NATUR VÅRDS VERKET

PLASTIC IN SWEDEN

FACTS AND PRACTICAL ADVICE

A short version of *Kartläggning av plastflöden i Sverige (Mapping Plastic Flows in Sweden)*

This is a summary of the report *Kartläggning av plastflöden i Sverige* (SMED report no. 2019:01) which is available here (in Swedish): https://www.naturvardsverket.se/Miljoarbete-i-samhallet/Miljoarbete-i-Sverige/Uppdelat-efter-omrade/Plast/Plastfloden-i-Sverige/

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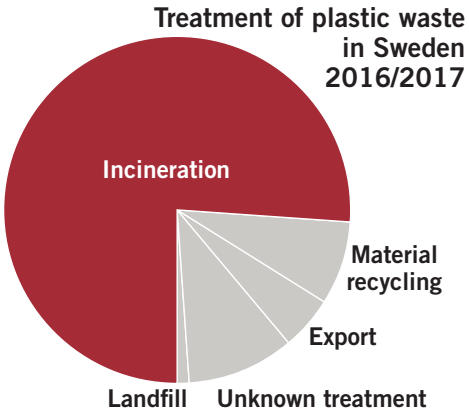
SMED is the abbreviation for Svenska MiljöEmissionsData (Swedish Environmental Emissions Data), which is a cooperation between IVL Swedish Environmental Research Institute, Statistics Sweden, the Swedish University of Agricultural Sciences and the Swedish Meteorological and Hydrological Institute. The SMED cooperation was founded in 2001, to bring together and promote the long-term development of Swedish expertise in emissions statistics related to work on a range of measures. This was a response to the Swedish Environmental Agency's need for expert support in Sweden's international reporting on emissions to air and water, waste and hazardous substances. The SMED cooperation primarily aims to develop and promote national emissions databases, and to provide associated services for national, regional and local authorities, organisations for clean air and water, businesses and other bodies.
More information is available on SMED's website: www.smed.se.

PLASTIC VOLUMES ARE INCREASING

Plastic is everywhere, all around us. Plastic consumption is increasing steadily, and so is the amount of plastic waste. Some plastic is stored in products with a long life, such as vehicles, buildings and infrastructure, while disposable plastic products rapidly become waste.

MOST PLASTIC WASTE IS INCINERATED

Most plastic waste is currently disposed of in mixed waste. This is incinerated in plants that produce heat and power, resulting in significant emissions of greenhouse gases. Almost all plastics are manufactured from fossil-based raw materials.



A tiny proportion of plastics undergo material recycling, and there is great potential for improved sorting and recycling in the future. Many more plastic products also need to be designed in a way that allows the material to be recycled.

