Metals Recycling in the UK

BMRA
BRITISH METALS
RECYCLING ASSOCIATION

The UK Metals Recycling industry

Metals recycling is an established globally competitive industry that provides essential raw material from recycling for metals manufacture, which in turn enables a significant reduction in use of energy and virgin resources.

Scrap metal is a secondary raw material used in the process of metals recycling.

In the UK, metal recyclers collect, sort, separate and process scrap metal ready for use in foundries, smelted to become new metal.

There are two main classes of metal: ferrous and non-ferrous metals. Ferrous metals contain iron, such as steel, and are magnetic. Non-ferrous metals, such as aluminium, brass and copper, don't contain iron and are not magnetic.

Metal recyclers in the UK recycle a wide range of products, such as end-of-life vehicles, packaging, batteries, domestic appliances, building materials and electronic goods.

THE ECONOMY

Metals recycling is a £7 billion sector and comprises an estimated 2,000 businesses and employs over 15,000 people.
These roles vary from general operatives on the yard, machinery operators, drivers, traders, engineers, scientists, as well as people who provide clerical office-based support.

In 2022, 11.8 million tonnes of scrap metal was processed in the UK. As the UK produces considerably more scrap than is required for domestic markets, around 80 percent is exported worldwide. In fact, by volume, the UK is one of the five largest metal scrap-exporting countries in the world.

THE ENVIRONMENT

Metal is 100% recyclable, it is permanent, and it can be recycled forever, over and over again. The process of recycling varies for different metals but generally recycling produces metals of equivalent quality to primary material.

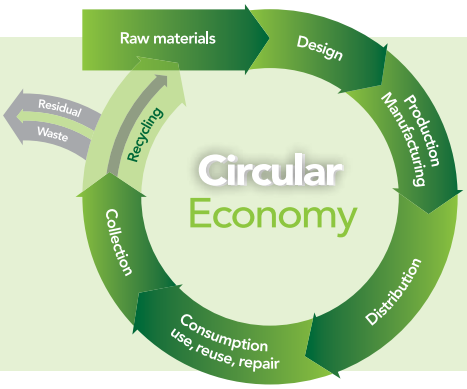
Using scrap metal, also known as secondary raw materials, means less use of precious natural resources and destruction of natural habitats caused by the mining of metal ore. Materials used in making brand new metal compounds include: iron ore in steelmaking; nickel in stainless steel; or bauxite in aluminium smelting.

Recycling metal **avoids** sending a permanent material to **landfill**

Metal contributes to the circular economy

In a linear economy, materials are taken from the Earth, products are made from them, then they are disposed of as waste either via incineration, energy from waste or sent to landfill.

In a circular economy, as per the diagram to the right, waste is stopped from being produced in the first place and products are reused, repaired, and recycled thereby diverting waste from landfill.



The British Metals Recycling Association

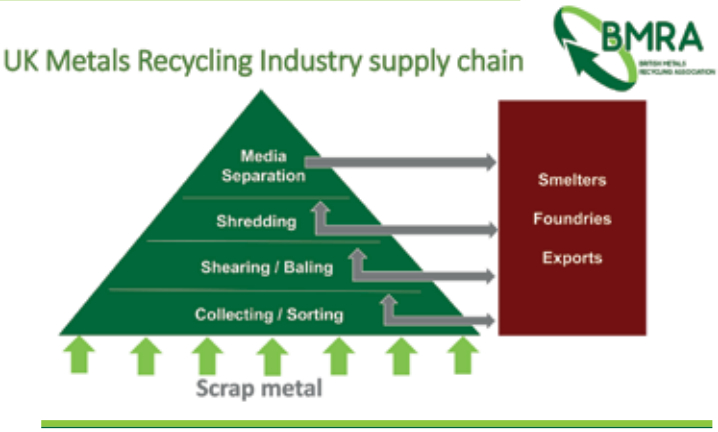
The British Metals Recycling Association (BMRA) is the trade association representing the UK metals recycling sector. The BMRA is the industry's voice and its main point of contact when lobbying the Government and liaising with legislators for the sector. It works closely with stakeholders such as Defra, the Environment Agency, the Department for Energy Security and Net Zero, and British Transport Police to highlight the issues affecting metal recyclers in order safeguard member interests and to improve the industry in the long term. It keeps members informed about upcoming issues and regulations, while helping them overcome problems and challenges related to running a metal recycling business.
www.recyclemetals.org

