

When your green bin is collected by your Local Authority, (in either Herefordshire or Worcestershire) it makes its way to EnviroSort. EnviroSort is a Commingled Materials Reclamation Facility. Here, your recycling is sorted into the key material types such as glass bottles and jars; paper, card and cartons; steel tins, aluminium cans and aerosols; and plastic bottles, trays, tubs, punnets and pots. In this series of articles, we'll look at how these four material types are separated before they are baled and sent for reprocessing across the U.K.



*Sorted and baled materials being loaded to be despatched to a reprocessor*

Recycling started in Herefordshire and Worcestershire in the early 2000's when the first Commingled Materials Reclamation Facilities (CMRFs) were built. As wheelie bins were introduced across Herefordshire and Worcestershire, we moved to the commingled (mixed) green bin collection that we all know today. The EnviroSort CMRF at Norton, Worcestershire, was built in 2009 to process the commingled collections.

In this first section, we look at green bin contamination. EnviroSort separates over 75,000 tonnes of green bin recycling every year and 13% of that, that's around 10,000 tonnes, is contamination. These rejected items cannot be recycled.

Once the recycling arrives at EnviroSort and is loaded onto the conveyor belts, its first destination is pre-sort, before it is then separated into the different material types.

Pre-sort consists of two conveyor belts where operatives remove items by hand that have been incorrectly placed in the green bin. These items include general (black bin) waste, wood, food waste, garden waste, electrical items, textiles, clothing, shoes and nappies. These items cannot be sorted for recycling at EnviroSort and are rejected.

Food waste and garden waste are received daily. These items will contaminate the surrounding recycling and result in it all being rejected. For more information on preventing food waste please see <https://www.worcestershire.gov.uk/lets-waste-less/foodsavvy>

Garden waste (if it cannot be composted at home or if you do not have a garden waste collection) can be taken to a Household Recycling Centre (HRC).

Wood cannot be recycled via a green bin collection, but can be taken to an HRC. Despite wood being the source material of paper, paper is a completely different product having been processed from wood.

Clothing and textiles are another major source of contamination and should **not be included** in any green bin collection. Besides being soft enough to cause blockages in the machinery, clothing also picks up shards of glass which would make it unrecyclable. EnviroSort receives over 200 items of clothing per week. Clothing and textiles, if clean and dry, can be donated to a charity shop or taken to the clothing bank at an HRC.

Nappies (and sanitary products) cannot be recycled from green bin collections as they are contaminated by organic matter and this will spoil other items in the green bin. They cannot be recycled, even if clean as they are still contaminated by other components such as the absorbent gel padding and the “paper” isn’t paper, but plastic fabric. Whilst some companies have started to recycle nappies, this is still a specialised process and these companies only deal with this type of product. Around 8 million disposable nappies are thrown away each day in the U.K., that’s over 3 billion every year. For information on reusable nappies see: <https://www.worcestershire.gov.uk/lets-waste-less/reuse-and-repair/reusable-nappies> or <https://www.herefordshire.gov.uk/rubbish-recycling/reusable-nappies>

Other items incorrectly placed within green bins include electrical items\* (please take to an HRC and place in the Small Appliances container), children's toys\*, (take to a charity shop if usable), ink cartridges\* (return to the manufacturer or take to an HRC), loose shredded paper and shredded paper inside a plastic bag. Shredded paper\* can only be recycled via a green bin if placed in an envelope, paper bag or cereal-type box, then flattened. (Reasons why items marked with an asterisk\* cannot be recycled via a green bin collection will be covered within sections/articles on the different material types.)

Please place clean, dry and loose items into your green bin. Any bagged items (unless from an approved Local Authority bag collection) will be rejected due to Health and Safety as colleagues can't tell what's inside bagged items. Dirty items will contaminate other items in the green bin, such as baked beans left in a tin which could spill over other items inside.

Batteries shouldn't be placed in black or green bins as they may cause fires. These can be recycled in either a supermarket battery collection or at an HRC.