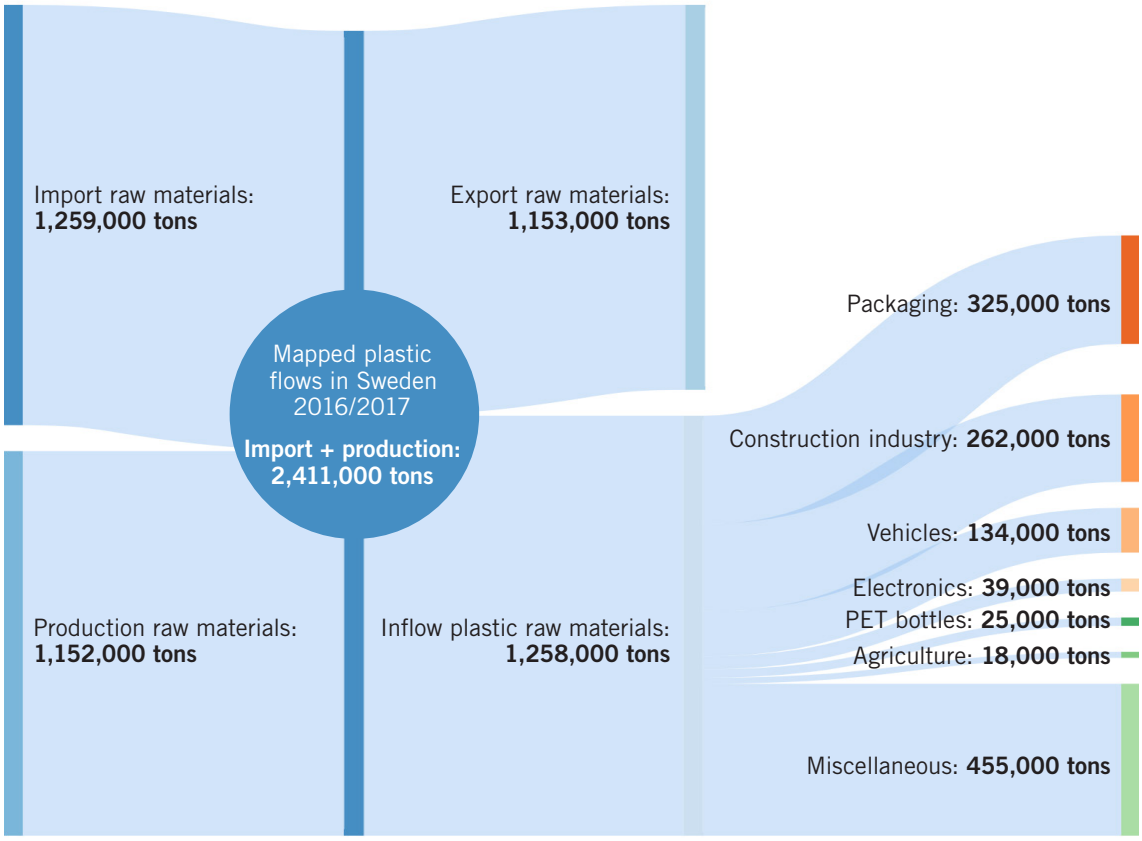
This summary presents what we now know about plastic in Sweden. It is part of a mapping of plastic flows that has been conducted at the request of the Swedish Environmental Protection Agency.

GLOBAL PROGRESS

In recent years, the problem of plastic litter has received a great deal of attention, both locally and globally:

- New EU legislation prohibits or places new restrictions on a range of disposable plastic items from July 2021.
- Several Asian countries have imposed import restrictions on mixed plastic waste and other mixed waste. This has led to new actors becoming established in plastic sorting and recycling, both in Sweden and the rest of Europe.
- The rules for global trade in plastic waste are being reviewed under the Basel Convention.
- Numerous pieces of European waste legislation are being updated and will place tougher demands on plastic recycling, such as how to report the level of recycling as regards producer responsibility for packaging.
- To better match the supply and demand of recycled plastic, a new, Swedish-led ISO secretariat is working on the development of quality standards for recycled plastic.

HOW MUCH PLASTIC DO WE USE?



In 2016, 1,258,000 tons of plastic raw materials entered the Swedish market. This is equivalent to around 130 kg per person – about the same as the combined weight of two average Swedish women.

This amount comes from adding imported plastic raw materials to domestic production and then subtracting Sweden's exports of plastic raw materials. Detailed figures are presented in the above diagram.

Most raw materials that are manufactured in Sweden are exported. At the same time, significant volumes of plastic raw materials are imported.

Two companies that are major Swedish producers of plastic raw materials are Borealis and Inovyn in Stenungsund. The exported raw materials can be used in power cable insulation, pipe manufacturing, the automotive industry and medical and electronic products.








WHAT IS PLASTIC USED FOR?

There are many different types of plastic. The most common ones in Europe are polypropylene and polyethene.

THE FOUR MOST COMMON TYPES OF PLASTIC

Type of plastic	Abbreviation	Share in Europe	Example products
Polypropylene	PP	19.3 per cent	Food packaging, pipes, vehicles parts, banknotes
Polyethylene, low density	PE or LDPE	17.5 per cent	Reusable bags, agricultural film, food packaging film
Polyethylene, high density	PE or HDPE	12.3 per cent	Toys, shampoo bottles, pipes, household products
Polyvinyl chloride	PVC	10 per cent	Window frames, profiles, flooring, pipes, cable insulation, garden hoses, inflatable pools

OTHER TYPES OF PLASTIC MENTIONED IN THIS REPORT

Type of plastic	Abbreviation	Example products
Polyurethane	PUR	Insulation, mattresses
Polyethylene terephthalate	PET	Drink bottles
Polystyrene	PS	Disposable items, glasses frames
Polystyrene, expanded	EPS	Insulation, takeaway food containers

PRODUCERS MUST TAKE RESPONSIBILITY

In Sweden, producers have a legislated responsibility for a number of products made from plastic. This means that producers must report current volumes, as well as collecting and managing the products when they are no longer in use.

