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Packaging recycling fact check

What really gets recycled.

Agenda

1. **Welcome address**
2. **Recycling rate performance for packaging waste collected by dual systems in 2024**
3. **Myth 1**
   Almost everything tossed in the yellow bag or bin gets incinerated anyway.
4. **Myth 2**
   Most plastic packaging never gets recycled at all.
5. **Myth 3**
   Packaging waste collected in glass containers gets mixed back together by the bin lorry.
6. **Conclusion**
7. **Questions**

Recycling rates

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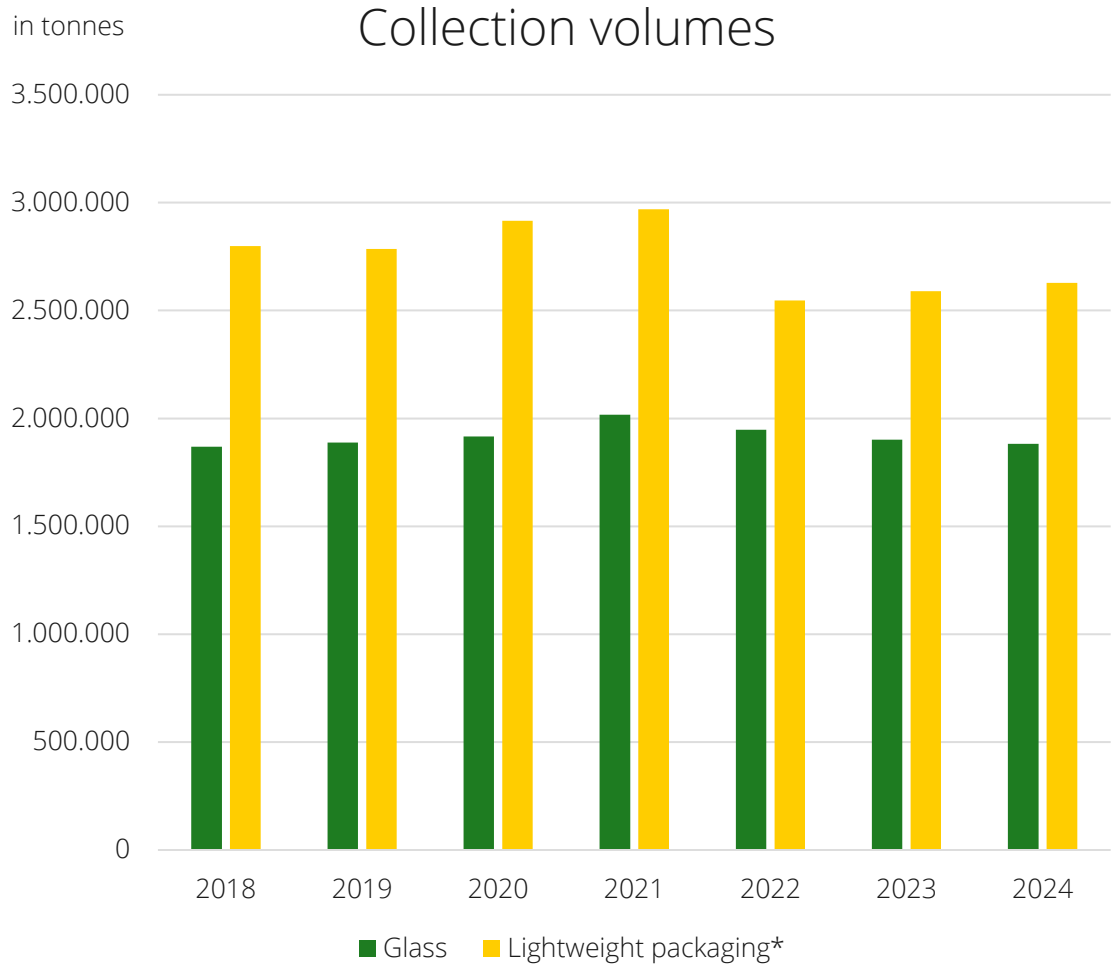
Recycling rate performance for packaging waste collected by dual systems in 2024