***If in doubt, leave it out!*** We've included a link to EnviroSort's website which lists those items you can place in your green bin for collection: <https://www.severnwaste.com/envirosort/what-can-i-recycle/>

**Following pre-sort, glass is the first material type to be separated from the mixed recycling.** Did you know the glass content of green bin collections always increases during January?

Glass is made from natural raw materials such as **silica, soda ash and limestone**, plus additives for specific colours and finishes. Glass contains around 75% silica, (more commonly known as sand). These raw ingredients have to be quarried. This depletes the earth's resources, plus energy is used in their extraction and in the glass making process.

Glass is separated from the other recyclables by a machine called **The Glass Breaker**. Glass is broken into small pieces by moving along a series of rotating metal discs. The glass falls between the gaps between the discs and is stored in a bunker. This glass is called cullet. When cullet leaves EnviroSort and arrives at the glass reprocessor/factory, it is washed and sorted into different colours by using light. It is then liquified (melted), ready to be made into new items. **Glass can be recycled infinitely without losing any of its qualities.**



*The Glass Breaker*

Only glass bottles and glass jars (also known as container glass and around 30% of all glass is container glass) can be placed into the green bin. These are food and make-up jars and glass bottles, such as water bottles, wine and beer bottles etc. Empty perfume bottles can also be included. You can recycle any colour of glass, including black. (Glass can be sorted by light into different colours at the glass factory.) Lids and labels can be left on as they will be removed during the sorting process. If any lids fall through with the glass, these can be removed at the glass factory by using magnets and recycled. Please don't include corks.

Nail polish bottles can't be recycled due to nail polish being a contaminant. Please don't wash these out in order to recycle them as the contents will pollute the water supply.

Glass bottles and jars have to be placed into the green bin, empty, clean, and dry. Glass will break from around lids during the sorting process. Any liquid or food/product residue can contaminate other items inside the green bin which may result in that load of recycling being contaminated. Food and product residues will also contaminate glass during its reprocessing.

Types of glass that can't be placed into the green bin include window glass, greenhouse glass, Pyrex and heat-proof glass, vape juice bottles and drinking glasses. Whilst they may look similar to glass bottles and jars, these types of glass are manufactured differently and liquify differently and at higher temperatures. It's comparable with butter and cheese, both are made from milk, but they are manufactured differently and melt differently.

Pyrex is manufactured from borosilicate glass. Borosilicate glass is made from silica and boron trioxide. This enables it to withstand high temperatures and it is used for cookware and sometimes vape juice bottles. It won't liquify properly in a glass furnace.

Drinking glasses and vases have been manufactured to be tougher and less likely to break, and often contain added chemicals. Window glass is also manufactured using a combination of chemicals and heat to toughen it. These types of glass liquify at a higher temperature than container glass. This higher liquifying point and the added ingredients used in their composition will cause contamination in any liquified glass.

Mirrors can't go into the green bin as they have a metallic layer which is a contaminant. Mirrors, drinking glasses, vases and Pyrex items, if unbroken, can be taken to a charity shop.

Spectacles/reading glasses can't be placed in your green bin. The lenses are made differently to container glass, plus there are other components such as frames and metal fastenings. These need to go to a charity collecting spectacles or be placed in your black bin.

Lights bulbs also can't be placed into the green bin as they contain electrical components and have been produced from a different type of glass. Light bulbs can be recycled at your local HRC.

China, crockery and ceramics can't be placed into the green bin as they won't liquify in a glass furnace. If unbroken they can be taken to a charity shop, or if broken please place in your black bin.

Recycling 1 tonne of glass saves 1.2 tonnes of raw materials. Plus, 580kg CO<sub>2</sub> is saved throughout the supply chain, air pollution is reduced by 20% and water pollution cut by 50%.

At EnviroSort, we recycled 27,684 tonnes of glass last year. 33,221 tonnes of raw material and 16,056 tonnes of CO<sub>2</sub> were saved when compared with making fresh glass.

**Paper, card and paper-based cartons are the second material type to be separated from the commingled recycling.** You can recycle printed paper, newspapers, magazines, small booklets, junk mail and leaflets, letters and envelopes (with windows but not padded), non-glittery/non-shiny greetings cards, non-shiny wrapping paper, cardboard boxes, cardboard sleeves, paper bags, egg boxes, tubes and cartons.