One aim is to encourage the development of products that use fewer resources, in which it is easier to recycle the plastic and which also, wherever possible, are free of substances that are harmful to the environment.

Products that contain plastic and which are covered by producer responsibility are packaging, PET bottles, vehicles and electrical and electronic products. There is a voluntary agreement for agricultural plastic.

PACKAGING: **325,000 TONS**

Statistics from the Swedish Environmental Protection Agency state that 215,600 tons of plastic packaging (excluding PET bottles) entered the Swedish market in 2017.

However, this volume of plastic packaging is an underestimate, partly because not all companies take their producer responsibility. Another uncertainty is because packaging waste from distance sales and private imports are rarely reported. This means that the exact volume is unknown, so the official statistics are not entirely correct.

If unsorted plastic packaging is combined with plastic packaging disposed of in normal household waste and bulky household waste, the volume is estimated to be around 325,000 tons.

There are no exact figures on the volumes for each type of plastic. Pick analyses by FTI (a packaging and newspaper collection company) indicate that there are four dominant types of plastic:

- Low-density polyethylene: 36 per cent
- Polypropylene: 22 per cent
- PET: 17 per cent
- High-density polyethylene: 16 per cent

PET BOTTLES: **25,000 TONS**

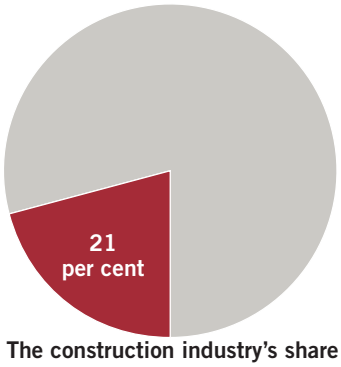
In 2017, 25,000 tons of redeemable PET bottles entered the Swedish market.

CONSTRUCTION INDUSTRY: **262,000 TONS**

The total volume of plastic that is used every year in the construction industry is estimated at 262,000 tons.

Plastic has many areas of use in construction; it can be used to protect buildings from moisture from the outside and from moisture created by indoor activities. Another function is insulation, to save energy.

Plastic is also used as a building material because it is cheap and has a long life, 30 to 50 years. Its use has increased significantly since the latter half of the 20th century. The construction industry is now responsible for about 21 per cent of plastic consumption in Sweden.



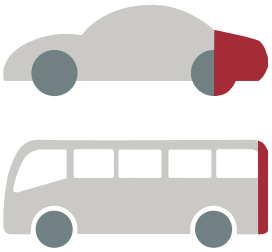
The construction industry's share of Sweden's plastic consumption

Plastic is found in a range of building materials, such as flooring, wall coverings, poly sheeting for roofs, different kinds of membranes, insulation, pipes, windows and cables.

There are differences in the plastic in waste from newbuilds and from demolition. Plastic waste from newbuilds is often more homogenous and can be relatively easy to recycle. It could be packing plastic that is low-density polyethylene, polystyrene insulation or leftover piping in polyethylene, polypropylene or PVC.

Plastic waste from demolition contains older PVC in the form of pipes, cables, profiles and plastic flooring. This plastic may contain prohibited levels of hazardous substances and usually ends up among mixed waste fractions, so it is generally incinerated and the energy recovered.

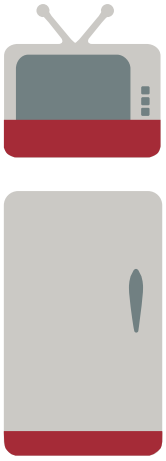
VEHICLES: **134,000 TONS**



In 2017, 442,200 vehicles were registered for the first time in Sweden. Assuming that each new car contains 300 kg of plastic and each new truck or bus 500 kg, the result is an additional 134,000 tons of plastic in vehicles in 2017.

Polypropylene is the most common plastic in vehicles, and numerous other types are also used. These plastics are often combined with fillers and other additives, such as flame retardants. Glass fibre and talc are common fillers that make plastic difficult to recycle.

ELECTRONICS: **39,000 TONS**



In 2017, 259,000 tons of new electronics entered the Swedish market.

Different electronics products have different plastic contents; it is difficult to estimate the proportion that is plastic.

