packaging)

Takeaway packaging is a type that often contributes to littering. The directive on single-use plastics therefore states that mugs and food containers are two products whose use must measurably decline over the next few years. Sweden's goal is to reduce consumption by 50 per cent between 2022 and 2026.

Based on data from the Environmental Protection Agency and SMED, 1,300 to 16,400 tons of plastic entered the market in 2023 as single-use mugs including lids, with 11,300 to 62,300 tons of plastic in disposable food boxes. These quantities refer to products made entirely or partly of plastic and can be compared to the 60 to 160 tons of plastic in mugs and lids that was estimated for 2020. The figures are very uncertain, and it is more important to track the number of mugs and boxes, as the reduction target refers to how many products are used.

Estimating the amount of single-use mugs and lunch boxes that became waste in 2023 has not been possible. Like other single-use products, these end up in different waste fractions, such as municipal residual waste and the separate collection system for packaging. Some mugs and boxes are also left as litter in the outdoors.

Artificial grass and activity surfaces: No information



In 2024, there were an estimated 1,400 artificial grass pitches in Sweden, equivalent to around 10 million square metres, with new ones being built every year. More than half of the pitches are filled with granules, usually from recycled tyres. Many equestrian centres use a mixture of sand and polyester fibre, polypropylene fibre and other synthetic fibres, known as fibre sand, or rubber from end-of-life car tyres to provide good traction. The ban on plastic granules for artificial grass pitches that will come into force in the EU in 2031 will probably influence which filler materials are used in the future. The legislation aims to reduce the spread of microplastics.[29]

There are many playgrounds and sports facilities with moulded rubber; the estimated total area was around 1,200,000 square metres in 2020. Of these, around 550,000 square metres were in playgrounds with around 650,000 square metres in sports facilities.[30]

Although it is possible to estimate the total surface area of artificial grass pitches and other

activity surfaces, quantifying how much plastic and rubber they contain is difficult. Waste management for these different surfaces also varies greatly, as well as between different municipalities. End-of-life artificial grass pitches can often be fully or partially recycled, while the most common treatment for end-of-life activity surfaces is energy recovery. Mapping quantities was not possible for waste amounts or waste management.

Synthetic textiles: 63,000–97,000 tons

As a large and growing share of the global textile fibre market consists of fossil-based synthetic fibres such as PET (polyester) and PA6 (polyamide/nylon), this mapping now includes synthetic textiles. The included flows are clothing, home textiles and geotextiles, although synthetic textiles are also used in other areas such as automotive, agriculture and healthcare.

The amount of clothing and home textiles that entered the market in 2023 is based on the Swedish Environmental Protection Agency's annual statistics, multiplied by a range between 34 per cent and 67 per cent for the share of synthetic textiles. This range represents the assumptions of different research reports and equals 46,900 to 80,600 tons of synthetic textiles entering the market as clothing or home textiles in 2023.

Geosynthetics consist almost exclusively of synthetic textiles, mainly PP (polypropylene). The amount of geosynthetics that entered the Swedish market has been mapped by Ramboll and amounted to 15,900 tons in 2021.[31]