Paper, card and cartons have to be placed into the green bin clean, dry and flat, so please flatten cereal boxes, egg boxes, cartons (you can leave spouts on) and toilet roll inserts. Paper, card and cartons are sorted from the rest of your recycling by a specialist machine, **The Ballistic Separator**, which separates 2D items like paper, card and cartons from 3D items such as tins, cans and plastics. It is a "walking floor"

made up of moving paddles at a 35° angle. 2D/Flat items such as paper, card and cartons go up the ballistic separator and 3D items go down the Ballistic Separator. (This is why we ask for tins, cans and plastics not to be flattened.)



*The Ballistic Separator*

**Paper can be recycled between 4 and 7 times.** New paper has long paper fibres. Each time paper is recycled those fibres get shorter until the fibres are too short to withstand another reprocessing. At this end-stage, paper is manufactured in to low-grade paper products such as tissues, paper towels, kitchen roll and toilet paper, which can't be recycled in the green bin.

The U.K. uses over 227,000 miles of wrapping paper every year. (That's around 18 feet/4.5 metres per person.) To put this into perspective, the moon is 235,855 miles away. Much of this wrapping paper can't be recycled due to the shiny coatings which are contaminants, as these can't be removed during reprocessing.

Try the scrunch test. Scrunch up a piece of wrapping paper, if it stays scrunched up, it can be recycled, if it unscrunches, it can't. Please don't buy recyclable paper and recycle it after one use, try to reuse it first, even non-recyclable paper can be reused. When you do recycle recyclable wrapping paper, please remove all tape which is a contaminant and it could also come off during the process and cause blockages within the machinery.

Shiny and glittery greetings cards cannot be placed in the green bin as the coatings are contaminants and cannot be removed. Please rip these in half with the shiny front going in the black bin and the back section can be placed in the green bin.

Wallpaper cannot be recycled in the green bin due to the patterns and coatings used in its manufacture. Wallpaper paste is also a contaminant.

Receipts and greaseproof/baking paper can't be recycled. Receipts have a thermal coating and greaseproof paper has a silicone coating which makes it non-stick. Both these coatings can't be removed.

Shredded paper can be recycled inside another paper product i.e., paper bag, envelope or cereal box. Loose shredded paper is a major contaminant of glass as the pieces can fall through with the glass on the Glass Breaker. (Once glass is received at the glass factory it is washed, shredded paper would pulp down and cause blockages.) Shredded paper cannot be recycled in a plastic bag as soft plastics are not recyclable via a green bin and this would be rejected.

Fancy a coffee? Over 7 million disposable coffee cups are thrown away each day in the U.K. Coffee cups can't go into the green bin even if they are marked as recyclable. The thin plastic lining that ensures they are leak-proof is hard to separate from the paper. They have to be reprocessed at a specialist reprocessor that only deals with coffee cups and similar packaging. As EnviroSort process over 75,000 tonnes of green bin recycling every year, there is not the capacity to handpick these items out. Disposable coffee cups also have to be made using fresh paper, recycled paper can't be used as there is a contamination risk to the food or liquid within the packaging.

Unwanted books can be taken to a charity shop or passed on to friends. Hardback books cannot be placed in a green bin due to the hardback covers. Small paperbacks are able to be recycled via a green bin if they cannot be reused. Many HRCs now have book banks.

The maximum size of box or cardboard to put in the green bin is A2 (42 x 59.4 cm), any larger and it's too big for the conveyer belt. Oversized cardboard is the biggest cause of blockages at EnviroSort. Cut it or rip it to size and remove any plastic film, windows and sticky tape. Don't fold it to size as it will flop open when it's unloaded from the lorry.

All recycling needs to be clean and dry. For example, food, paint and grease are contaminants that can't be removed. Greasy pizza boxes for example, cannot be recycled as the oil cannot be removed. Bin lids need to be closed.