2024 packaging volumes …

… collected by dual systems



Packaging volumes collected by dual systems showed a varied performance across the different material groups throughout 2024:

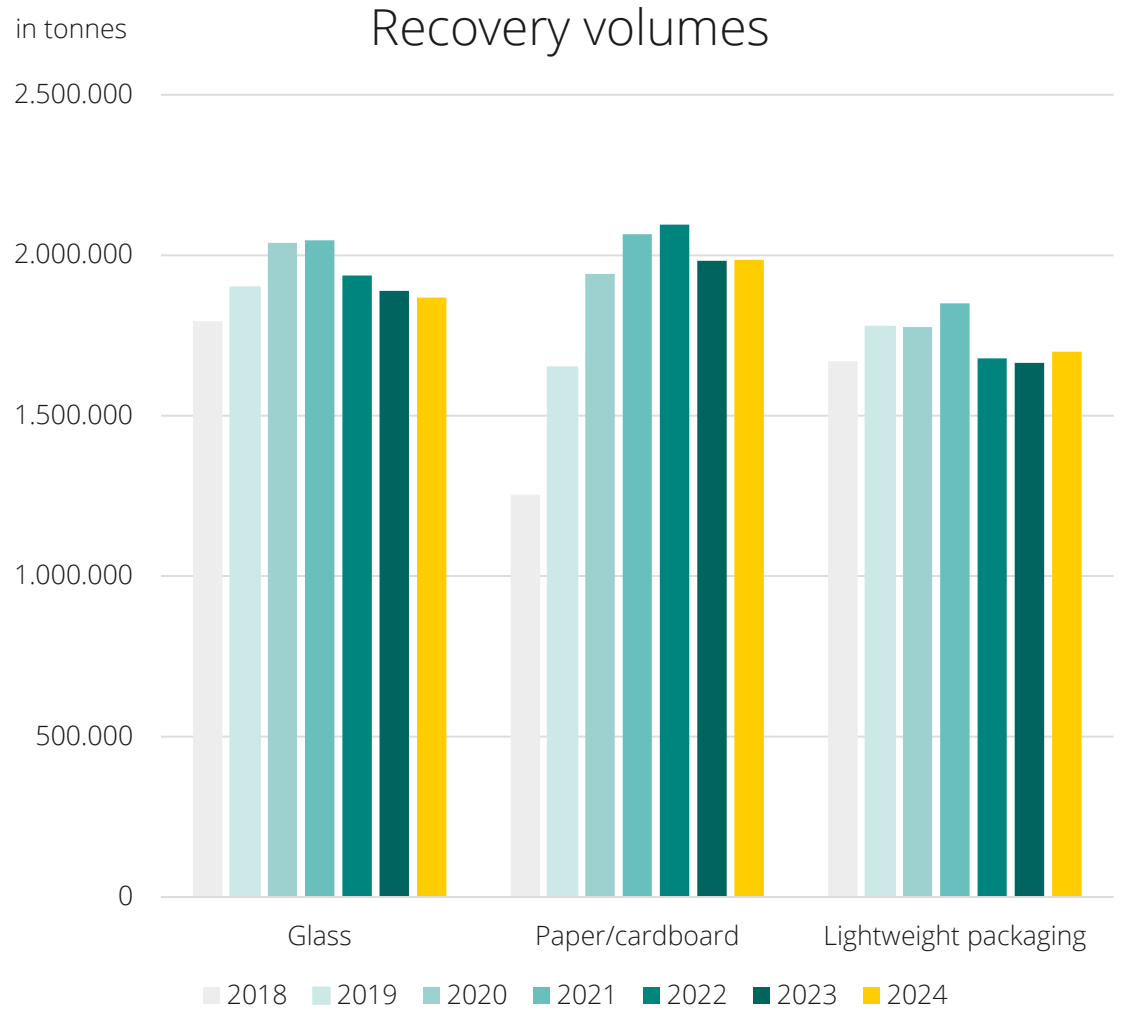
- The volume of lightweight packaging collected from private households and comparable sources of waste generation increased by around 1.5%.*
- Glass collection volumes dropped further in comparison to 2023. According to information from system operators and one study,** this is attributable primarily to the continued decline in container sites.