5 Ramsay Court, Hinchingbrooke Business Park, Huntingdon, Cambridgeshire PE29 6FY

A pyramid industry

Metals recycling is a pyramid industry that includes many small, family-owned companies, as well as large, international businesses. Metal recyclers, large and small, carry out a range of functions in order for scrap metal to be ready for recycling. These include:

- **Collecting:** Whether via trade at a metal recyclers site, known as gate trade, collected from a persons house or business premises, via a skip collection, or via a household waste and recycling centre, metal items are collected and/or bought, often based on the weight of the metal.
- **Shearing:** Some metal recycling sites may have a shear in order to reduce large metal items by cutting, ready to be processed further, either on that site, or moved to another.
- **Baling/compacting:** Metal can be placed in a baler or compacter, making it smaller in size, which make the metal easier to handle and transport.
- **Shredding:** Metal can be reduced to fist-sized lumps via a shredder/fragmentiser. For example, a car can be shredded in less than ten seconds. Many shredders in the UK are located near docks so that shredded metal can be placed on ships ready to be exported to a different country.



- **Sorting and media separation:** Once reduced in size, even to very small sizes, metal can be further sorted using innovative sorting and media separation techniques and technologies to be further separated from other metals and non-metallic materials to improve the purity of the scrap metal ready for smelting into new metal.
- **Granulation:** Metal can also be made into particles of varying sizes via a process called granulation. Metal, often cable, is fed in, and this results in small granules of metals. Cables, for example, can either be stripped, or some granulators can separate cable from its plastic casing.
- **Trading:** Trading is the buying and selling of metal, of which some firms specialise. Some metal is traded within the UK to make new metal, but most UK metal is exported to other countries.

A regulated industry

The metals recycling industry is highly regulated. From mobile collectors to large, multinational operators, all metal recyclers must be correctly licensed to operate legally. The licences include a Scrap Metal Dealers Licence and a Waste Carriers licence.

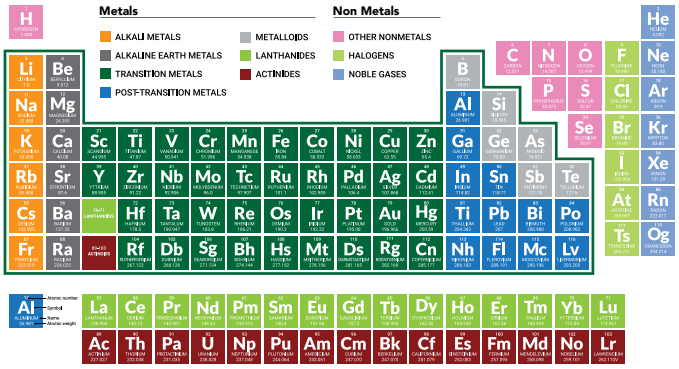
In England and Wales, the Scrap Metal Dealers Act was introduced in 1964, and amended in 2013. One key aspect of the amended Act was to make it illegal to pay cash for scrap metal.

The intention of the amendment was to create an audit trail in order to combat metal theft. Scrap metal dealers must also verify the identity of all sellers ensuring traceability and creating an effective audit trail of scrap metal transactions. Payment for scrap metal can be made by cheque, BACS or etransfer.

In 2015, the Air Weapons and Licensing (Scotland) Act 2015, followed suit and banned the payment of cash for scrap metal in Scotland.

