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A|U|F and European Aluminium building scrap flow study in Germany

A|U|F e.V.

**Aluminium und Umwelt
im Fenster- und Fassadenbau**

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that the sources «A|U|F and European Aluminium» are mentioned.

Introduction

Sustainable Environmental and Resource Protection is achievable – for example, and particularly effectively, through the certified recycling system of A|U|F.

Germany holds a leading position when it comes to energy- and resource-efficient use of aluminium: low energy consumption, high climate compatibility, a steadily increasing share of secondary metal, and exemplary recycling rates are standard.

A|U|F goes even further: we promote a closed-loop recycling system for aluminium scrap from the building envelope sector, including windows, doors, façades, and more. The work of A|U|F is a success story – both in quality and quantity!

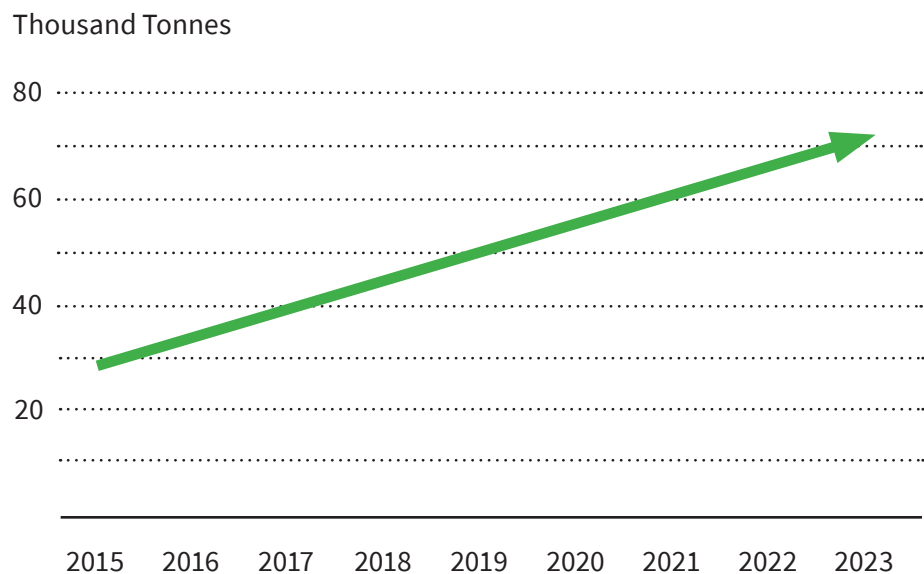
Since 2015, Conversio Market & Strategy GmbH, on behalf of A|U|F, has been preparing a scrap volume scenario for aluminium windows, doors, façades, solar shading systems, as well as roof and wall cladding. This study records the relevant material flows of aluminium scrap in the construction sector and subjects them to detailed analysis.

The Scrap Volume Scenario 2023 is currently the most comprehensive and differentiated industry report on the use and recycling of aluminium in the construction sector. The preparation of the current study was generously supported by European Aluminium.

Thomas Lauritzen – Chairman of the Board

„The quantity of aluminium scrap collected and processed through A|U|F amounted to around 70,500 tonnes in 2023.“

1 Development of quantities A|U|F



Tasks and Objectives

The A|U|F stands for the sustainable promotion of the collection and processing of dismantled building components/profiles, windows, doors, façades and solar shading systems, as well as roof and wall cladding made of aluminium. The objective is material reuse.

The activities of A|U|F also extend to the promotion of the collection of production scrap as well as their processing and recycling. In this way, an environmentally sound, resource-saving and product-specific recycling loop for the profile material aluminium is promoted.

A|U|F offers metal construction companies the opportunity to provide an optimised processing solution for windows, doors and façades in sustainable buildings and thus qualify for tenders.

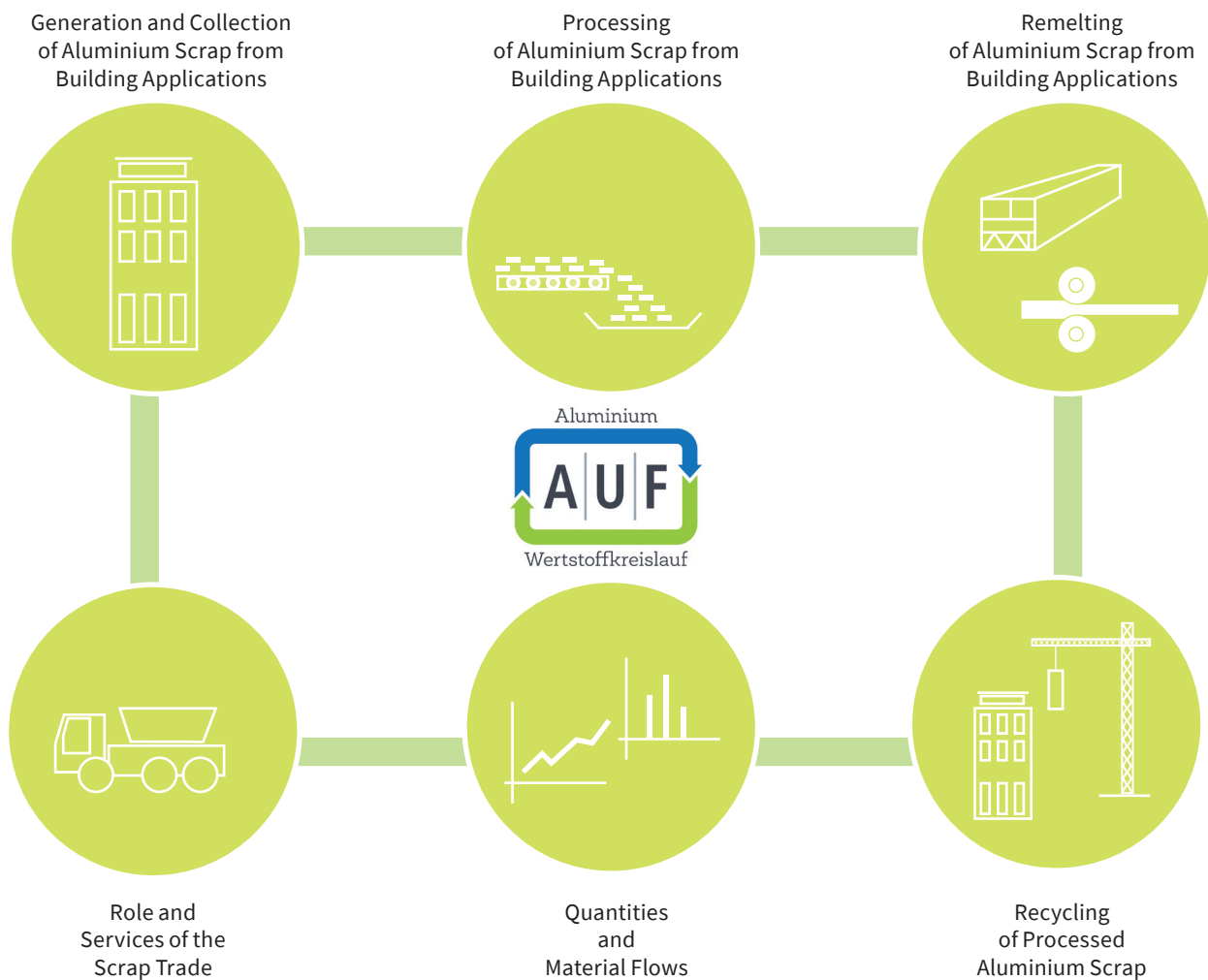
The recycling loop for aluminium organised by A|U|F guarantees that high-quality aluminium profiles are manufactured again from scrap material and that the recyclable material remains in Germany or the European Union. A|U|F enables the industry to sustainably influence and optimise the product-specific recycling process.