For example, a new television is around 33 per cent plastic, while new fridges and freezers contain around 9 per cent. If the assumption is that 15 per cent of the total weight of all electronics is plastic, the amount of additional plastic in 2017 was about 39,000 tons.

AGRICULTURE: **18,000 TONS**

Agricultural plastic includes bale wraps, cultivation films, sacks and containers. In 2017, 18,800 tons of agricultural plastic entered the market.

HEALTHCARE: **UNKNOWN QUANTITY**

A great deal of plastic is used in healthcare, both as packaging and other single-use plastics, but it is hard to quantify the total weight.

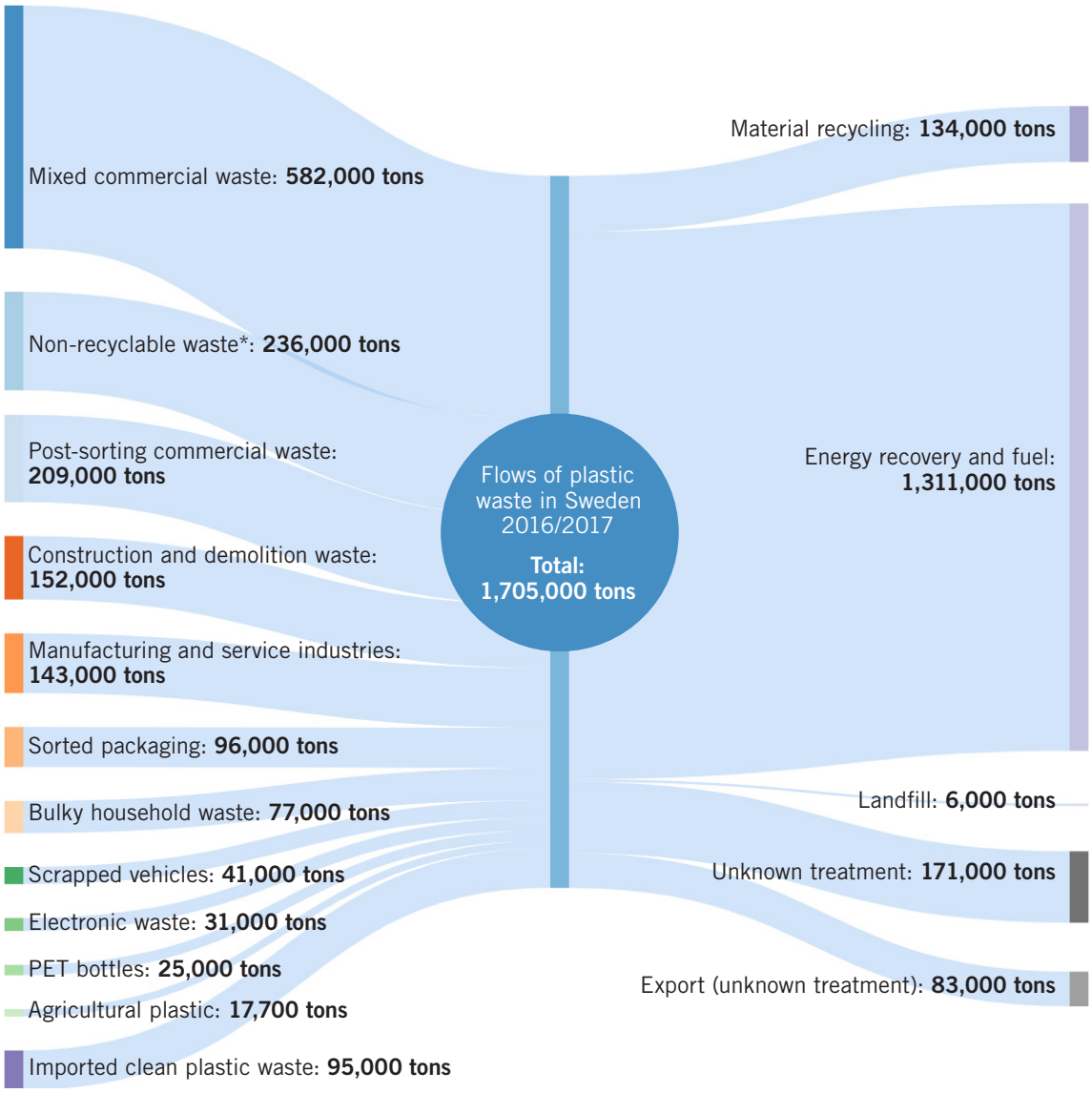
Disposable gloves and other plastic products have been estimated at 813 million items annually, of which gloves are the most common and weigh at least 2,100 tons. Previous studies have estimated the weight of blood bags and disposable aprons to be 80 tons and 1,900 tons respectively.

