

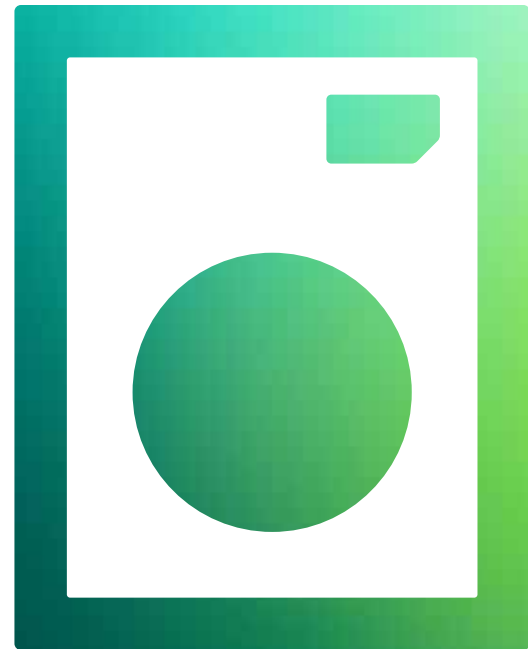


WEEE Recycling Carbon Impact Report 2024



This is equivalent to

4,216 train journeys from London to Glasgow



How working with Ecogenesys delivers net carbon savings

WEEE recycling through Ecogenesys

Every tonne of electrical waste that Ecogenesys collects to fulfil your Producer Responsibility obligation enters the Waste Electrical and Electronic Equipment (WEEE) system in the UK. This system incorporates transport, treatment and recycling processes, which all result in carbon emissions.

The outputs of electrical recycling, on the other hand, result in carbon emissions savings from recycled material, electrical reuse and energy-from-waste treatment of non-recyclable material. These outputs reduce the need for virgin materials and conventional energy generation, avoiding the carbon emissions that would have resulted from these.

The net carbon saving is determined by calculating the difference between emissions produced and emissions avoided, representing the overall environmental benefit of recycling the waste electricals collected by Ecogenesys.

ISO accreditation

The Ecogenesys carbon model was independently peer reviewed to ISO14044 standard in 2025, which is the international standard for life cycle assessment (LCA). This accreditation ensures that the model is robust, reliable and consistent with global best practices for how environmental impacts, such as carbon footprint, should be measured and reported.

A copy of the report is available on request.

How was this achieved?

The Ecogenesys carbon model quantifies the carbon emissions (measured in tonnes of CO₂e) generated for every tonne of electrical waste that Ecogenesys collected on behalf of its members. It does this by combining data from the transport and treatment operators with carbon emissions data for these processes. It then quantifies the carbon emissions avoided by the recycled outputs and energy generated from the treatment of waste electricals.

The model uses direct data obtained from Ecogenesys' Approved Authorised Treatment Facilities (AATFs) and transport operators, as well as information from central databases, such as the widely recognised Ecoinvent lifecycle inventory database.

What was done?

Version one of the model was developed in 2021 through a collaboration between Ecogenesys (REPIC) and Lancaster University. The initial version used 2019 data and encompassed all waste electricals collected by Ecogenesys during that year.

Version two of the model was completed in 2024 with support from Small World Consulting, and was certified to ISO 14044 by SLR Consulting in 2025. Building on the foundation of the version one model, the updated model incorporates 2023 data from selected parts of the supply chain, emphasising consistent assumptions and the collection of robust data. Additional primary data was sourced from UK plastic processors, UK energy-from-waste facilities and standard data from cement kiln energy recovery. These enhancements have improved the specificity of the model to the UK WEEE system.

What is the benefit?

The primary benefit of this carbon model is the ability to quantify the environmental impact of electrical recycling in the UK, taking account of the impacts and benefits. By replacing virgin material production, significant carbon savings are achieved. The information from our carbon model will help optimise recycling operations, identify areas for improvement across transport and treatment, as well as providing data to promote the net carbon savings from recycling end-of-life electricals.

End-of-life Electrical Recycling: Processes and Technologies

Recycling end-of-life electricals is a highly advanced and environmentally responsible process that reduces carbon impact while recovering valuable resources. Once items are delivered to an Approved Authorised Treatment Facility (AATF), they undergo a complex technology-driven process beginning with inspection for reuse potential and the safe removal of hazardous components such as batteries, cables, oils and refrigerant gases using specialised depollution tools.

