

Aluminium is a perfect fit for the Circular Economy

Aluminium is a key material for the Circular Economy. Aluminium has been recycled from the beginning of its industrial production 125 years ago; as a result, today about 75 percent of all aluminium ever produced remains in use.

Around half of the aluminium produced in Europe originates from recycled materials. Today, we have reached recycling levels of 90-95 percent for end-of-life vehicles and building parts and over 73 percent for beverage cans.

Aluminium - and metals in general - can be recycled without loss of quality. As the metallic bonds are restored upon re-solidification, metals continually recover their original performance properties, even following multiple recycling loops. This allows them to be used repeatedly for the same application. In contrast, the performance characteristics of most non-metallic materials degrade after recycling (see Annex 1).

As the energy required to recycle aluminium is around 5 percent of that needed for primary production, the environmental benefits of recycling are clear. The amount of energy saved through recycling (up to 95 percent) corresponds with an equivalent saving of greenhouse gases.

The recycling of used aluminium is relatively easy and pays off!

The recycling of aluminium products includes three main steps:

- 1) collection,
- 2) sorting, and
- 3) melting and casting into new aluminium products.

Collection of aluminium from end-of-life building products is informally established due to the high value of aluminium scrap, although there might be room for improvement of collection practice to avoid building products scraps, often mono-alloy, being mixed with other scrap flows and exported out of Europe. The German [AUIF](#) initiative aims to address this issue.

Sorting aims to extract an 'as pure as possible' aluminium fraction through various steps. Following shredding, magnets attract ferrous metals while eddy-current allows the separation of remaining non-ferrous metals from organics and minerals. Aluminium can then be separated from other non-ferrous metals based on its density, either by heavy media separation (sink float) or, more recently, by X-Ray Transmission-XRT equipment (see Annex 3).

Melting aluminium, the final recycling step, can either be done by refiners or remelters:

- Refiners process all kinds of scraps, including mixed alloys and soiled scrap. They mainly produce casting alloys for foundries.
- Remelters mainly process wrought alloy scrap. They produce extrusion billets or rolling slabs.

Evolution of processes and technologies

Sorting technology evolves rapidly, and new plants are emerging that can produce high-purity aluminium fractions suitable for re-melting into new extrusion billets, with a minimal input of primary aluminium (see 'New route' in Annex 3). A growing number of remelters are also able to process coated¹ or polymer-containing scraps.

¹ When it comes to coatings applied to window frames, it should be noted that about half of it is already detached during shredding, while the other half can be eliminated by a complementary decoating at the remelting plant.

These plants demonstrate the technical feasibility of producing window profiles with a high recycled content and prove the superior recyclability of aluminium. However, the supply of high recycled content window frames is limited by the availability of scrap, which is insufficient to meet current demand, as explained in the next paragraph.

‘End-of-life recycling rate’ and ‘Recycled Content’, why do they differ?

Aluminium is a relatively new material and its use has progressively increased along the years. Currently, around 20 percent of the aluminium produced is used in buildings and 40 percent in vehicles. These two applications are characterised by relatively long lifespans, and efforts are made to increase the durability and the performance of components in order to increase their lifespan further and, in some cases, also allow products to be re-used. This aspect, desirable from the functional and technical point of view, has some drawbacks when considering recycling. The quantity of aluminium that we can currently collect from vehicles and buildings at their end-of-life is the same as was used to make them 15, 20 or 50 years ago. Since the amount of aluminium used has increased steadily in the years, what can be collected and recycled today - even assuming 100 percent recovery of the available aluminium that reached its end of life stage - will not be sufficient to satisfy the current demand. In other words, while the stock of aluminium is increasing rapidly, the secondary aluminium available from products at end-of-life is growing much slower, due to the long and increasing lifespan of the main applications.

As this limited scrap volume cannot meet the increasing demand for aluminium (see Annex 2), the shortfall must be met by the primary aluminium industry².

Calling for a high recycled content in a specific aluminium component will not change the global situation. In fact, the secondary aluminium available today is already completely recycled and is used to produce new products. Imposing minimum recycled content figures for a specific product will simply take recycled aluminium from other products without a minimum threshold. While this will reduce the environmental impact of a particular product (for example, a window) it will not affect the overall picture. Instead, it will only displace the burdens and the benefits from one product to the other.

Instead, higher end-of-life recycling rates will be far more useful in further stimulating the collection and recycling of used aluminium. The additional resulting secondary aluminium will be absorbed by the market and find its way into new products. For these reasons, as a key indicator for the circular economy, the environmental benefits of end-of-life aluminium recycling should always be fully considered in life-cycle assessments, regardless of the lifespan of products (60 days for cans, 10-20 years for cars, 20 to over 50 years for building products). Recycling is already an integral part of our industry; it does not need artificial incentives such as minimum recycled content requirements to stimulate the demand for recycled materials³.