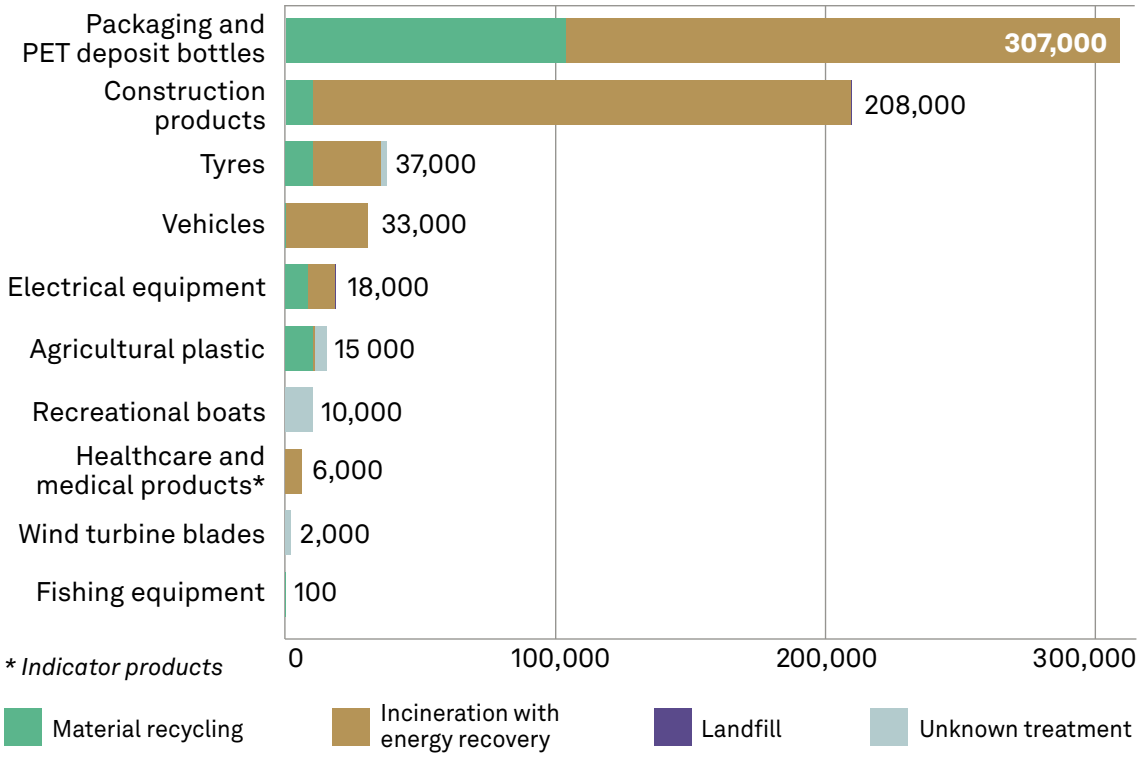
Due to a lack of statistics, no estimates have been made of waste quantities or waste management. The availability of data on textile flows is likely to significantly improve, as the separate collection of textile waste was introduced across the EU in 2025 and producer responsibility for textiles is expected within a few years.

Plastic consumption generates huge amounts of waste

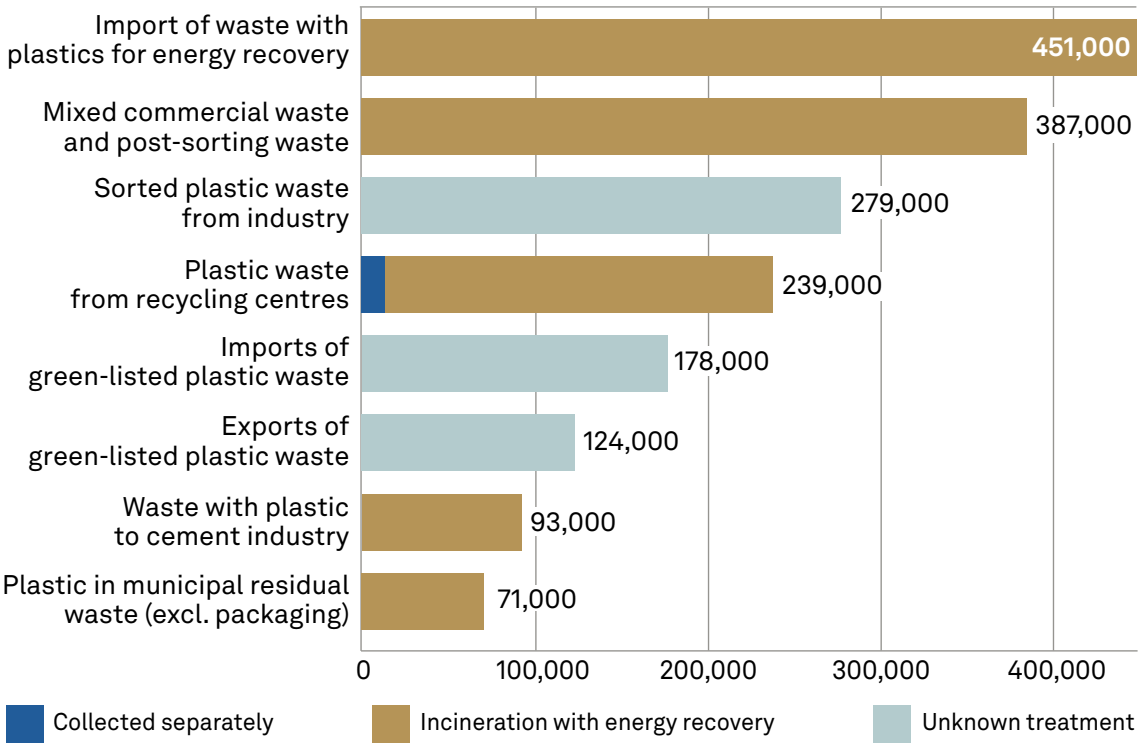
Plastic consumption leads to huge amounts of waste. This can either be sorted and separated for material recycling, or end up as mixed fractions which, after varying degrees of pre-processing, go to material recycling, incineration with energy recovery, or landfill.