Mechanical deconstruction follows, using powerful separation technology to break items down into manageable parts. Automated systems are used for highly efficient material recovery, including:

- Air and mechanical separators
- Sink-float tanks
- AI-powered optical sorters
- Robotic arms

Recovered materials can be used in new products. A small amount of non-recyclable or hazardous materials, such as plastics containing Persistent Organic Pollutants (POPs), which are mandated by legislation to be destroyed, are directed to high temperature facilities that convert the thermal energy generated into electricity or heat, ensuring that even non-recyclable materials contribute to resource efficiency and sustainability.

Each electrical stream - Cooling Equipment, Display Equipment, Large Domestic Appliances LDAs and Small Electrical Items SMW - has its own tailored treatment process, reflecting the unique materials and hazards they contain.

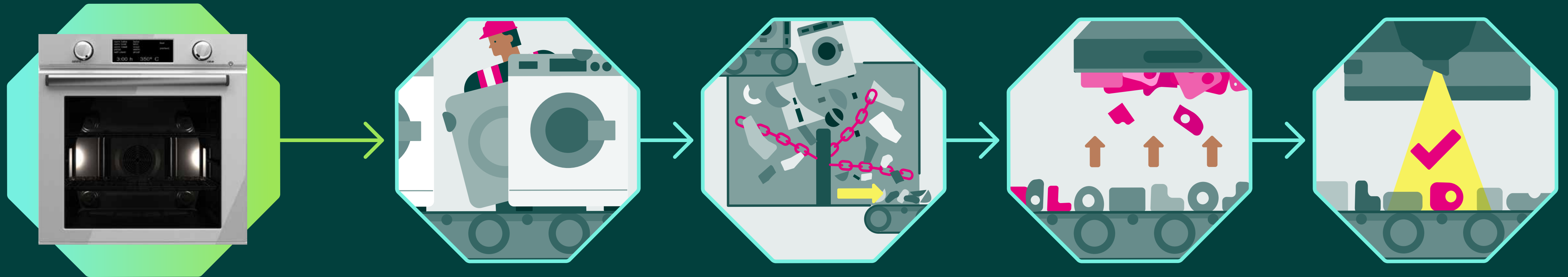
An overview of the journey that the items your organisation produces, from user disposal to treatment and material recovery, is summarised on the following pages of this report.





Every time you recycle your old electricals, you're starting a journey that turns waste into valuable resources and helps the transition to a more circular, sustainable future.

Recycling Large Domestic Appliances



Large domestic appliances (LDAs) including washing machines, cookers and dishwashers are made from durable materials such as steel, aluminium, wiring and plastics. At the end of their life, they require careful treatment to recover valuable components and reduce waste to landfill.

Pre-sorting and preparation
LDAs are delivered to the recycling facility and inspected to ensure they do not contain any cooling elements or hazardous materials. Any removable items such as plugs, cables and drums are separated before mechanical processing to maximise recovery.

Mechanical shredding
Once prepared, the appliances are fed into a high-powered shredder which breaks down the items into smaller components. This step helps to break apart dense casings and free up internal materials for further efficient separation.

Ferrous and non-ferrous metal recovery
Following shredding, a strong electromagnet is used to extract ferrous metals such as steel and iron, which are then sent for reprocessing into new products. The remaining stream passes through an eddy current separator, which targets non-ferrous metals such as aluminium and copper for recovery.