A|U|F members include metal construction companies, window and façade construction companies, system providers, as well as demolition or dismantling companies, architects and planners.

Today, more than 250 members actively participate in the nationwide A|U|F recycling loop. Seventeen environmental partners and processors, with a total of around 300 collection points, ensure a professionally organised and reliable recycling system.

The share of processed aluminium has been increased every year since the initiative was founded. In 2023, the amount of aluminium scrap collected through A|U|F had risen to around 70,500 tonnes (t).

2 Concept and Content of the A|U|F-Scrap Study



Transparency and Performance

The A|U|F building scrap flow study identifies the processing potential for aluminium products from the building construction sector through a market survey and presents the development of volumes with the greatest possible differentiation.

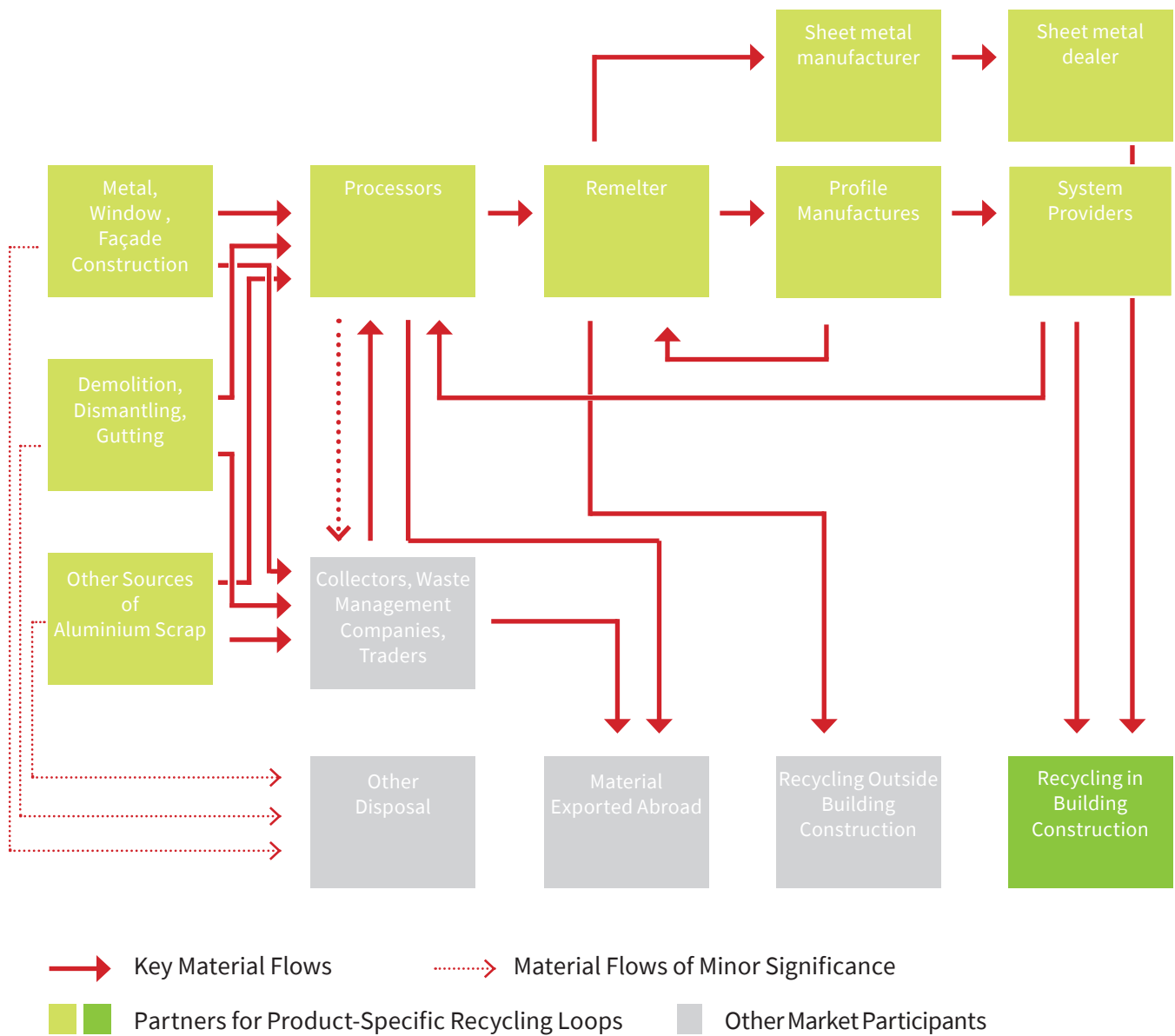
Within the framework of this study, A|U|F enables the analysis and documentation of aluminium scrap generation, processing, and reuse of scrap resulting from the processing of corresponding products from the building construction sector.