Recycling one tonne of paper saves seventeen trees and saves 38% CO<sub>2</sub> compared with manufacturing virgin paper. EnviroSort sent out over 34,737 tonnes of paper, card, cartons and cardboard for reprocessing

last year from Herefordshire and Worcestershire's green bin collections. This saves 590,529 fully-grown trees every year. That's about  $\frac{3}{4}$  of a tree for every Herefordshire and Worcestershire resident.

**Steel cans, aerosols and aluminium cans (metals) are the third material type to be separated from the commingled collection.**

Steel is made from natural raw materials and is an alloy of iron and carbon. It can contain small quantities of silicon, phosphorus, sulfur and oxygen. Iron ore is extracted from the earth's core by surface mining.

Aluminium's main ingredient is bauxite, which is generally extracted from the earth by open cast mining. The bauxite ore is then refined to recover alumina. Alumina is then smelted to produce aluminium. Approximately four to five tonnes of bauxite produce two tonnes of alumina and approximately two tonnes of alumina produce one tonne of aluminium.

Only steel food tins, aluminium cans, empty aerosols and metal lids can be placed in the green bin. All items need to be clean and dry. Labels can be left on. Remove the lid from the aerosols as they are plastic, and place these into the green bin separately. Any food or liquid left in any cans or tins will contaminate the other items in the green bin, and will also contaminate the sorted materials when they leave EnviroSort to go to the reprocessors. If aerosols are not empty, they are classed as hazardous and would need to be taken to an HRC.

Metal cans, tins and aerosols are separated from your other recyclables by two machines. The first are **The Magnets**. An over band of magnets lift out steel tins and metal lids. They are carried along until the magnetic current is interrupted and they fall down a chute into a bunker waiting to be baled.





### *The over band magnets*

Next, **The Eddy Current Separator** repels the non-ferrous (non-magnetic) aluminium cans and aerosols. An Eddy Current Separator is actually two magnets, an inner magnet inside an outer magnet, both spinning in opposite directions. The current generated by these opposing magnets repels the aluminium cans. They are thrown down a chute into their own bunker.



*The Eddy Current Separator*

After the remaining materials leave the Eddy Current Separator, an operative will check the recycling for quality control and to ensure any steel tins, aluminium cans and aerosols haven't been missed.

When each bunker is full, it is emptied onto a central conveyor belt before being baled. **Both steel and aluminium can be recycled indefinitely without losing any quality.**

Tins, cans and aerosols need to remain 3-D, as the previous machine in the recycling process is the Ballistic Separator which separated the 2-D items such as paper, card and crushed cartons, from 3-D items such as tins, cans and plastics. This is why we ask please don't crush or squash tins, cans and aerosols to save space.

Other metal items such as cutlery, coat hangers, saucepans, pipes, nails, screws, clean aluminium foil, tomato puree type tubes, keys, ladders, gates etc cannot be recycled via the green bin.

Aluminium foil and foil trays cannot be recycled via a green bin collection as they are a low-grade metal. If clean, these can be taken to the metal container at an HRC. If foil is not clean, it needs to be placed in your black bin.

Tomato puree type tubes cannot be recycled from the green bin as they are contaminated by product residue.

Stainless-steel cutlery and saucepans, although magnetic, cannot be recycled through a green bin collection as they contain chromium, which would be a contaminant if they are processed with steel cans. In addition, some cutlery has additional coatings such as silver plate which would also be a contaminant. Metal coat hangers also have coatings which could be chrome, lacquer or plastic which are contaminants. Items such as cutlery, coat hangers and pipes may get jammed in our machinery and cause injuries to colleagues.

Please do not empty and wash out oil cans and paint tins in order to recycle them as the contents are classed as hazardous and will pollute the water supply. These can be taken to an HRC.

Gas bottles and canisters should never be placed in the green (or black) bin and should be taken to an HRC.

Food pouches, crisp packets, chocolate wrappers etc. may look like metal but they are usually manufactured from plastic or a mix of plastic and aluminium. They are classed as soft plastics and may be recycled at a supermarket soft plastics collection point.

Sharp items such as nails, screws, needles, syringes and knives etc would cause a hazard to the sorting operatives who physically pick out incorrect items, as they could puncture gloves and cause injuries.