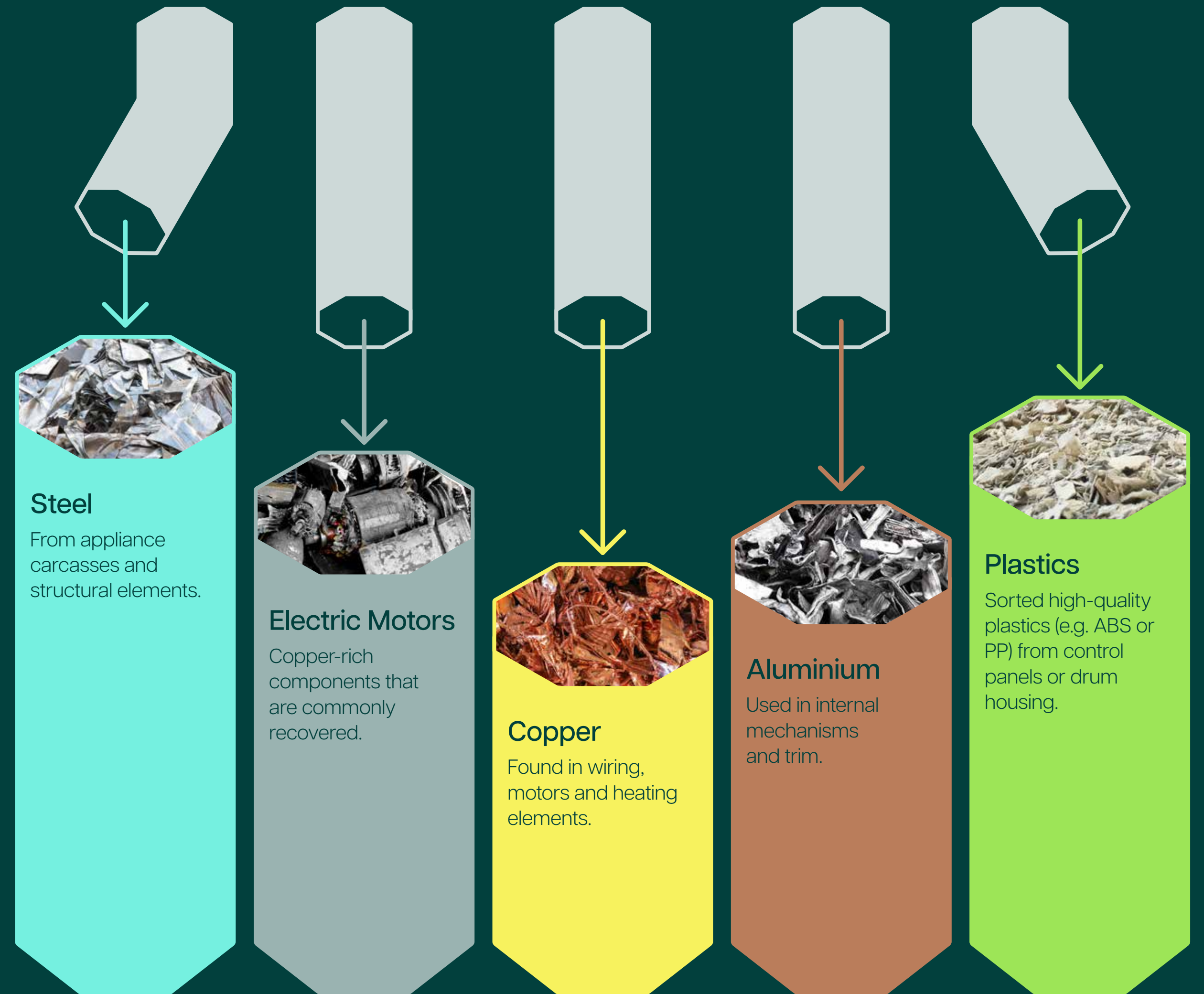
Electric motors are also recovered and are sent for copper recovery. Some heating elements and thermostats may contain nickel-chromium alloys (nichrome), which are valuable in specialist recycling streams.

Plastics, glass and residual material separation
Advanced sorting technologies, including optical sortation, are used to identify and recover plastic fractions from the remaining material. Any leftover residuals are sorted further or disposed of responsibly, with an emphasis on maximising material recovery and minimising environmental impact.

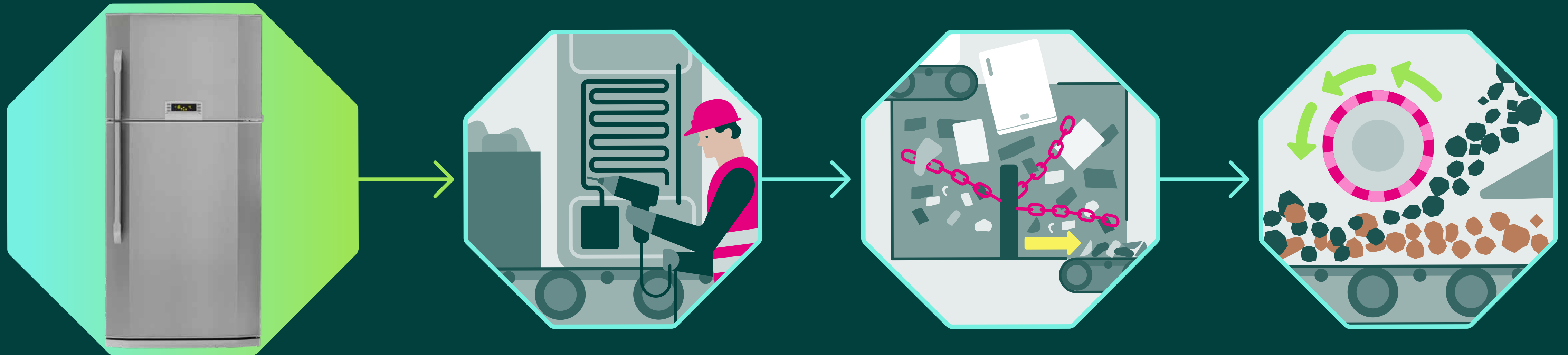
Recycling high-grade steel, aluminium and other metals from LDAs helps significantly reduce the carbon footprint compared to primary extraction.