The recorded or determined material flows and volumes include windows, façades, doors and gates of all kinds, roof windows as well as accessories such as window sills, rain protection as well as solar shading systems and other aluminium applications in the construction sector.

The diversity of the arising material includes scrap from production and processing, as well as material separated from the waste stream during the manufacturing process (**preconsumer scrap**).

Post-consumer scrap, on the other hand, arises from demolition, and dismantling activities. This means material from residential, commercial and industrial buildings that can no longer be used for its intended purpose.

3 Schematic Material Flows of Aluminium Scrap and Their Recycling



Partners and Data

The volume analyses within the framework of the study include scrap from the building construction sector that arose in Germany in 2023 or was processed and remelted within Germany. As part of a hybrid project approach, both secondary statistical data as well as information from expert discussions and interviews were taken into account.

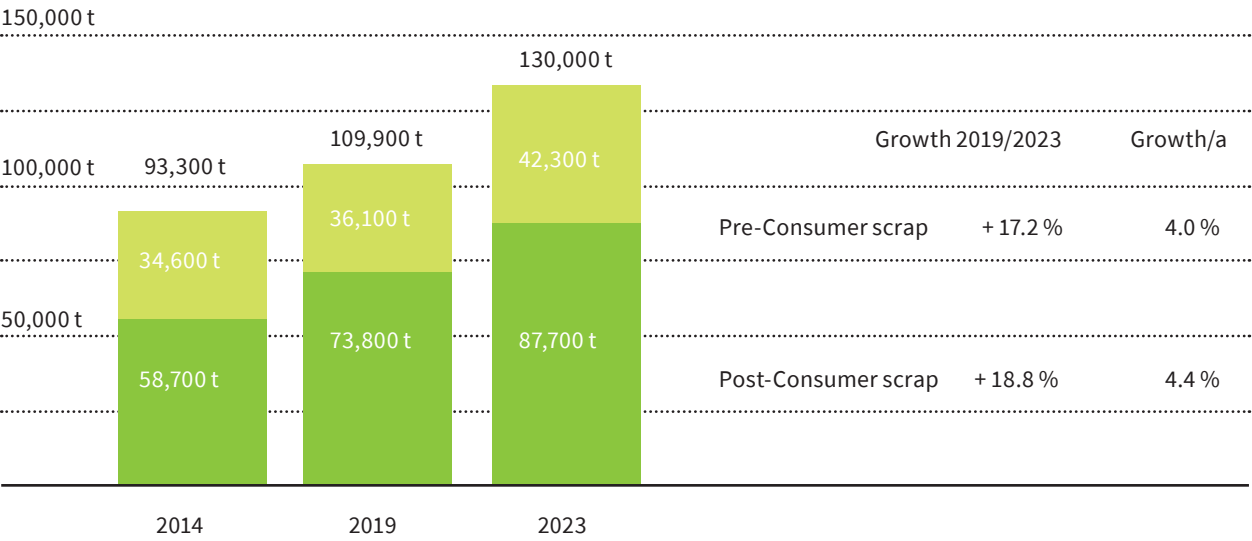
The market participants included in the study are:

- Metal, window, and façade construction companies
- Demolition and dismantling companies
- Scrap dealers and waste management companies
- Recycling and processing companies
- Remelters (remelting and casting plants)
- Profile manufacturers (extrusion plants)
- System providers
- Sheet metal manufacturer
- Sheet metal dealer

The schematic illustration (left) provides an overview of the market participants considered in the study and shows the material flows between the individual market players and application areas.

The exchange of volumes in the scrap trade is particularly complex. In addition to the export of material abroad, there is also trading between dealers within Germany. This was taken into account in the material flow model. The same applies to the transfer of scrap from waste management companies to dealers.

4 **Development of Aluminium Scrap Generation in the Building Sector 2014–2023**
approximate figures, in tonnes



Strong Growth Across All Scrap Categories

In total, aluminium scrap generation from the building construction sector in Germany was estimated at around 130,000 tonnes in 2023.

The majority of the scrap (around 67% or 87,700 t) consisted of **post-consumer scrap**, which primarily arose from demolition or dismantling activities.

Pre-consumer scrap from production and processing (around 42,300 t) originated from metal, window, and façade construction companies as well as from profile manufacturers (scrap from extrusion plants or system providers).