However, not all material from the sorted plastic waste is recycled to make new products. If it does not fulfil requirements for cleanliness, for example, it is removed during pre-processing and goes to another type of waste treatment, usually incineration with energy recovery. Some plastic waste is exported for post-processing and recycling.

Plastic waste per product category, divided by waste treatment (tons, rounded)



Plastic in mixed waste flows, divided by waste treatment (tons, rounded)



Plastics in commercial and post-sorting waste

Plastic waste from businesses is found in sorted plastic waste and in mixed waste with other materials. Much of the mixed waste is processed through incineration with energy recovery, either as 'direct delivered waste' or 'post-sorting waste' after the waste has first undergone a sorting process where fractions such as recyclable material are sorted out.

Because mixed commercial waste can vary hugely, there has been little information about this stream, for example on the proportion of plastics. In a recently concluded project, SMED performed 166 random samples on the two fractions of direct delivered waste and post-sorting waste, improving knowledge of their content. Samples were taken from deliveries to 11 Swedish waste incinerators.[32]

Based on the results of the random sampling, the plastic and rubber content of the waste from included facilities could be calculated. The project also mapped total amounts of directly delivered waste and post-sorting waste treated at Swedish waste incineration plants in 2023. The estimated proportions for plastic and rubber refer to the eleven facilities included in the project. Altogether, these facilities treated 57 per cent of all directly delivered waste and post-sorting waste treated at Swedish waste incinerators in 2023.

The total amount of plastics and rubber could be estimated by assuming that the commercial waste treated at the other facilities had the same average composition as that sampled. In total, Swedish directly delivered waste and post-sorting waste contained around 387,000 tons of plastic and rubber, broken down as shown in the table below.

That the proportion of plastics in mixed commercial waste is around 24 per cent and corresponds to previous estimates of between 20 per cent and 30 per cent. The total amount of plastics and rubber is also similar to the range estimated for 2020: 270,000 to 600,000 tons. A large proportion of plastics, as much as 39 per cent, is plastic packaging, which should really be sorted for recycling under producer responsibility. There is great potential for increased recycling here.

Swedish commercial waste sent to incineration with energy recovery in 2023, proportion that was plastics and the amount of plastics in commercial waste that went to incineration with energy recovery in 2023.