Electrical items such as kettles, toasters and sandwich makers cannot be recycled in the green bin as they contain many different types of metal and other components. These items need to go in to the small appliance container at your HRC.

Coffee pods cannot be placed in the green bin as they are too small for the machinery in most CMRFs to separate and they are made from a mix of plastic and aluminium, which is very hard to recycle, plus they may contain product residue. (Paper coffee pods can't be recycled from your green bin as they are contaminated with product residue.) Most coffee pod manufacturers have their own recycling schemes.

Recycling one tonne of steel saves 1.5 tonnes of iron ore and reduces CO<sub>2</sub> emissions by 80%.

At EnviroSort last year, we sent out 2,407 tonnes of recycled steel, that's saving 3,610 tonnes of iron ore and 3658 tonnes of CO<sub>2</sub>.

Recycling one tonne of aluminium saves 4 tonnes of bauxite and 9 tonnes of CO<sub>2</sub>. At EnviroSort last year, we sent out 845 tonnes of recycled aluminium, that's saving 3,380 tonnes of bauxite and 7,605 tonnes of CO<sub>2</sub>.

As aluminium is around 1/3 of the weight of steel, we recycle similar volumes of steel and aluminium every year. Recycling both steel and aluminium also ensures fewer areas of the planet are disturbed by mining.

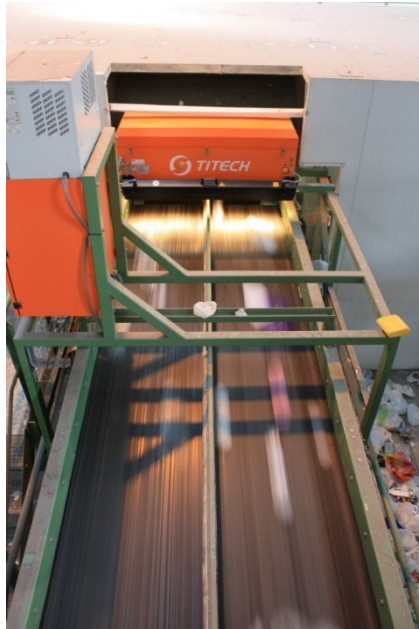
**Plastic bottles, tubs, trays, punnets and pots are the fourth material type to be separated from the commingled collection.**

**Most plastics are made from chemicals that come from petroleum (oil), natural gas, or coal.** When these chemicals are heated, they break down into molecules. Molecules are groups of more than a single atom. These molecules are then joined in to chains. These long chains of atoms are called polymers. Each time they are recycled, the polymer chains shorten, these plastics can generally be recycled 2-3 times before their quality degrades to the point they cannot be recycled. In addition, each time these plastics are recycled, their strength weakens and sometimes virgin plastic is added to off-set the shortened polymers and add strength. These plastics are **thermoplastics**.

Other plastics are formed when their polymers are crosslinked to form an irreversible chemical bond. These plastics are **thermoset**. These plastics are not recyclable as no matter how much heat is used; they can't be remelted in to new products.

Only plastic bottles, trays, tubs, punnets and pots (including non-black plant pots) can be placed in the green bin. All items need to be clean and dry. Any food or liquid left in any plastics will contaminate the other items in the green bin, and will also contaminate the sorted materials when they leave EnviroSort to go to the reprocessors. Remove any soft film lids. Please don't squash plastics and do keep lids on the plastic bottles as it helps them keep their 3-D shape and helps ensure they don't get mistaken for flat materials such as paper, card and squashed cartons.

The plastics are sorted from your other recyclables by a machine, **The Optical Sorter**. It works by shining beams of light down on to the plastics. The plastic reflects the light back to the Optical Sorter, identifying it as plastic. A jet of air then blows the plastic onto another conveyor belt.



*The Optical Sorter*

The plastic then goes through three more optical sorters. The first Optical Sorter is looking for **clear PET plastics**. These are numbered **1**, and are used for clear plastic drinks bottles. Over 7.7 million PET water bottles are used daily in the U.K.