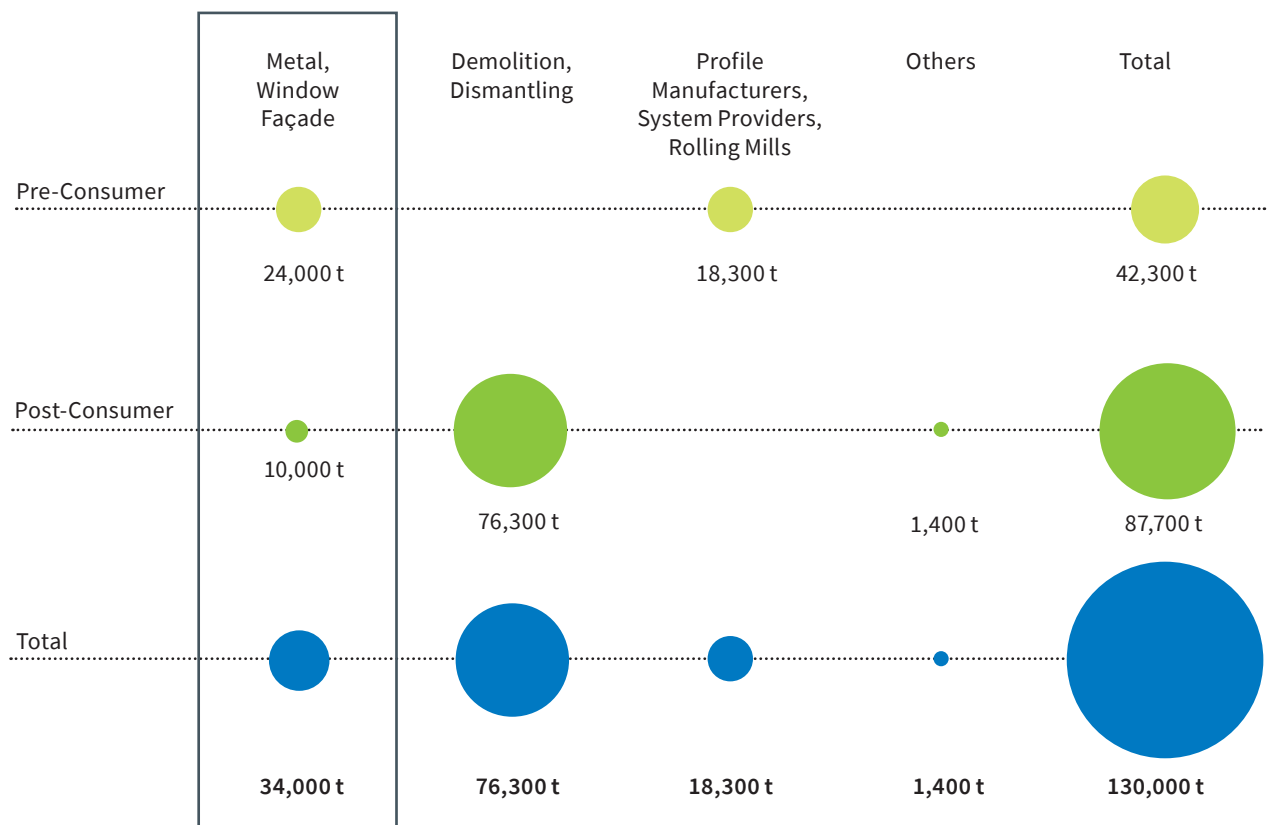
The quantity of aluminium scrap generated in the building sector increased from a total of around 109,900 t in 2019 to about 130,000 t in 2023. This corresponds to overall growth of nearly 19% or an average annual growth rate of about 4%.

The increase in total volumes results partly from rising quantities of post-consumer scrap, which grew to more than 87,000 t in 2023. This rise in post-consumer scrap is primarily attributable to the significantly higher return of material from demolition and renovation activities (e.g., old windows, façades, and other aluminium products).

The volume of pre-consumer scrap also increased significantly, reflecting the ongoing efforts of processors and profile manufacturers to improve material efficiency, but also due to the inclusion for the first time of scrap from rolling mills.

5.1

Matrix of Aluminium Scrap Generation in the Building Sector by Source Area 2023 (approximate figures, in tonnes)



Potential in Metal Construction

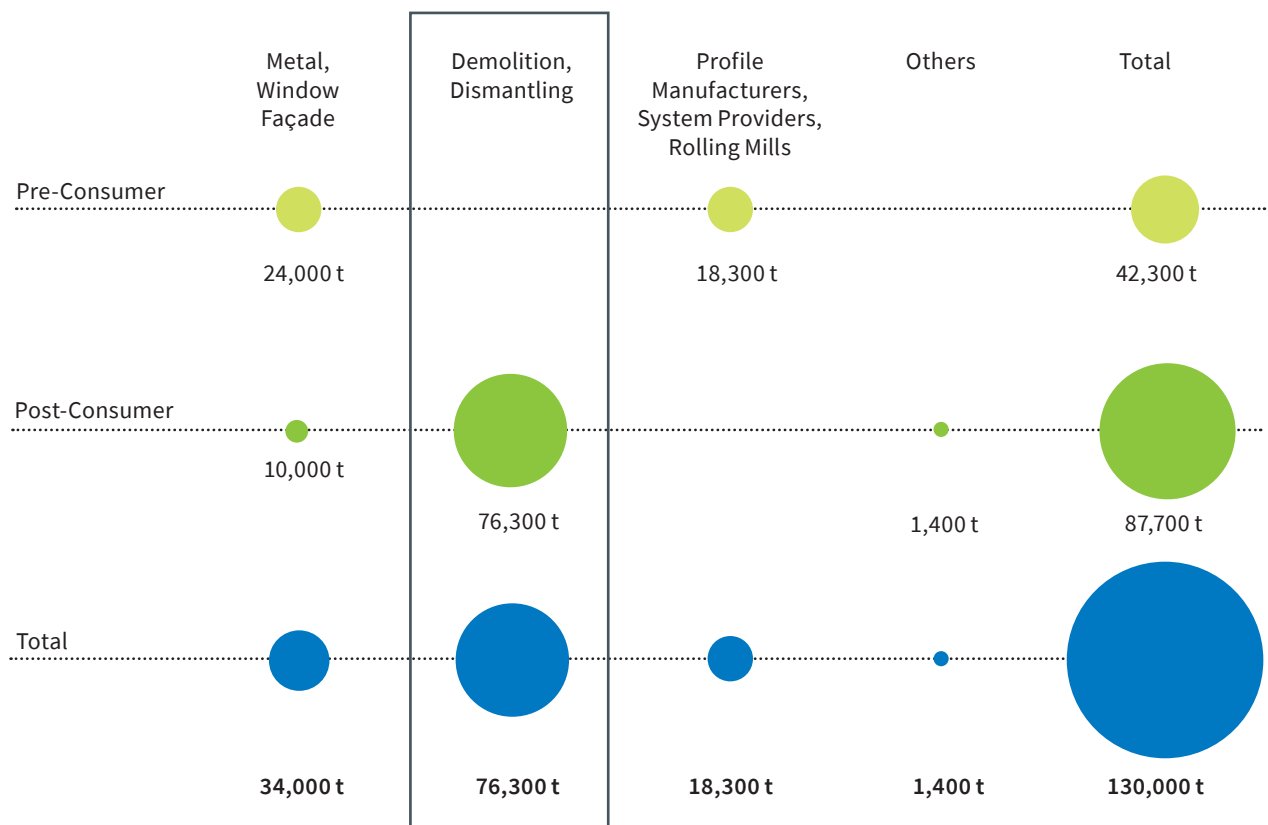
More than a quarter of the total aluminium scrap volume from the building construction sector arises from metal, window, and façade manufacturers.