* Data for paper/cardboard packaging volumes includes communal waste paper collection (blue bin) for all systems. As such, there are no figures exclusively for paper/cardboard packaging. Lightweight packaging collections also include residual waste (sorting errors) and non-packaging of the same material (intelligent sorting errors). In regions where recycling bins are used, only packaging shares are taken into account (retail, grouped and shipment packaging). Source: ZSVR; last updated: December 2025

** Source: Study by the Institut für Abfall, Abwasser und Infrastruktur-Management GmbH, Ahlen; November 2023

2024 recovery volumes …

… of packaging collected by dual systems



With the exception of glass, recovered packaging volumes have performed well:

- The trend in glass packaging collection and recovery showed further declines, reaching roughly 2019 levels in 2024.
- The paper/cardboard recovery volume remained stable at the prior year's level.
- Compared to 2023, lightweight packaging recovery increased by around 2.1%.
  - Within this material group, roughly 4.1% more plastic packaging was recovered mechanically than in the prior year.
  - At more than 9.3%, the increase in other composite packaging recovered shows a positive picture. Considerable areas for improvement remain, however.

Source: ZSVR; last updated: December 2025

Total recovery rate …

… for packaging subject to system participation over time

The total recovery rate based on packaging volumes participated with dual systems was around 82% in 2018 (more than 4.7 million tonnes of packaging waste recovered across all material types). By 2023, it climbed to about 90% and remained stable at this high level in 2024. Roughly 5.5 million tonnes of packaging waste across all material types was collected by dual systems for recovery in both 2023 and 2024.

! The rates refer exclusively to packaging subject to system participation that has participated with the different systems.

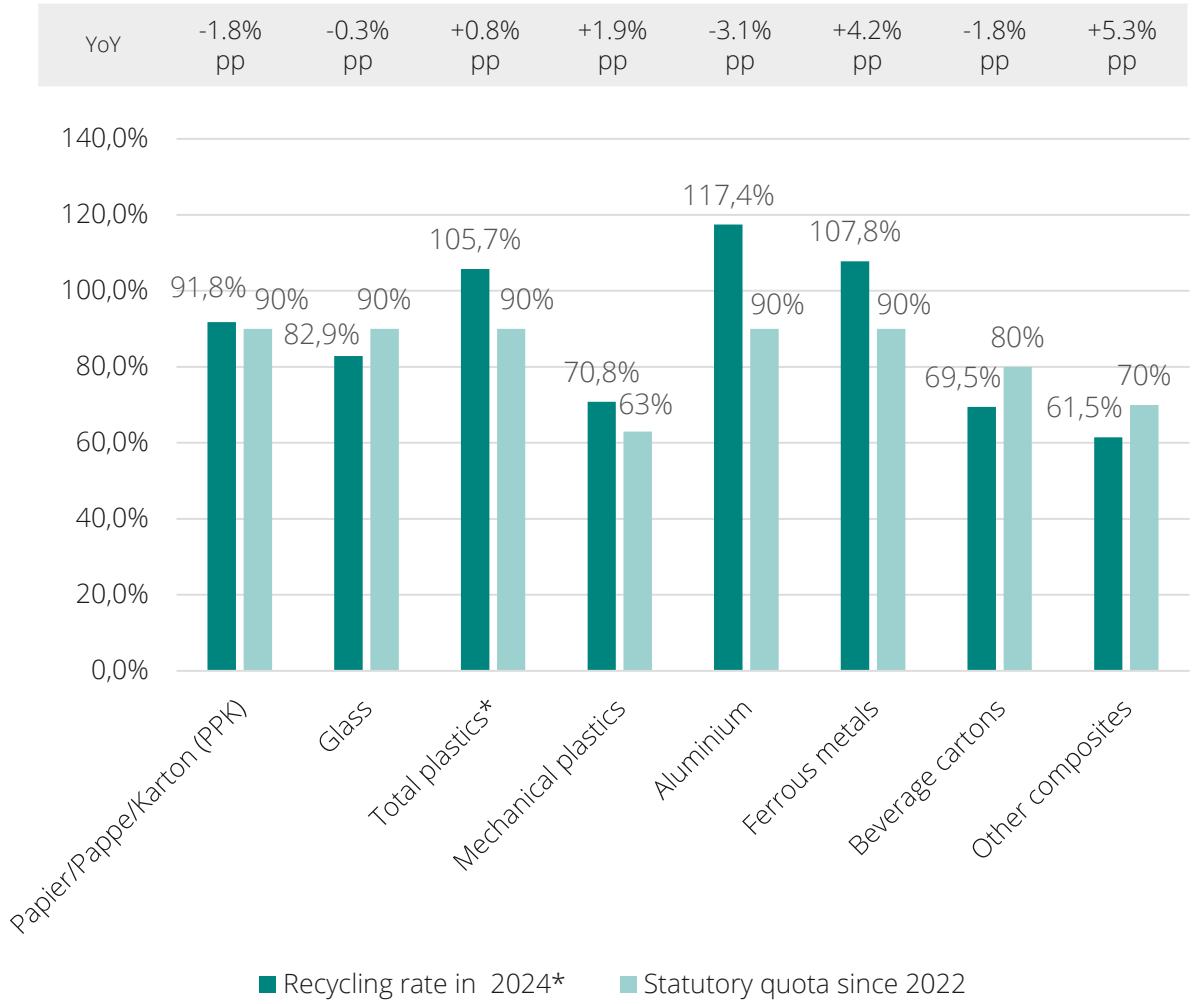
Packaging subject to system participation