The next Optical Sorter is looking for **white HDPE plastics**. These are numbered **2** and are used for white milk bottles. The third Optical Sorter is looking for the other types of plastic, these are primarily pots, punnets, trays, tubs and bottles that are not either clear PET or white HDPE plastics. Once each type of plastic has been identified, it's blown down a chute into its own bunker. When each bunker is full, it is emptied separately onto a central conveyor belt into the baler.

Black plastic can't be recycled in the green bin. Black plastic absorbs light so it is invisible to the Optical Sorters. Even carbon-free black plastic isn't always recyclable, as not every Optical Sorter is able to be reprogrammed to identify carbon-free black plastic. It is also worth noting that not all black plastic in the recycling stream will be carbon-free.

Non-carbon-free black plastic is a low-grade plastic. It was commonly used as it was a cheaper plastic made up of leftover plastic pieces of all different colours then dyed black to hide the imperfections. More manufacturers are now moving away from black plastic as it cannot be recycled.

Hard plastics such as drainpipes and children's toys can't be recycled as they are manufactured from thermoset plastics. If toys are in good condition, they can be donated to a charity shop or passed on to friends. Some toy manufacturers now operate toy recycling schemes.

Soft plastics such as bread bags, carrier bags, crisp packets, food pouches and film lids can't be recycled in the green bin. They are too soft to be recycled via the green bin as they will cause blockages at the CMRF and can also be a source of contamination in the paper stream. These can be recycled at a supermarket soft plastic collection. (Supermarket soft plastics collections can't take bubble-wrap, cling film and biodegradable/compostable soft plastics.) All soft plastics need to be clean.

Blister packs cannot be recycled from the green bin as they are manufactured from plastic and foil which are glued together so they are not easy to recycle due to being mixed materials. As they are flat/2D in appearance, they may be mistaken for paper or card by the Ballistic Separator and contaminate the paper stream.

Soft plastics and blister packs are major contaminants of recycled paper. Once paper leaves EnviroSort and arrives at the paper mill, it is shredded and pulped to be made into paper. Any plastic will also be shredded and pulped with the paper. Pulp is combined with water and placed on a paper making machine where it is flattened, dried, and cut into sheets and rolls. The plastic will fall out of the paper during the drying process leaving holes in the paper.

Polystyrene and Styrofoam can't be recycled from a green bin collection. Recycling these items is a specialised process. It is also a fragile product as it easily breaks into pieces, and it would contaminate the other recycling.

Pump top plastic lids and trigger spray lids can't be recycled as they contain metal and are classed as mixed materials.

Make-up, sunscreen, lip gloss, mascara tubes, make-up palettes, lipstick cases, roll-on/stick deodorants etc. can't be recycled from your green bin due to the size and/or product residue. Many retailers now operate make-up recycling schemes.

Cotton buds cannot be recycled as they are small enough to fall through the gaps in the glass breaker and contaminate the glass.

Plastic cutlery and straws are designed to be single use and the shape and types of plastics used make them unrecyclable.

Many clothes are now manufactured using plastic or recycled plastic. Plastics are melted down and spun into fine threads. However, once plastic has been turned into clothing, it cannot be recycled. Take it to a charity shop or clothing bank at your HRC.

Biodegradable plastics, compostable plastics and any plastics made from non-petroleum components such as potato starch, sugar cane or wheat (plant biomass) can't be recycled in the green bin or via a supermarket's soft plastic collection. Whilst these plastics are manufactured from more sustainable sources, mixing these plastics with conventional petroleum-based plastics will cause contamination in the plastic recycling streams. These plastics are also unable to be composted in garden waste collections as they have to be composted at industrial temperatures in order to biodegrade.

Last year EnviroSort recycled 6,918 tonnes of plastic. This was made up of 1,549 tonnes of clear PET plastic, 680 tonnes of white HDPE plastic and 4,689 tonnes of mixed plastics.

Recycling one tonne of plastic can save 3,114 litres/19.5 barrels of oil and can reduce carbon emissions by 30-40%.

For more information on *Reducing, Reusing, Recycling*, please visit:

<https://www.worcestershire.gov.uk/lets-waste-less>

For any questions on domestic recycling please contact:

[enquiries@severnwaste.co.uk](mailto:enquiries@severnwaste.co.uk)