With more than 1,000 companies in Germany active in processing aluminium products for the building sector, this corresponds to an average aluminium scrap volume of 25 to 30 tonnes per company per year. The majority of this consists of scrap from the processing of profiles and sheets.

With regard to the recorded post-consumer scrap volumes, it should be noted that traditional metal, window, and façade manufacturers only carry out the dismantling of old building components to a limited extent themselves. The recorded increase in post-consumer scrap is primarily due to the stronger return flow of aluminium building products that have reached the end of their service life.

5.2

Matrix of Aluminium Scrap Generation in the Building Sector by Source Area 2023 (approximate figures, in tonnes)



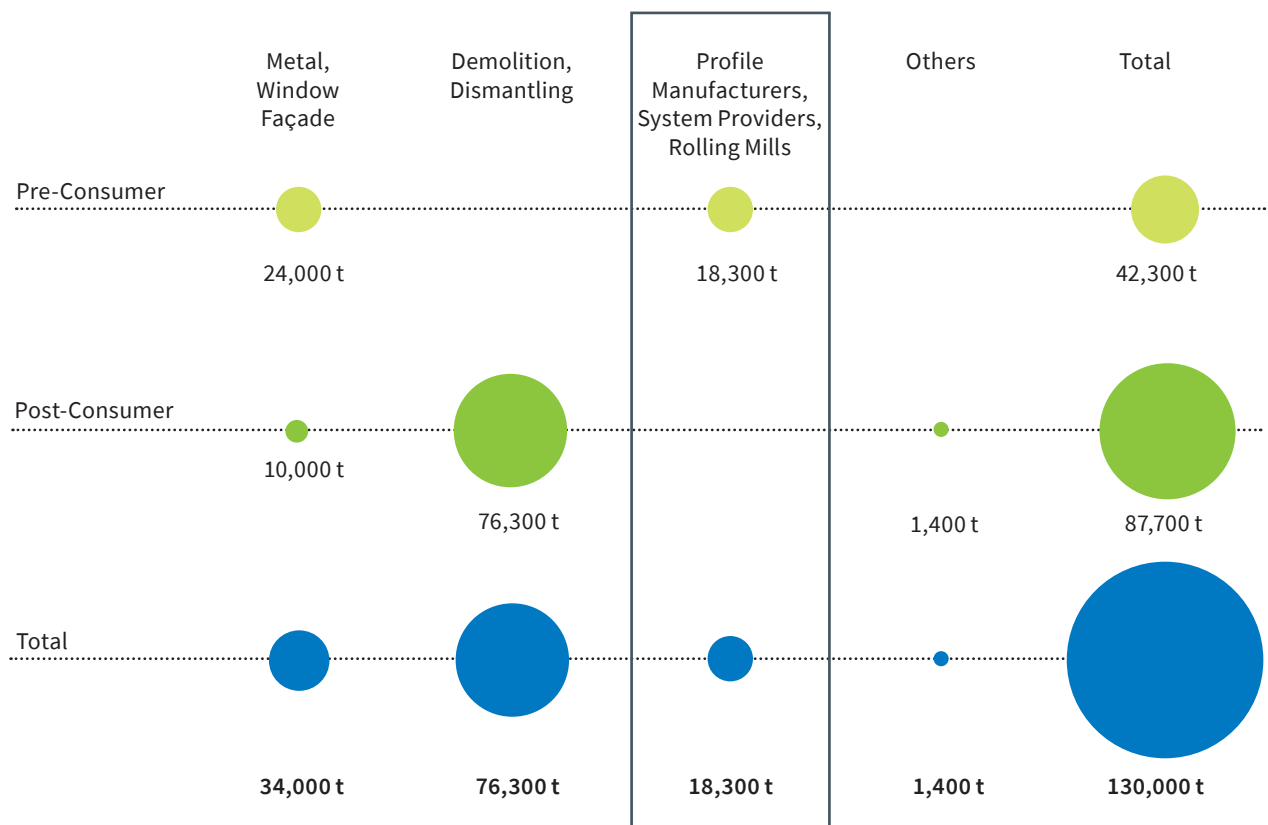
Demolition and Dismantling Account for More Than Half of the Total Volume

More than half (59% or nearly 76,300 t) of the total aluminium scrap volume from the building construction sector in 2023 arose from demolition or dismantling activities.