Packaging not subject to system participation

- Reusable packaging
- Single-use beverage packaging subject to deposit
- All other packaging, e.g. large commercial/ industrial, hazardous contents

2024 recycling rates

System recycling rates – 2024 reference year



- As in the prior year, five of eight recycling rate targets were met or even exceeded, namely paper/cardboard, plastics*, aluminium and ferrous metals.
- The recycling rates* of over 100% for plastic and metal packaging indicate continued under-participation in these areas. 'Intelligent sorting errors' can also be a contributing factor.
- Once again, the statutory quotas were not met for glass, beverage carton packaging and other composite packaging.
- Although the statutory quotas were not achieved for other composite packaging as a whole, the rate was 5% points higher in 2024 than the year before.
- The collected glass packaging volume was not enough to fulfil the statutory recycling quota.

* Unlike the other rates, the 'total plastics' rate refers to the recovery rate. This includes includes mechanical and energy recovery. 'Mechanical plastics' refers to mechanical recovery.

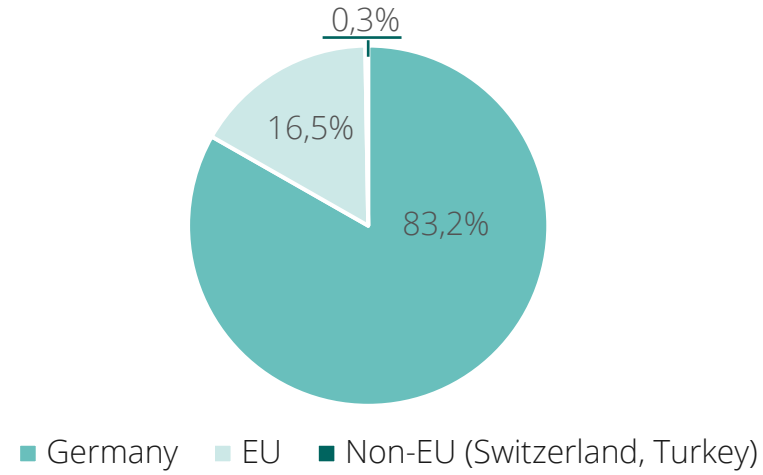
All rates are assessed in line with the cutoff point set out in the VerpackG for the transfer for recycling and/or (mechanical) recovery. Source: ZSVR; last updated: December 2025