Environmental credentials

Most elements on the Periodic Table are metals and come from the earth. The metals are mined, and the resulting ore further refined to create virgin metal to make all manner of items, steel for cars, aluminium for drinks cans, copper for pipework. Once the metal has reached the end of its life, the metal can be recycled.



Recycling metal is proven to avoid emissions of carbon dioxide (CO_2) and the dependancy for other naturally available materials needed to make brand new metal. EU figures indicate that using recycled raw materials, including metals, cuts CO_2 emissions by some 200 million tonnes every year.

As it can be recycled time and time again, metal has limitless potential. A drinks can could become a plane. A bridge could become a car. A brass door handle could become a trumpet. Gold in a mobile phone could become an Olympic medal. And then, they could all become something else!

Smelting dates back to 5,000BC in Mesopotamia, evidence that metal has been recycled for thousands of years.

Every tonne of recycled steel saves:

- **1.5** tonnes of iron ore
- **0.5** tonnes of coal
- **70%** of the energy
- **40%** of the water
- **75%** of CO_2 emissions

METAL is **100%** **recyclable**; it is permanent and can be recycled over and over again

57% of all mined nickel (Ni) is still in use and global nickel-related CO_2 emissions are reduced by one third thanks to nickel recycling.

Recycling one tonne of tin (Sn) saves 99% of the energy required for the primary production of tin.

Recycling metal emits **80%** less CO_2 than production from raw materials

Recycling one aluminium can saves enough energy to run a set of Christmas tree lights for two hours.

50% of lead (Pb) has been used before in other products. Using secondary lead instead of ore reduces CO_2 emissions by a whopping 99%

At present, approximately 30% of global zinc (Zn) production comes from secondary zinc. Secondary zinc production uses 76% less energy than primary.

6.7 million ounces of silver (Ag) was supplied from the recycling of scrap in 2017. Old jewellery scrap, coins and bullion make up a significant part of the scrap pool.

Almost 40% of the world's demand for copper (Cu) is met using recycled material. By recycling copper instead of extracting it from mined copper ore CO_2 emissions are reduced by 65%.

Recycling aluminium (Al) uses 95% less energy than producing aluminium from mined bauxite. Recycling one tonne saves 14,000 kWh of energy – more energy than the average household uses in a year.

Facts and figures supplied by: Nickel Institute, BIR, Every Can Counts, World Silver Study 2018, Dept of Energy & Climate Change and U.S. Energy Information Administration.

Recycling can save ore from being mined saving **natural habitats and woodlands**

The process of recycling metal

FERROUS PRODUCTION

Steel, an alloy comprised of iron ore and carbon, is the UK's most widely recycled metal at approximately 11.8 million tonnes, and the most widely used metal in the world. Steel is produced via two methods:

- The Electric Arc Furnace (EAF)
- The Blast Furnace – Basic Oxygen Furnace (BF-BOF)

The EAF can use up to 100% scrap metal. The BOF method uses smaller quantities of scrap metal, up to 25%. The remaining material used within the BOF method will be newly mined.

In a report by the Cambridge Institute for Sustainability Leadership* from 2023, around 82% of UK steel is produced using the BF-BOF method. EAF production accounts for 18% of UK steel production.

As of 2021**, only 2.6 million tonnes of the UK's domestic ferrous scrap is used to produce new steel within the UK, therefore there is an excess and a need to export UK scrap metal.

** Devlin, A. and Markkanen, S. (2023). "Steel sector deep dive: How could demand drive low carbon innovation in the steel industry." Cambridge: Cambridge Institute for Sustainability Leadership (CISL)*

*** Zhang, W., Chakuu, S., Godsell, J. and Li, Z. (2021). Steeling for a sustainable future: How the UK steel industry could compete through supply chains, University of Warwick, UK.*

NON-FERROUS PRODUCTION

Copper scrap is readily used by both primary and secondary producers. In EAFs, for example, around 75-80% of the raw material is scrap copper.