‘Window to window’ profiles recycling

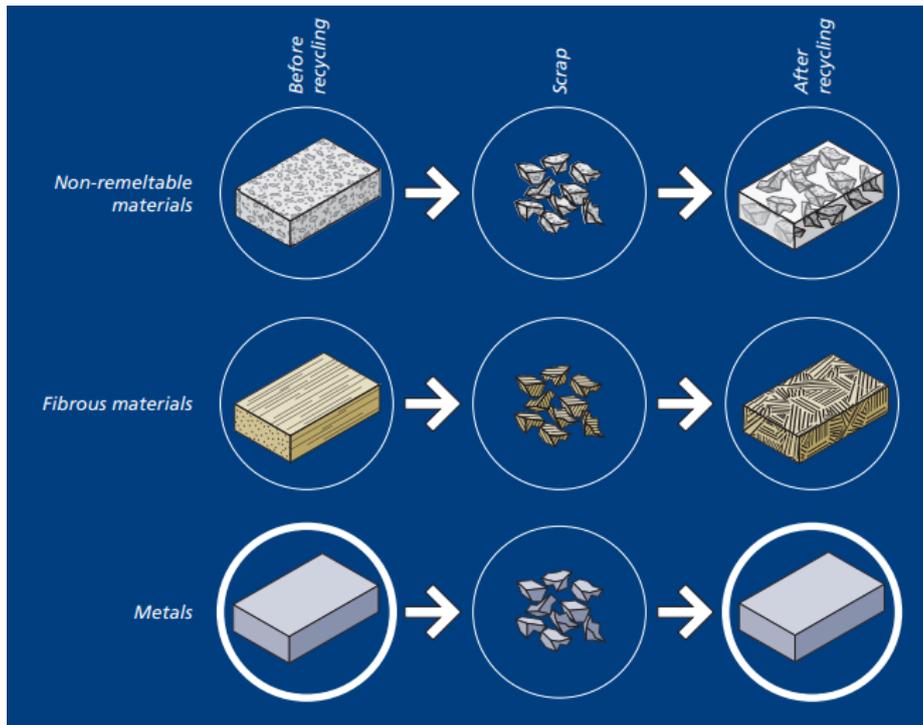
‘Window-to-window’ profiles recycling makes sense when sufficient volumes of window scrap can be collected and shipped to a single location with reasonable transport distances. We think this will develop further in the future, stimulated by the development of end-of-life window collection schemes. However, we normally consider the current recycling of used aluminium items into other aluminium product families (e.g. automotive profiles or castings) as being of the same quality; they contribute equally to the overall recycling performance of the industry, as ultimately it is substituting for primary aluminium.

² Primary aluminium is also improving, with a CO₂ footprint that is 3 times lower in Europe than in China (see our [Environmental profile report](#))

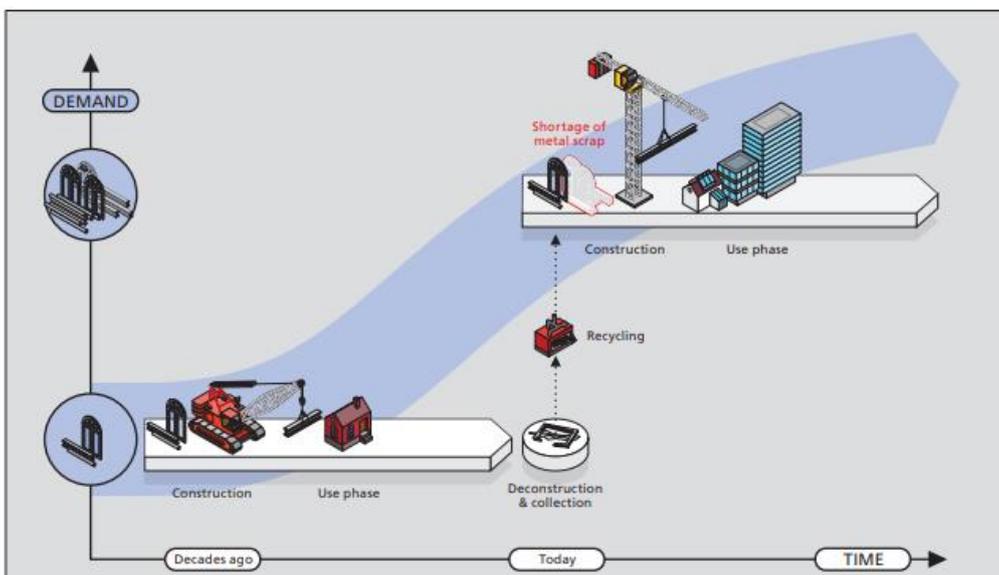
³ See also [Recycled Content vs. End-of-Life Recycling Rate](#)