2024 waste exports

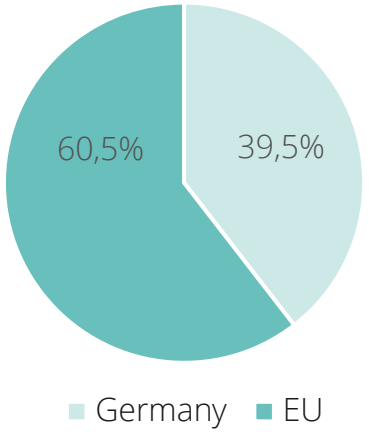
Shipping packaging waste abroad

- The share of plastic packaging recovered within Germany has declined slightly year on year. The EU accounts for almost all of recovery outside of Germany, as is the case for composite packaging.
- For other composite packaging, the ratio of roughly 60/40 in 2023 has reversed: in 2024, roughly 60% was recovered outside of Germany. Domestic capacity declined in 2023 due to plant closures. Existing plants located outside of Germany (but within the EU) now also accept composite packaging and saw greater utilisation in 2024.
- Significant volumes of beverage carton packaging were recovered outside of the EU (Türkiye), nearly 19% in total. The share of beverage carton packaging recovered in Germany showed a 29% year-on-year decline in 2024.

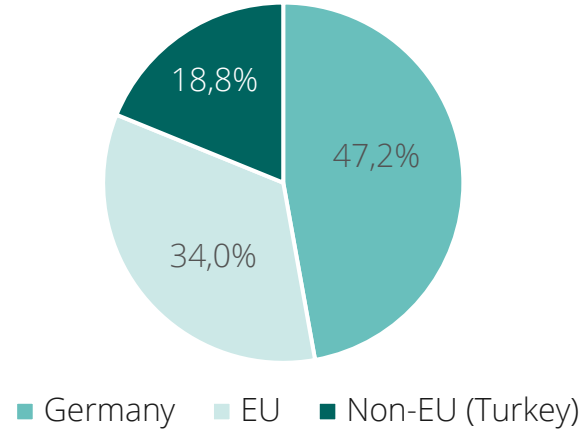
Sorted plastic packaging



Sorted composite packaging



Sorted beverage carton packaging



Source: ZSVR; last updated: December 2025

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Myth 1

Almost everything tossed in the yellow bag or bin gets incinerated anyway.

Is it true that …

… the contents of the yellow bin get incinerated anyway?

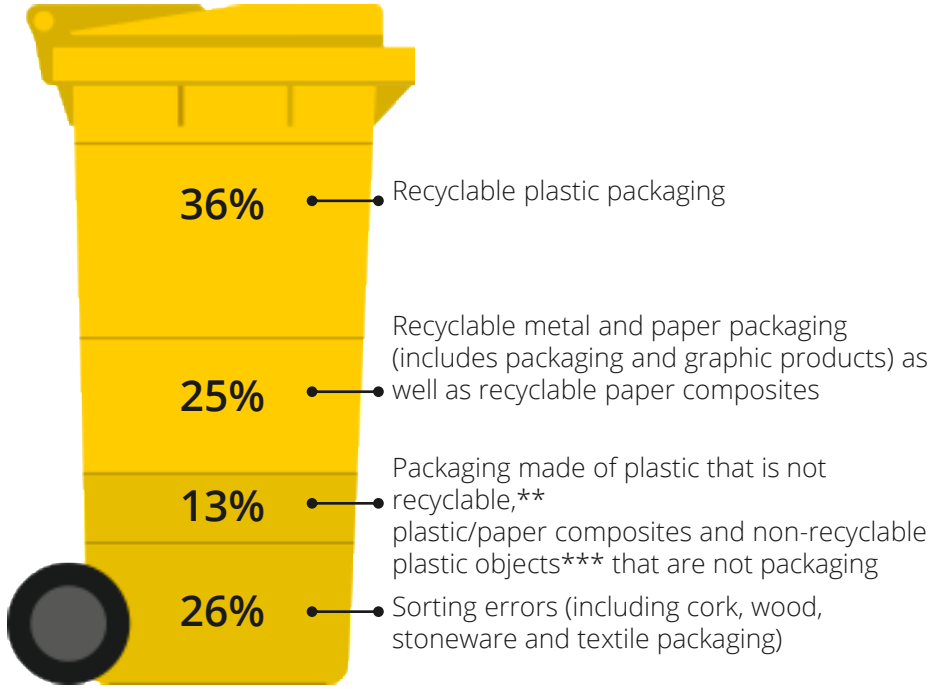
The truth: The contents are systematically sorted and recyclable packaging is consistently transferred for material recovery. Beverage carton and paper composite packaging recycling can be improved further. The sector is expanding capacity to do so.