Waste fraction	To energy recovery	Proportion of plastics	Proportion of rubber	Amount of plastics	Amount of rubber	Amount of plastics and rubber
Directly delivered waste	448,000 tons	23.7 per cent	1.2 per cent	106,000 tons	5,400 tons	111,000 tons
Of which plastic packaging	–	–	*10.2 per cent*	–	*45,700 tons*	–
Post-sorting waste	1,102,000 tons	23.9 per cent	1.1 per cent	263,000 tons	12,100 tons	276,000 tons
Of which plastic packaging	–	–	*8.9 per cent*	–	*98,000 tons*	–
Total	**1,550,000 ton**	**–**	**–**	**369,000 tons**	**17,500 tons**	**387,000 tons**

Facts about plastic waste 2023

Most plastic waste was generated in these product groups:

- Plastic packaging, including PET deposit bottles: 307,000 tons (2020: 320,000 tons).
- Construction products: 208,000 tons (2020: 120,000 tons, although a different calculation method was used).
- Vehicles and tyres: 69,000 tons (2020: 94,000 tons, although a different calculation method was used).

Plastics in other waste streams that cannot be attributed to specific product groups, estimated maximum quantities:

- Mixed commercial waste and post-sorting waste: 387,000 tons of plastic and rubber (2020: 270,000 to 600,000 tons).
- Sorted plastic waste from industry: 279,000 tons (2020: 240,000 tons).
- •Plastics in mixed waste, excl. packaging: 62,000 to 80,000 tons (2020: 83,000 tons).

Municipal mixed waste contained over 297,000 tons of plastics, including plastic packaging and other plastic products. (2020: 280,000 tons).

Incineration with energy recovery is the most common form of treatment for plastic waste in Sweden.

- In 2023, more than 1.2 million tons of plastics went to energy recovery at Swedish incinerators (2020: 1.1 million tons).
- Around 93,000 tons of plastic and rubber waste was used as fuel in the Swedish cement industry.
- In addition, 451,000 tons of plastics in imported waste were incinerated at Swedish incinerators.

Material recycling: Almost 141,000 tons of plastic waste went to material recycling in 2023, equivalent to about 13 per cent of the plastic that entered the market (2020: 10 per cent) or 8 per cent of the mapped plastic waste.

The largest amount of material recycled plastic was from packaging, PET bottles, tyres, electrical equipment and agricultural plastic.

Landfill: The amount of plastic waste that went to landfill in 2023 could not be quantified. Waste that contains plastic must be exempted from the landfill prohibition if it is to be used as landfill in Sweden.

Illustration of circular and sustainable consumption. (Illustration: Studio Flygar)

Towards more circular and resource-efficient plastic flows

Plastics are found in everything from single-use products to complex products that remain in use for a long time. This means that different types of plastic flows have completely different prerequisites for circularity. Compared to many other materials, plastics are cheap, which reduces financial incentives for circularity. However, an increasing number of business models and policy instruments are attempting to help movement towards a more circular society.

The concept of circularity includes activities that help keep materials and products in use for longer before they become waste, such as design for longevity, upgrading and repair, reuse, renting, borrowing and high-value recycling such as remaking (see figure above).

One circular business model that is growing in Sweden is the second-hand market. In 2024, this market's turnover was almost SEK 17 billion, and Svensk Handel predicts that this figure will be SEK 50 billion in 2034. To monitor market developments, a monthly 'pre-loved indicator' has been introduced. Fashion is the most common category for consumers to buy second-hand (4.7 billion), followed by electronics (4.3 billion). Furniture and home décor (2.6 billion) is in third place.[33]

EU legislation is pushing for circularity

ESPR (Ecodesign for Sustainable Products Regulation)

If products are to be repaired, updated and reused, they must be designed for this from the start. This is where the ESPR's ecodesign requirements will come into play. Each product category will have specific design rules that regulate factors such as energy consumption, life expectancy, reparability and upgradability of products, content of recycled materials or hazardous substances.

At least eight of the eleven proposed priority product groups contain plastics:

- **Textiles and footwear**
- **Furniture**
- **Tyres**
- **Mattresses**
- Laundry detergent
- **Paints and varnishes**
- Lubricants
- Cosmetics
- **Toys**
- **Fishing equipment**
- **Absorbent hygiene products**

The first work plan for the ESPR (2025-2030) was published on 16 April 2025 and covers the product categories for textiles/clothing, furniture, tyres, electrical equipment and mattresses, as well as the intermediate products of iron, steel and aluminium. The plan also includes requirements for reparability and recycled content.[34]

The ESPR also contains requirements for unsold goods; companies that destroy unsold consumer products must provide annual information about this on their website.