Outputs: Fit for a new future

The materials recovered from recycling large domestic appliances will be used in new products to reduce reliance on virgin materials.



Recycling Cooling Equipment



Fridges and freezers contain a complex mix of materials, from metals, glass and plastics to oil, insulation foam and refrigerant gases. Proper recycling ensures that hazardous substances are safely removed while valuable materials are recovered for use within new products.

Not only does this process contribute to giving new life to resources, it also protects our environment from Ozone depleting substances.

Notably, the recycling process safely captures refrigerant gases, some of which have global warming potential thousands of times higher than CO₂.

Preparation for recycling and de-gassing

Cooling equipment enters a precheck stage. This includes checking for contamination and the manual removal of glass shelves, plugs and cables.

The next step is de-gassing. A specialist gun pierces the coolant circuit to extract refrigerant gases and compressor oil.

Hydraulic tools are used to remove compressors, which contain copper, aluminium and steel. These will be further dismantled for recycling.

Mechanical breakdown and separation

The remaining product, the fridge carcass, is then fed into the mechanical separation process chamber, which breaks down plastics, metal and foam components. The separated material is transferred to heated conveyors for conditioning and the removal of remaining gases, where PUR foam (polyurethane insulation) is separated using a vibrating screen and bagged for further reprocessing or energy recovery.