- The contents of yellow bags and bins are heterogeneous. They comprise:
  - packaging subject to system participation with varying recyclability and
  - sorting errors.
- The recycling quota under section 16 (4) VerpackG relates to the total contents of the yellow bags and bins (the entire collection volume).

$$\text{Formula: } \frac{\text{Volume transferred for recycling}}{\text{Volume collected}} = \text{recycling rate}$$

- Sorting is generally automatic, using various technologies such as sieving machines, magnetic separation and near infra-red (NIR) separators. In total, there are 43 sorting facilities in Germany for this purpose (2024).
- For lightweight packaging, 52.55% of collected volumes were transferred for recovery in 2024, exceeding the requirement of 50%.

Shares in lightweight packaging input



Basis analysis of collected lightweight packaging in 2017 (reference volume 2.6 mn tonnes, source: CHI Institut cyclos-HTP, December 2025); see the fact sheet on sorting lightweight packaging for details

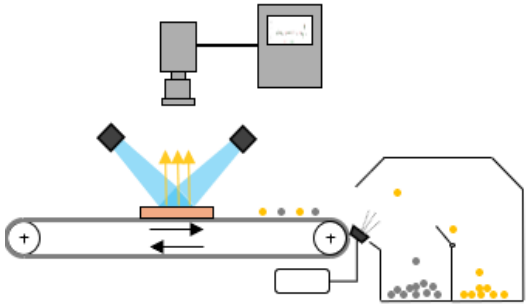
** Such as multilayer pouches, opaque PET bottles, packaging containing carbon black
*** Objects made of plastic without any recovery path, such as PVC articles and swim wings

* Source: ZSVR; last updated: December 2025

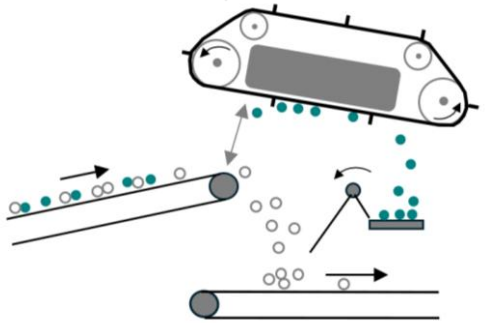
State of the art in sorting facilities

Technical trends and developments

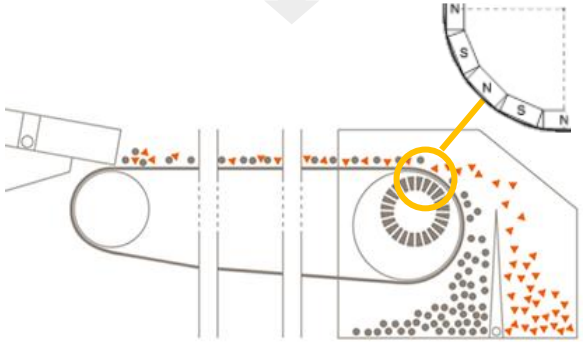
Getting ready for sorting: opening, sieving, air classifying and ballistic separation



Sensor-based sorting (individual material types, paper-based packaging)



Magnetic separation (ferrous metals)



Eddy current separator (aluminium, non-ferrous metals)