Gloves and blood bags are not recycled due to the risk of infection. There is great potential for recycling products made from pure polyethylene and polypropylene and which are not in contact with patients, if they can be sorted into flows that are large enough and clean enough.

MISCELLANEOUS: **455,000 TONS**

One large flow is made up of miscellaneous plastic products, such as toys, furniture, and medical, household and sporting goods. These have not been quantified in detail.

PLASTIC WASTE – WHERE FROM AND WHERE TO?



* Non-recyclable waste from households and businesses, collected via municipal waste collection.

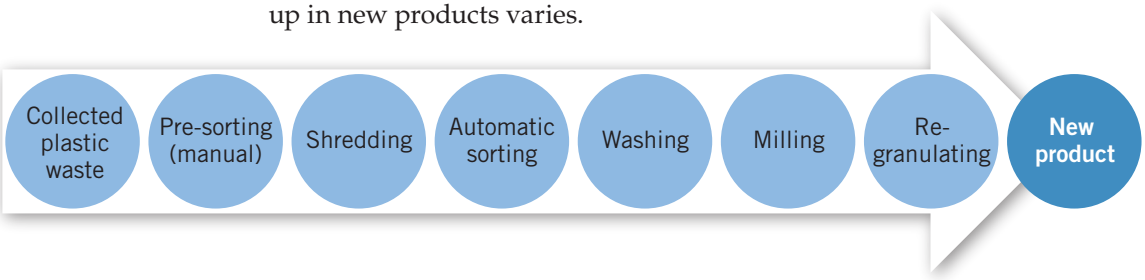
FACTS ABOUT PLASTIC WASTE

- The biggest volumes are plastics from unsorted mixed waste (from health care, industrial production, etc.) and non-recyclable waste (mainly from households), as well as post-sorting waste from a range of activities.
- The majority is incinerated and the energy recovered.
- Less than 10 per cent of the mapped plastic flows are recycled for materials. PET bottles, electronic waste and sorted packaging are the most recycled.
- A small proportion, around 6,000 tons, goes to landfill.
- Recycling plastic is easier the cleaner the waste flows are, but a great deal of plastic ends up in mixed waste flows.
- Some plastic waste is exported. How it is treated after this is unknown.

Svensk Plaståtervinning's plant in Motala sorts packaging based on the type of plastic.

WHAT IS MATERIAL RECYCLING?

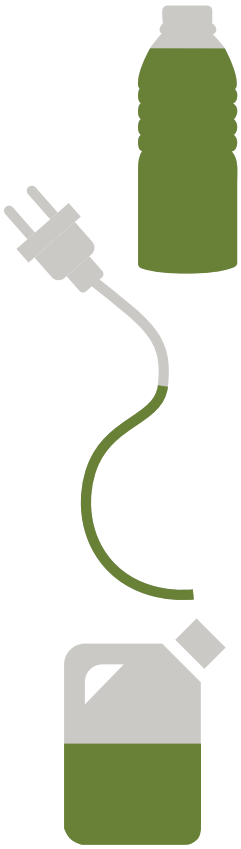
Several steps are necessary in the recycling process for plastic materials (see the figure below). These differ depending on the type of plastic waste to be recycled, the need for sorting and the customer's wishes. Most steps in the process entail some loss of material, so how much ends up in new products varies.



Material recycling for plastic packaging is currently quantified as the volume of pre-sorted packages that go to automatic sorting. However, several types of plastic packaging are not currently recycled because there is too little demand and too few opportunities for recycling.

WHICH PLASTICS ARE RECYCLED?

To achieve more sustainable plastic use, there must be more material recycling. What is the current situation?