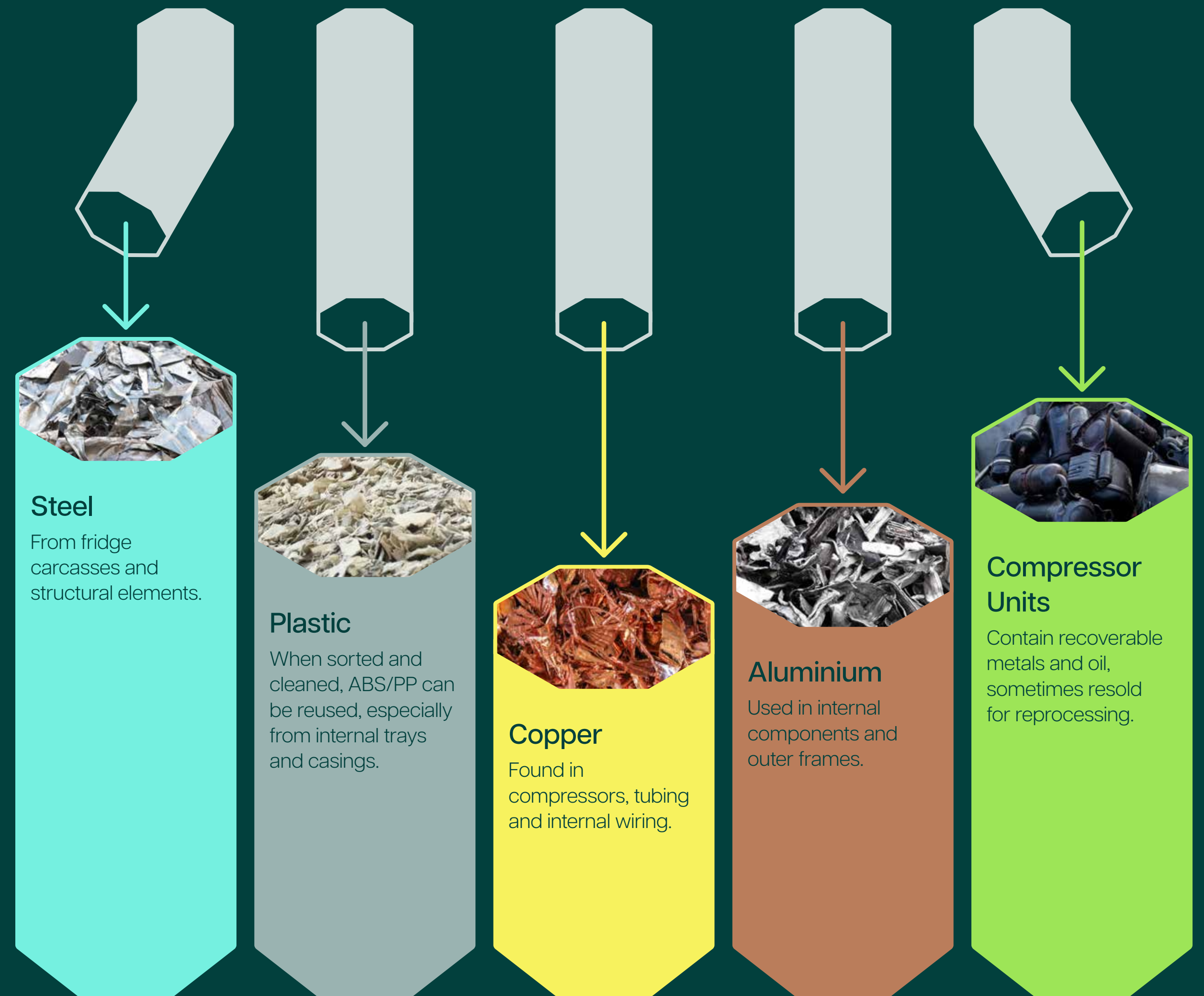
Metal, plastic and gas recovery

Magnets and eddy current separators are used to extract ferrous and non-ferrous metals from the remaining material. Plastics are sorted for further processing. Gases released during the mechanical separation are captured by a cryogenic plant, liquified and stored in pressurised tanks before final safe treatment via high-temperature incineration and energy recovery.

High-grade steel, copper and aluminium are recovered and sent to secondary smelting facilities—saving up to 95% of the energy used in virgin extraction.

Outputs: Fit for a new future

The materials recovered from recycling cooling equipment will be used in new products to reduce reliance on virgin materials.



Recognising our environmental achievements today



Bertazzoni are proud to be members of Ecogenesys. 98% of the materials used in our products are recyclable and soon all packaging will have no polystyrene. Working with Ecogenesys, we ensure that all the old appliances we collect from our customers are recycled in a sustainable manner, contributing to the circular economy and a better future for us all.

Maurizio Severgnini
CEO, Bertazzoni UK

Guidance on the Ecogenesys model

Our model carried out a detailed analysis of data, beginning with the point at which electrical equipment was deposited and collected as waste, and continuing through its treatment. This included the recovery and production of secondary raw materials using advanced recycling technologies. The analysis calculated both the carbon emissions generated and those avoided for every tonne of WEEE that Ecogenesys collects.

The limited amount of material unsuitable for recycling is directed to energy recovery or disposal and the emissions from these processes are included. The results provide a carbon calculation to measure the environmental impact and identify opportunities for future reduction.

This model only assesses the end-of-life stage and does not include production and use phases of electrical and electronic equipment (EEE); these are out of scope for this report.

Our carbon model follows both ISO14044 and the CENELEC life cycle assessment rules, ensuring best practice is followed in the data collection and methods. Carbon impact can vary between AATFs due to differing operations, recovery rates and the proportion of material sent to various treatment processes. The results in the model represent a sample of Ecogenesys' AATFs, not the specific AATFs that your WEEE obligation was treated at.

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Guidance on how to use the figures

Members can use the net carbon saving figure in sustainability messaging and reports and internal briefings to show the impact of their WEEE recycling.

Please ensure that when using the figures:

1. The net carbon saving is for the end-of-life lifecycle stage only and is based on collected WEEE by Ecogenesys.
2. Do not use the figure in your Scope 1, 2 or 3 emissions – the boundary of the model is wider than that required in downstream Scope 3 'End-of-Life Treatment of Sold Products', which must exclude the emissions from recycling processes and their avoided emissions.
3. Do not use this figure to claim your organisation is "carbon neutral" as the figure includes avoided emissions from recycling, not the full carbon footprint of product or operations.
4. Acknowledge the data boundaries by making it clear that the model excluded the production and use phase of electricals, and that figures may vary between AATFs due to different recovery efficiencies.

Source for personalised data conversion (p2):

The equivalent carbon net saving is based on verified data from 'How Bad are Bananas: The Carbon Footprint of Everything' by Mike Berners-Lee and/or Arbor, the carbon accounting platform.

Acknowledgements and Restrictions

We would like to thank Gap Group NE LTD for supplying the images used on page 5 of this report.

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