The share of demolition and dismantling scrap has increased by almost one fifth (19%) compared with 2019. This is due in part to the sharp rise in demolition activities, but also to the generally higher return flow of aluminium building products that have reached the end of their service life.

5.3

Matrix of Aluminium Scrap Generation in the Building Sector by Source Area 2023 (approximate figures, in tonnes)



Closed Loop at Profile Manufacturers and System Providers

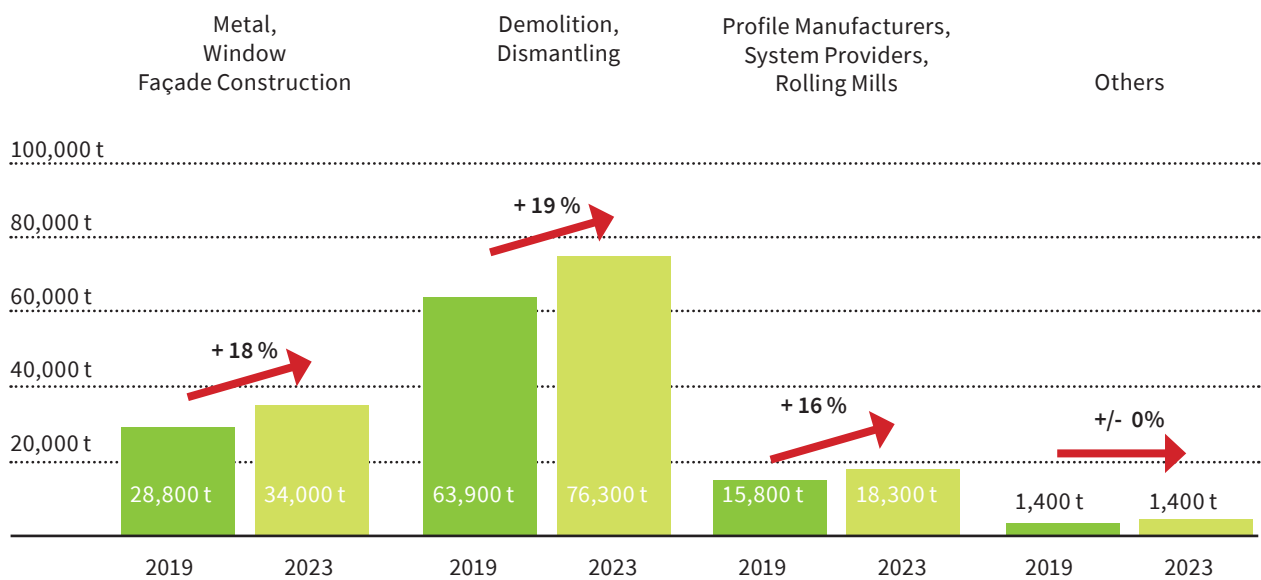
In 2023, around 18,300 t of aluminium scrap for recycling arose at system providers and profile manufacturers (extrusion plants).

The majority of this volume consists of production scrap, which are usually remelted by a remelter and subsequently fed back into profile production.

A smaller share of the material consists of scrap from system providers within their own extrusion plants. Not included are run around scrap that were reprocessed internally in foundries at profile manufacturers or rolling mills and returned directly into the production cycle.