Approximately 60% of copper produced since 1900 is still in use today.

When it comes to aluminium production, while primary raw materials require temperatures of around 900°C, scrap aluminium melts at around 660°C.

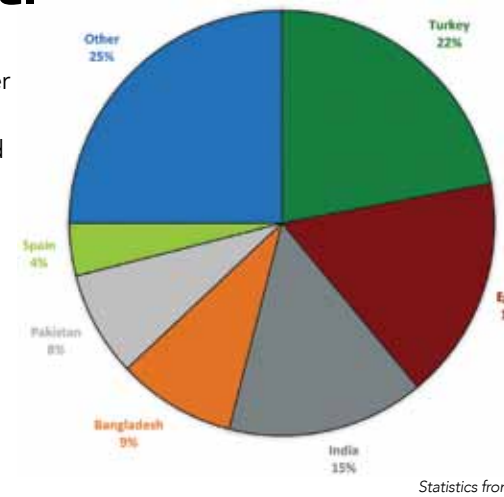
Aluminium packaging, such as drinks cans, uses a closed loop production, which means that the aluminium that is being recycled will be used again for the same purpose. Thanks to this process, a used aluminium drinks can will be recycled and back on supermarket shelves as a new drink can in as little as 60 days.

Approximately 75% of aluminium ever produced is still in use today.

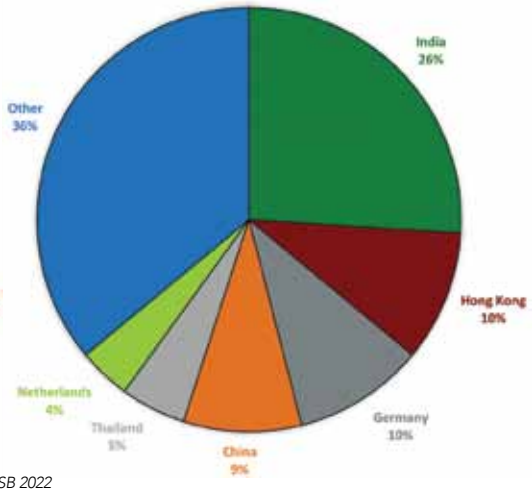
The export of metal

The UK exports about 80% of the metal processed for recycling to other countries, which is just over 9 million tonnes. The metal will be transported via ships from docks in the UK.

UK ferrous exports



UK non-ferrous exports



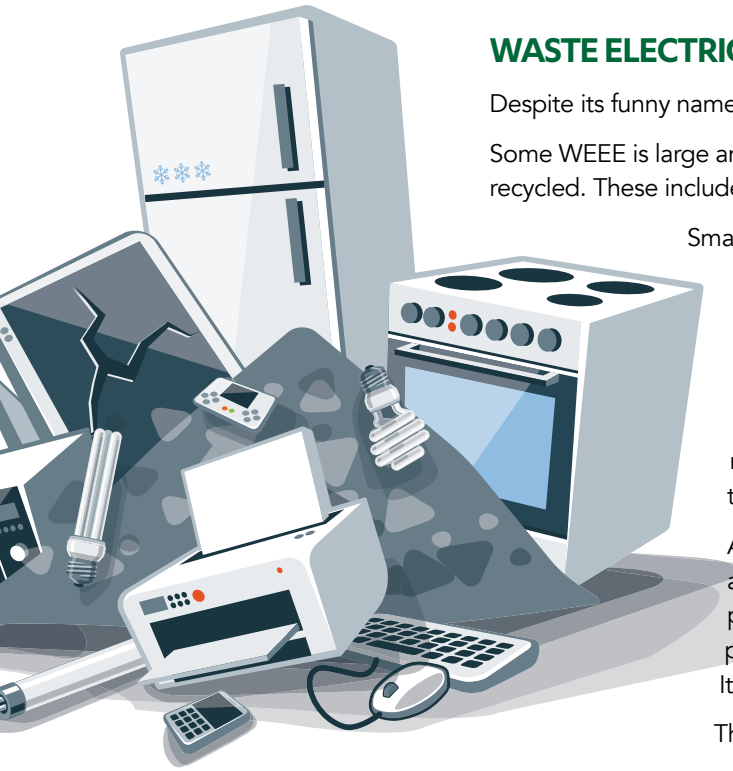
Statistics from ISSB 2022

Spotlight on...