Annexes

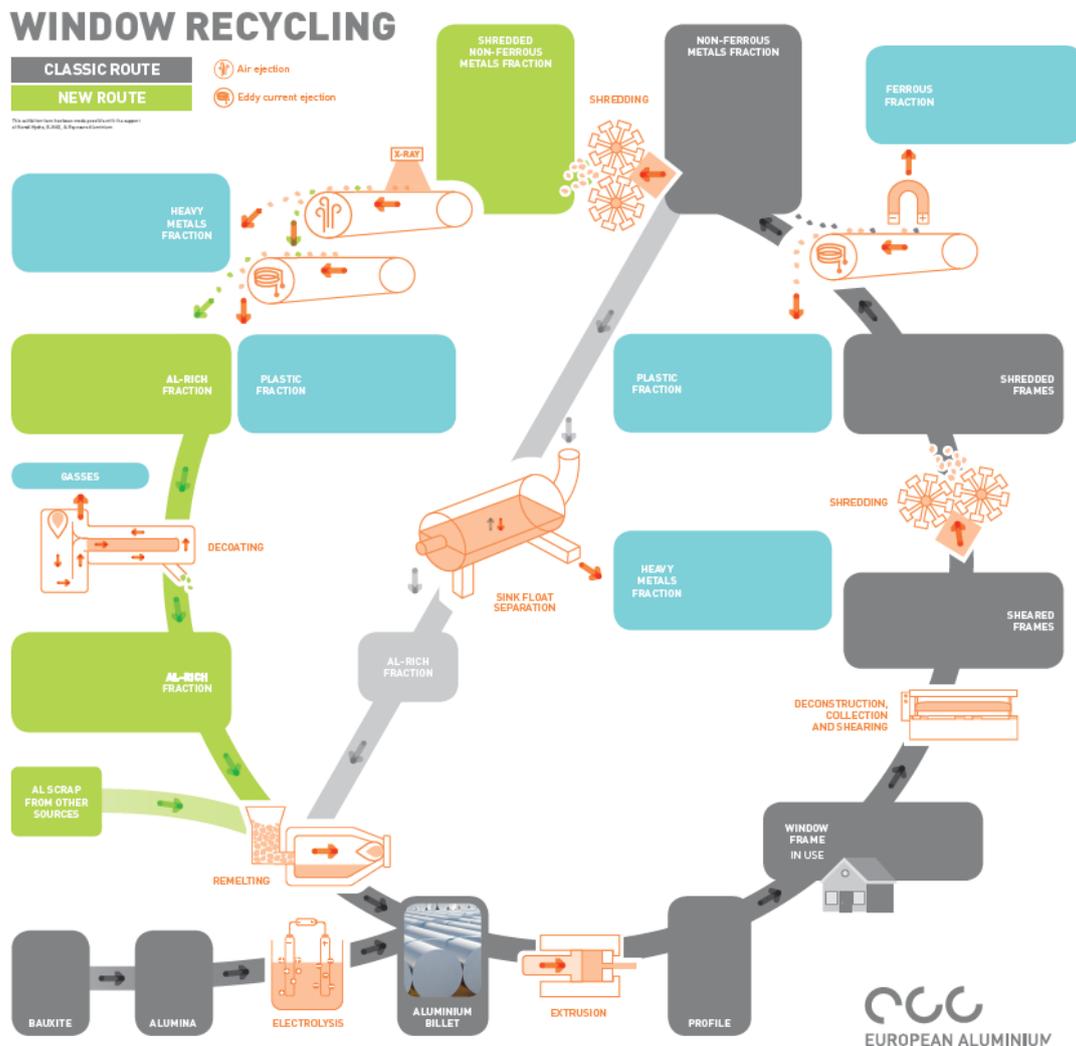
1. Metals remain metals (Source: www.metalsforbuildings.eu)



2. “Recycled content” vs. “end-of-life recycling rate” – why can they differ?



3. Closed loop recycling of aluminium window profiles



About European Aluminium:

European Aluminium, founded in 1981, is the association that represents the whole value chain of the aluminium industry in Europe. We actively engage with decision-makers and the wider stakeholder community to promote the outstanding properties of aluminium, secure growth and optimise the contribution our metal can make to meeting Europe’s sustainability challenges. Through environmental and technical expertise, economic and statistical analysis, scientific research, education and sharing of best practices, public affairs and communication activities, European Aluminium promotes the use of aluminium as a permanent material that is part of the solution to achieving sustainable goals, while maintaining and improving the image of the industry, of the material and of its applications among their stakeholders.