6 Aluminium Scrap Generation in the Building Sector 2019–2023

(approximate figures, in tonnes) – Changes in %

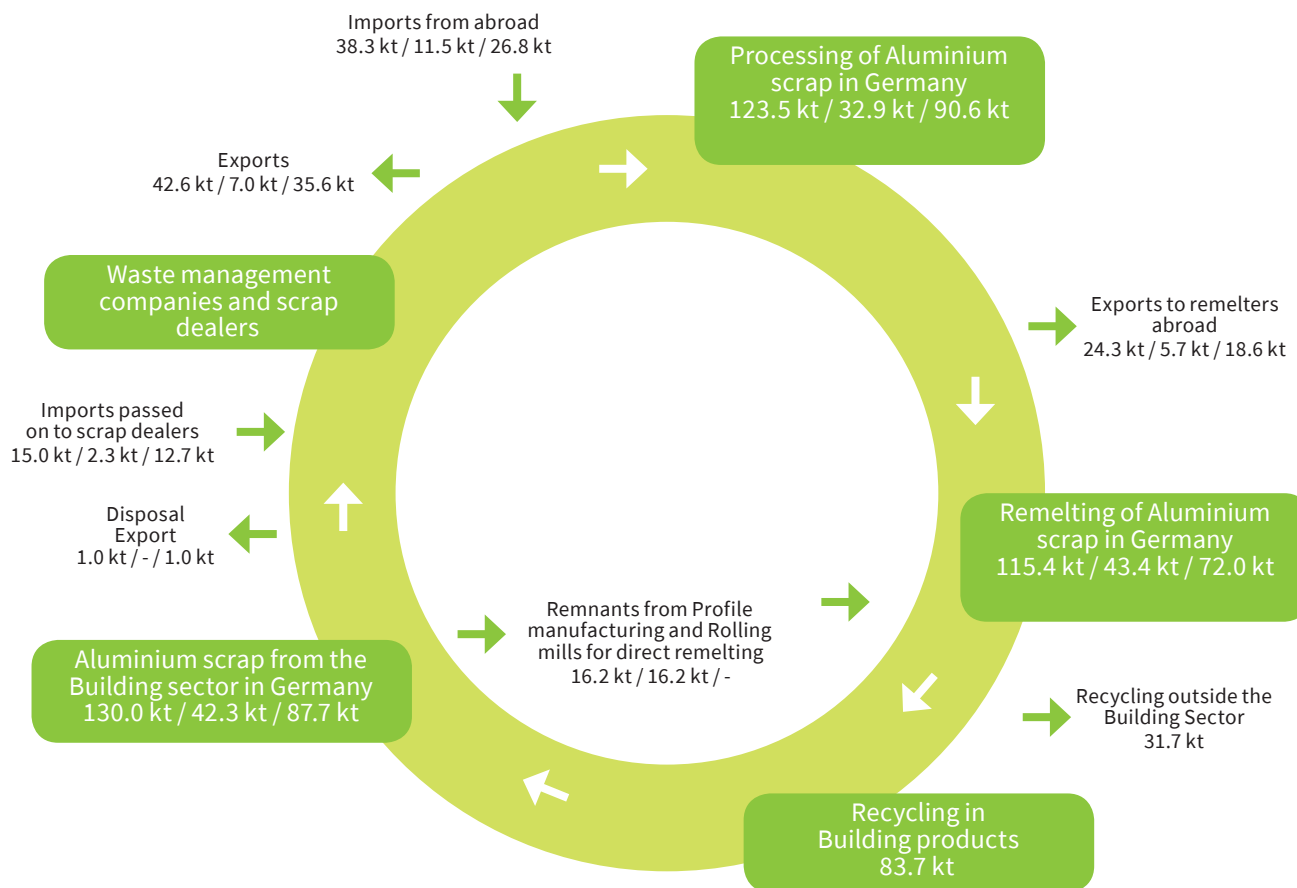


Strong Increase in Volumes from Demolition and Dismantling

Rising aluminium scrap volumes between 2019 and 2023 were recorded in particular among demolition companies as well as metal, window, and façade manufacturers.

Both sectors reported especially higher quantities of post-consumer scrap. This was due, on the one hand, to the generally higher return flow of aluminium building products that had reached the end of their service life. Another factor was the sharp increase in demolition activities over the past years.

7 Circular Use of Aluminium Scrap in the Building Sector in Germany 2023 (approximate figures, in thousand tonnes)



Legend: total / pre-consumer scrap / post-consumer scrap

High-Performance Recycling Loop

Over 70% of the aluminium scrap remelted in Germany from applications in or for the building sector (115,000 t) is recycled in new aluminium products for construction (83,700 t). The collection, processing, and recycling of aluminium scrap in Germany takes place within a largely closed recycling loop.

Around 67,200 t of the processed and remelted scrap is reused for the production of extrusion billets and further extruded for use in windows and façades. Approximately 16,500 t was used as rolling slabs and further processed into sheets, among other things, for building façade applications.

About 84% (70,570 t) of the profiles and rolling ingots recovered from aluminium scrap and intended for recycling in building applications were recorded by AIUIF in 2023. Nearly one quarter of the remelted scrap volume in 2023 was used in areas outside the building sector.

One of AIUIF's objectives is to further reduce this share and to continue improving the quality of the closed recycling loop for aluminium products in construction.

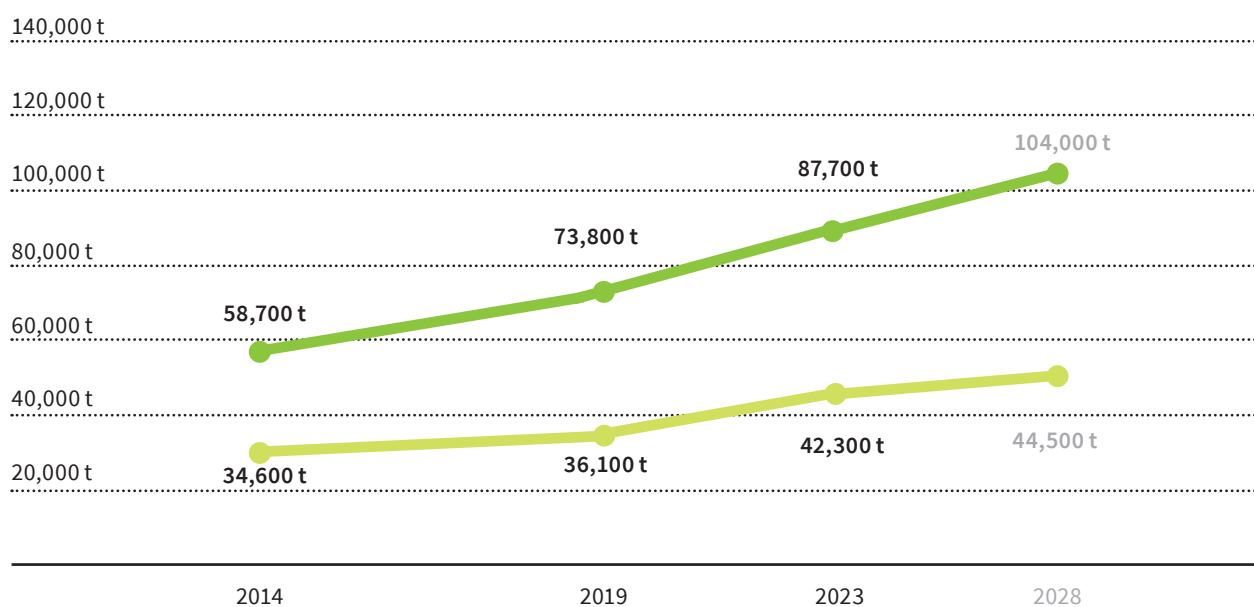
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Aluminium Scrap Generation – Volume Forecast to 2028

in Tonnes

● Pre-consumer scrap

● Post-consumer scrap



Outlook: Significant increase in scrap volumes by 2028

Particularly due to increasing return flows from the post-consumer sector, such as old aluminium windows and façades reaching the end of their service life, further growth in scrap volumes can be expected in the coming years. For 2028, A|U|F anticipates a total volume of up to 148,500 t. Compared with 2023, this corresponds to growth of nearly 15%.