CARS

Cars are part and parcel of our everyday life. There were approximately **32.7 million passenger cars** registered in 2020 in the UK. Most of these cars will eventually become an end-of-live vehicle (ELV). So, what happens to them?

A car is typically made up of **65% steel and iron** and will go to specialist metal recycler called an Authorised Treatment Facility (ATF) to either be broken down for spare parts or crushed, shredded and seperated into ferrous and non-ferrous ready to be made into new metal. The other 35% includes durable plastics, textiles and glass.



WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

Despite its funny name, WEEE makes up a huge number of items that need to be recycled.

Some WEEE is large and bulky and made up mostly of metal and therefore quite easily recycled. These include washing machines, fridge freezers and ovens.

Smaller electrical and electronic items, that require more sophisticated processes to recycle them, include: mobile phones, computers, tablets, and TVs.

The scale of unwanted electrical waste in the UK is vast. In 2021, UK households bought nearly **40 million new electrical items** in the period between Black Friday and Christmas. This results in around two million being put into the recycling stream, while the rest of the old technology is hoarded, or worse, thrown away in the general waste.

Although they look like mainly plastic, these items contain an array of precious and other metals. For example, a smart phone can contain 0.034g of gold, 0.34g of silver and 0.015g of palladium. This is in addition to 1000th of a gram of platinum. It also contains 25g of aluminium, and 15g of copper.

The average television contains **6% metal**.

WEEE should not be put in the bin. It needs to be taken to a **HWRC**, returned to a retailer who takes back electrical appliances or a scrap yard so that it can be **recycled**.

DID YOU KNOW:

One tonne of smartphones can contain **300 times** more gold than one tonne of **gold ore**

Batteries

KEEPING PEOPLE SAFE IN THE RECYCLING INDUSTRY

Batteries can be recycled and a host of metals can be found in batteries including; zinc, nickel, lithium, mercury, silver, lead, and cadium.

Batteries are normally found in WEEE, and they can either be single-use batteries, like AA batteries used in a children's toy, or a battery that can be recharged, such as in a mobile phone.

The batteries may be able to be removed from a device for recycling, or the batteries might be fixed into a device. Therefore, it is always vital that the whole device is recycled, not only to recover the metals, but to ensure they are recycled safely.

One of the most widely used batteries is lithium-ion. These are the main rechargeable batteries found in, among other things, mobile phones, power tools, e-scooters, e-cigarettes, and electric vehicles.

Unfortunately, they are also one of most widely talked about because they can be the most dangerous. If they are tampered with or damaged, they can cause fires and even explode.

A FIRE HAZARD

The incorrect disposal of lithium-ion batteries is one of the biggest health and safety threats that has ever been faced by the waste and metal recycling industries. There has been a significant rise in the number of fires at waste and recycling sites, including metal recycling sites, due to concealed lithium-ion batteries.

The fire will be caused when the battery is damaged because someone wasn't aware of how to dispose of them, or because they have been intentionally put in a general waste bin or hidden in a load of scrap metal.

Due to the nature of how waste, recycling, and metal is processed, the batteries can be damaged and pierced, which causes the chemicals within the battery to ignite and set on fire. It also may cause the battery to explode.

These fires and explosions could occur when the waste and recycling site is unmanned, but can also occur in waste lorries, on picking lines, or in a waste or recycling shredder.

Sadly, these fires are not limited to waste and recycling sites. Spontaneous fires can also occur in the home, more often because the lithium-ion battery has been overcharged or a battery has become damaged.