PPWR (Packaging and Packaging Waste Regulation)

The new packaging regulation, the PPWR, entered into force on 11 February 2025 and will be implemented from August 2026.[35] The legislation entails new requirements for those who put packaging on the market. The overall objectives are to prevent packaging waste, especially plastic waste, and create more circular packaging flows.

Some of the provisions of the PPWR are:

- Binding requirements on the share of reusable packaging by 2030 and recognition of customers rights to bring their own packaging for takeaway food and drinks.
- The amount of packaging that enters the market must reduce by 5 per cent by 2030, 10 per cent by 2035 and 15 per cent by 2040.
- Empty space in grouped packaging, transport packaging and e-commerce packaging must not exceed 50 per cent. Packaging weight and volume must also be minimised.
- Certain types of single-use plastic packaging are prohibited, such as for non-processed fruit and vegetables, single-use portions, shampoo and 'hotel packaging'.

From 2030, plastic packaging will be required to contain a certain percentage of recycled material and must be recyclable according to specific criteria.

Barriers to increased plastic recycling

Only a small proportion of plastics now goes to material recycling. Instead, the majority goes to energy recovery through incineration. Some barriers to increased material recycling for plastics are:

- **Poor sorting**
  Lack of space, but also a lack of interest, make sorting plastics difficult. Poorly sorted plastics end up in mixed waste and go to incineration with energy recovery instead of material recycling.
- **Badly designed products**
  Plastics are often found in complex products. They may also be attached to other materials and contain additives that hinder material recycling.
- **Poor match between supply and demand**
  Currently, large volumes of plastics are sold on global commodity exchanges, while individual companies have specific requirements for the plastics included in their products. The result is that it is difficult to find the correct quality for each use.
- **Uncertainty about content**
  A lack of knowledge about plastic waste's origin and content, such as potentially hazardous substances, means that it is sent to incineration with energy recovery rather than material recycling.

Good examples lead the way

To overcome barriers, actors in the entire plastics value chain often have to join forces to work towards common goals. One example of a cross-industry initiative is the *Handlingsplan för att minska plast till förbränning* (Action plan for reducing plastics sent for incineration), which lists measures for different actors and plastic flows.[36]

The City of Stockholm developed an action plan for sustainable plastic use in 2022, with 14 actions to be implemented by 2026 in procurement, use, waste and communication.[37]

Sweden's plastics coordination unit also collects good examples of sustainable plastic use on its website in the form of 'snowballs',[38] where different actors can share their examples and be inspired by others.

Facts about recycling

MATERIAL RECYCLING

Material recycling means that waste is treated so it can be used in new products with similar or new areas of use.

The process of recycling plastics has several stages (e.g. collection, pre-sorting, coarse shredding, automated sorting, washing, grinding and granulation). Which stages are required depends on the type of plastic waste being recycled and the recycling technology that is necessary. Material is lost during most stages, so how much of the material ends up in new products will vary.

MECHANICAL RECYCLING

Mechanical recycling is the most common technique used for recycling plastics. This involves melting the plastic and transforming it into a new product. A plastic's quality can deteriorate when it is melted, so it may be used for less demanding applications. Mechanical recycling is less energy intensive than chemical recycling.

CHEMICAL RECYCLING

Chemical recycling means that the plastic is broken down into smaller molecules, which can then be used for making new products. Various techniques are used for chemical recycling, such as pyrolysis, solvolysis and gasification.

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Plastic in Sweden

A summary of the report *Kartläggning av plastflöden i Sverige* (Mapping Plastic Flows in Sweden)

Using plastics where they do the most good requires making well-informed decisions. In turn, this demands knowledge about current circumstances: how plastics are used, how much plastic waste is generated, how this waste is treated, and information about the most significant sources of plastics and the ways they spread through the environment.

This mapping report of plastics in Sweden aims to provide such a snapshot for 2023. In some cases there is no data for 2023, so information from previous years has been used instead.

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