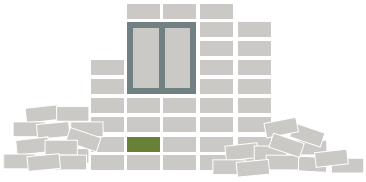
EXAMPLES OF HIGH LEVELS OF PLASTIC MATERIAL RECYCLING

- **PET bottles: 84 per cent**
  The bottles are ground, sorted and washed. Around 12-15 per cent (glue, labels, leftover drinks and steel wires from bales) is sorted out and incinerated for energy recovery. The primary product is plastic flakes for new bottles. On the Swedish market, the proportion of recycled material in new bottles is around 50 per cent.
- **Electronic waste: 45 per cent**
  Plastic from electronic waste is sorted and sold, primarily to Asia but also to Europe, for further processing and material recycling. Almost all other plastic from electronics is incinerated because it can contain hazardous substances, especially bromine. Incineration is carried out in Sweden, mainly by the cement industry. A small proportion is sent to landfill because it contains PVC, but new treatment options are being explored. One example of investment in the recycling of electronic plastics is Stena Recycling's pellets manufacturing, in which different plastics from electronics are processed.
- **Packaging: maximum 44 per cent**
  The true level of material recycling for plastic packaging is lower than this official figure, because the volume that enters the market is underestimated. There are also losses during sorting and material recycling. Following collection, the packaging is baled and sorted, and the material processed into new plastics. Around 45-50 per cent becomes new products. The rest is incinerated and the energy recovered.

EXAMPLES OF LOW LEVELS OF PLASTIC MATERIAL RECYCLING

- **Mixed waste: 0 per cent**
  Mixed waste, post-sorting commercial waste and non-recyclable waste, mainly from households, all contain plastic that is incinerated and the energy recovered. The level of material recycling for this type of plastic is therefore zero.

- **Scrapped vehicles: 0 per cent**
  The vehicles are dismantled; the plastic is often incinerated, but some plastic is sorted for future material recycling. To increase the chance of this happening, the recycler works to identify the types of plastic in the flows and test new methods for separation and sorting.



- **Construction and demolition waste: 0,8 per cent**
  The plastic that the construction industry sends for material recycling is sorted plastic waste, including flooring waste, and plastic from sorted mixed waste.

- **Municipal plastic waste from recycling centres: 17 per cent**
  Municipal plastic waste is comprised of products made from hard plastic, such as buckets, sledges, toys and garden furniture, that are collected separately. A small proportion may go to material recycling, but this is made difficult by the very varied quality of the plastics. Sorting could increase if more recycling centres offered separate plastic collection.

WHAT ARE THE PROBLEMS?

- **Poor sorting.**
  Too little plastic is separated from mixed waste. This applies to everything from household packaging to plastic in construction waste and from other activities.

- **A lack of capacity in sorting and material recycling.**
  Historically, a great deal of plastic has been exported by Sweden and the EU. As opportunities for this decrease, it takes time to readjust and improve domestic sorting and processing capacity.

- **Poor match between availability and demand.**
  Currently, large volumes of plastic are sold on global commodity exchanges, while individual companies have specific requirements for the plastic they want to include in their products. The result is that it is difficult to find the correct quality for each use.

- **Lack of standards.**
  Uncertainty about quality is a common barrier that means people avoid using recycled plastic

- **Badly designed products.**
  Plastic is often found in complex products. It may also be attached to other materials and contain additives that hinder material recycling.

WHAT ARE THE SOLUTIONS?

- **Promote recycling-friendly design.**
  Designers of recyclable products should be rewarded. FTI has differentiated producer responsibility charges for packaging. This is one example of a financial incentive for manufacturers of easily-recyclable products.

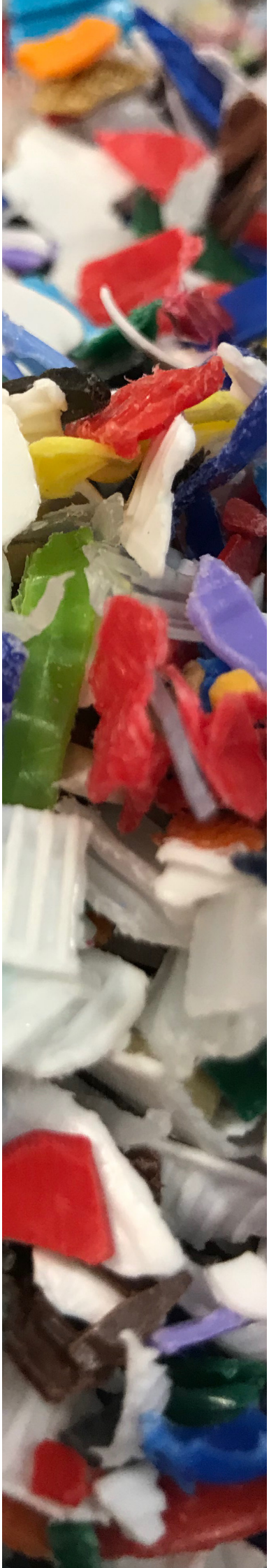
- **Demand that businesses sort more of their waste.**
  Procurements and legislation need to include requirements for separate plastic sorting. This could apply to construction sites, during manufacturing and to logistics and warehousing.