Batteries and their chargers should be always bought from reputable sources, suitable for the device that is being charged and used with care.

HOW TO DISPOSE OF YOUR BATTERIES

In order to be safely recycled, batteries can be taken to a specialist recycler if you have one in your area, you can check your local council website to find a local Household Waste and Recycling Centre (HWRC), or a retailer that offers a take back scheme, such as a supermarket or an electrical shop.

*More than **20,000 tonnes** of batteries end up **in landfill** each year. The toxins that these batteries release can contribute to water pollution.*

Source: Zero Waste Scotland

A highly technical industry

The purpose of recycling scrap metal is to prepare it for use in a smelter or a furnace.

Metals recycling is a highly technical industry, with millions of pounds worth of investment in various types of tools and machinery to ensure a highly effective and efficient process. Metals can be recovered, thanks to innovative technological advancements.

A key process to enable efficient metals recycling is media separation, whereby metal is separated either from other metals, or other materials it has been mixed with, such as plastic.

Most scrap metal will need to be broken down into a more manageable size to enable it to be processed. This might take of the form of hot cutting, or the use of a shear.

A metal recycler can also use machinery known as shredders/ fragmentisers to reduce the size of metal. This could be on a large scale when a car be can reduced to a fist-sized lump, or it can be small to mid-scale such as granulators. Once the item is shredded, the shredded pieces are sent to be separated.

Car baler image courtesy of Lefort

If the metal recycler doesn't have the means to shred or separate metals, they might use a baler, that can crush, cut and bale metal enabling a more compact size for transportation.

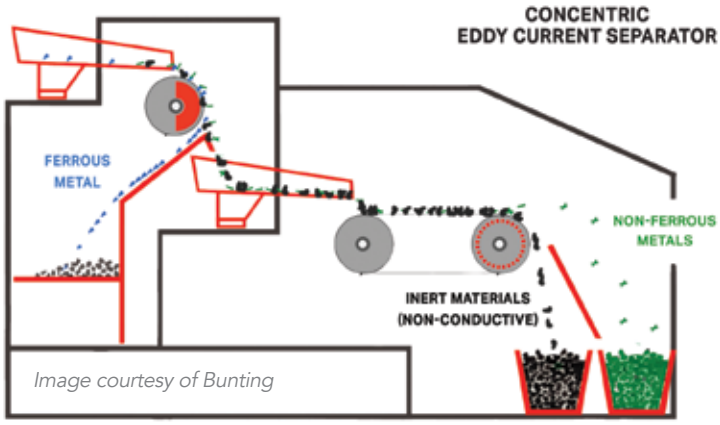


Image courtesy of Bunting

While ferrous metals are easily separated from other material thanks to its magnetic properties, non-ferrous metals require a further separation process.

An eddy current separator is used to separate non-ferrous metals from non-metallic materials. Magnets move in such a way that it creates a magnetic field where non-ferrous metals, like aluminium and copper, behave like magnets for a split second, meaning they spring into the air and collect together.

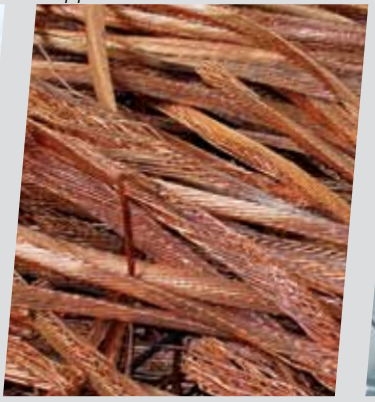
Metal recyclers can also use technology such as sensor-based sorting, as well as XRF (X-ray fluorescence), usually a hand-held device, to further identify the metal or alloy.

All of this technology enables metal recycling to increase the purity of the metal ready for smelting and the furnace, and further increases the amount of metal that can be separated and recycled in the future.

The most processed metals in the UK

Aluminium

Copper



Steel

Lead