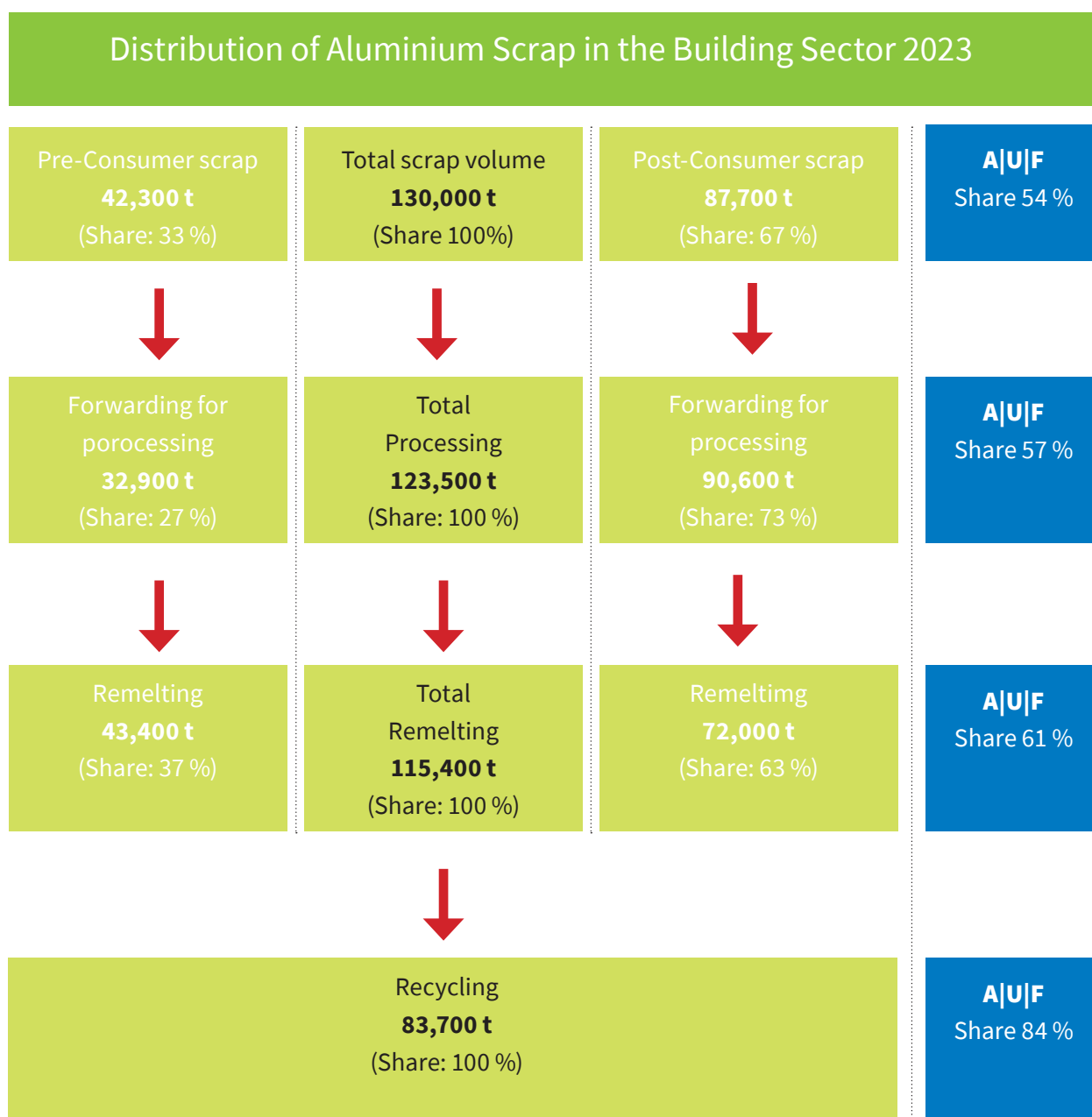
Due to the rising return flow of installed aluminium products from demolition and renovation activities, post-consumer scrap volumes are expected to continue increasing over the next few years. Based on annual growth of around 3.5% (derived from growth rates of recent years and expert assessments of future scrap development), post-consumer scrap volumes are projected to exceed 100,000 t by 2028. Compared with 2023, this represents overall growth of nearly 19%.

The generation of pre-consumer scrap depends on additional factors: the volume of profiles and sheets produced in Germany for use in the building sector, their processing into products, and the disposal/processing practices of companies. Based on a balanced volume scenario in profile production, pre-consumer scrap in 2028 is expected to amount to around 44,500 t. Compared with 2023, this corresponds to growth of just over 5%.

9

Distribution of Aluminium Scrap in the Building Sector 2023

A|U|F Shares in % (Approx. Figures)



A|U|F share records strong growth

The A|U|F market share of aluminium scrap arising and disposed of in the building sector in Germany increased from 31% in 2019 to around 54% in 2023.

This means that the volume recorded by A|U|F nearly doubled within five years. The A|U|F record is also strong in the areas of processing and remelting. In the field of recycling, as much as 84% of the material used originates from scrap volumes recorded by A|U|F.

Summary

The volumes recorded by A|U|F in 2023 accounted for around 54% of the aluminium scrap generated in Germany's building sector. Due to the high value of aluminium scrap, recycling rates of almost 100% are achieved in Germany. The aluminium cycle is based on a well-established and functioning private sector system. In the areas of processing and remelting, the A|U|F share stands at 57% and 61% respectively.

The volume of aluminium scrap generated in the German building sector has increased from around 93,000 t in 2014 to approximately 130,000 t in 2023. This overall increase is mainly the result of higher post-consumer scrap volumes, primarily arising from demolition and dismantling activities.

A large proportion of the scrap (around 70%) is processed, remelted, and returned to the market in Germany as secondary aluminium in the form of extrusion billets or rolling ingots. Approximately 83,700 t are recycled in building products, thereby ensuring a closed material cycle within this application sector.



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