Automatic and manual post-cleaning and product inspection

Technical trends and developments

- Sensors for automatic process management and control
- Automatic sorting quality control
- Product portfolio diversification in line with recycling requirements
- Transition to multi-sensor AI-based sorting devices

Source: CHI Institut cyclos-HTP; last updated: December 2025

Lightweight packaging sorting essentials

Design for recycling, robust sorting technology & waste separation

- The technology being used today in sorting facilities makes it possible to achieve very high sorting rates (relative to the packaging in the collected mix) for packaging made of the following materials:*
  - Recyclable plastic packaging: > 95%
  - Liquid packaging boards: > 95%
  - Aluminium packaging: > 95%
  - Tinplate packaging: > 99%
- The high sorting rates for packaging are up against the negative impacts of sorting errors:
  - Sorting errors are transferred very efficiently to sorting waste. They go through every stage of the sorting process chain, resulting first and foremost in substantial costs.
  - Certain sorting errors even pose a high risk of injuring people and damaging machines (such as lithium ion batteries).
  - Sorting errors impact weight-based sorting figures considerably because other materials that are heavy distort results: a trainer weighs about as much as 100 yoghurt tubs.

To increase material recovery (and recycling rates) packaging needs to be designed better for recyclability, sorting technology must be continuously improved and waste consistently separated, with a low share of sorting errors by consumers.

* For example, more than 99% of tinplate packaging and 95% of liquid packaging boards are sorted out from the collected mix.

Source: Drawing heavily from a presentation documentation from CHI Institut cyclos-HTP, December 2025

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Myth 2

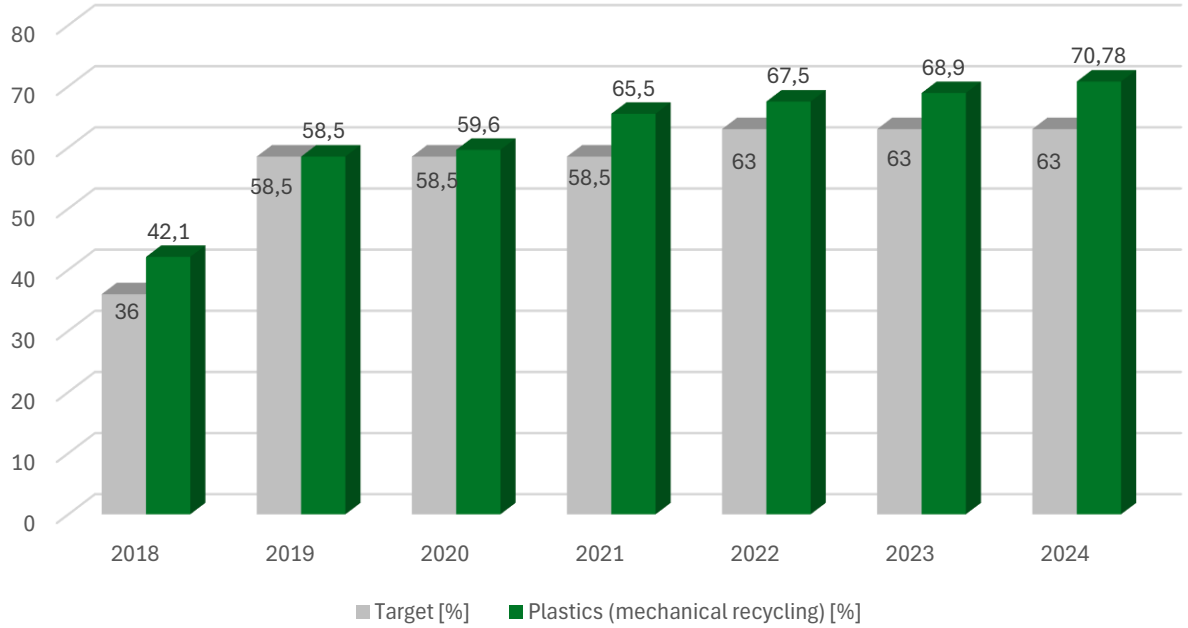
Most plastic packaging never gets recycled at all.

Is it true that …

… most plastic packaging never gets recycled at all?