- **Support investment in new plants.**
  Sorting and processing capacity will increase as new actors and plants become established in Sweden. Investment aid is necessary to support this development and allow us to process more plastic domestically. Clear regulations are needed about when plastic stops being waste and becomes a new product.

- **Cooperate with customers who buy recycled plastic.**
  Many large manufacturers have targets for using more recycled plastic. Businesses that process plastic waste can benefit from long-term business partnerships with these manufacturers, so they can produce the quality that suits their customers' products.

- **Take back your own product.**
  The recycling systems that work best are those where the quality is known, such as the one for PET bottles, recycling leftovers from PVC flooring or food crates. Circular systems for products or materials increase quality assurance and can thus lower the threshold for recycled plastic. More of these systems are needed.

- **Create standards for plastics that are used in large volumes.**
  Recycled plastic from the most common types, such as polyethylene and polypropylene, also requires quality assurance to increase confidence and demand. SIS (Swedish Institute for Standards) is developing standards for a number of plastic qualities. However, specialised qualities are best developed as a cooperation between the manufacturer and customer.



WHAT CAN WE DO?

FIVE POINTERS FOR BUSINESSES AND ORGANISATIONS:

1. **Reduce unnecessary plastic use in all areas.**
   Conduct an inventory of where you use a lot of plastic and think about whether you can phase anything out.

2. **Use recyclable plastic.**
   Choose polypropylene or polyethylene when you must use plastic, because these are in demand on the recycling market. Avoid laminates and material combinations that are difficult to separate. Avoid decomposable plastic as it is not compatible with current recycling systems.

3. **Separate plastic waste.**
   Establish a collection target and hire a transparent contractor who can explain what happens to the material.

4. **Use recycled plastic.**
   Investigate whether you can use recycled plastic in your production process or purchase products made from recycled plastic.
   Set requirements for your suppliers during procurements.

5. **More cooperation.**
   Better dialogue is needed between the collectors, processors and purchasers of recycled plastic, to guarantee that the qualities that are in demand reach the market. Clear specifications and quality standards must be developed in partnership between the various actors in the value chain.

FIVE POINTERS FOR INDIVIDUALS:

1. **Avoid single-use plastics.**
   Reduce your consumption of single-use plastic products, such as fast food containers, bags, cups and cutlery. Bring your own container for take-away food!

2. **Continue to sort and recycle.**
   Make a habit of going to the bin room or recycling station. Recycle all your PET bottles (fruit juice is now sold in recyclable bottles).

3. **Dispose of items at the recycling centre.**
   Dispose of garden furniture, crates, buckets and so on (everything that is not packaging) at a recycling centre that has a separate collection point for plastic.

4. **Choose recycled products.**
   Buy products made from recycled plastic and ask for them when you shop.

5. **Never throw plastic away in the environment.**
   Plastic takes a long time to decompose and, regardless of this length of time, it can harm people and the environment. Plastic has no place in nature.

Plastic in Sweden

Plastic is everywhere, all around us. Plastic consumption is increasing steadily, and so is the amount of plastic waste.

This brochure is a summary of the report *Kartläggning av plastflöden i Sverige (Mapping Plastic Flows in Sweden)*, which was produced for the Swedish Environmental Protection Agency in 2019.

It contains information about how much plastic we use and what happens to it afterwards. Currently, most of it is incinerated for energy recovery. However, to reduce greenhouse gas emissions, it is important to increase the material recycling of plastic, so this brochure presents suggestions for how to do this, focusing on businesses, individuals and decision-makers.

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