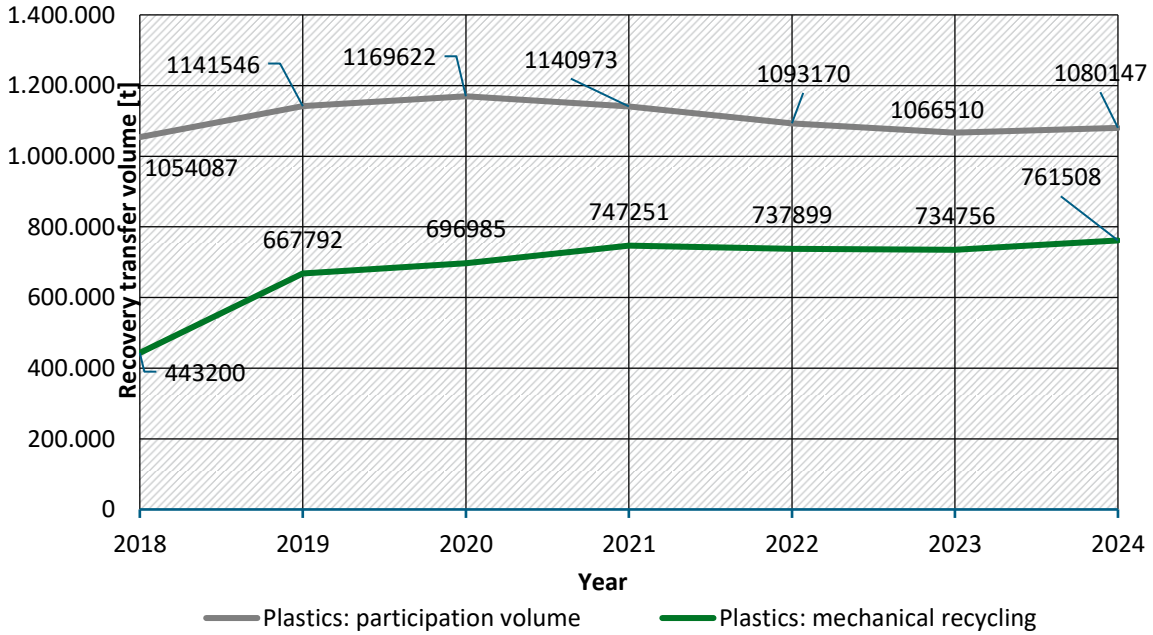
The truth: More than 70%* of plastic packaging subject to system participation undergoes mechanical recovery.*****

Systems have exceeded the statutory quotas:



Please note: Plastic packaging collected by systems is generally recovered by mechanical means at present. Chemical recycling is insignificant in terms of volumes.

Much higher volumes get recycled than before.



2018 – 2024 difference	
Participation volumes	+ 2.5%
Plastics (mechanical recovery)	+ 71.8%

* Calculation of this rate: Transfer volume for mechanical recovery / participation volume (cf. Annex I VerpackV 1998, section 16 (2) VerpackG).

** The material type exclusively comprises packaging that is at least 95% plastic (packaging made of less than 95% plastic is not reflected in this rate, e.g. other composite packaging, beverage cartons).

*** Source: Data from volume flow reports from the dual systems, aggregated, after examination by the ZSVR.

Is it true that …

… most plastic packaging never gets recycled at all?

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The truth: If plastic packaging is correctly disposed of in the yellow bin, the majority of it will be recycled at high quality.

Practice of sorting and recovery on the German market in 2023/2024

Research question: How likely is it that packaging placed in the designated waste collection by consumers will be transferred to a plant for high-quality recycling?

We survey all facilities that are supplied with packaging waste collected by the dual systems from private final consumers in Germany (full survey): waste paper, waste glass and lightweight packaging collection (e.g. yellow bins).

Please note: Materials recovered through recycling often are substituted for the same type of virgin material in typical applications for that material. They are only partially reused in packaging (glass and PPC being notable exceptions).

Probability of input in plants for high-quality recycling > 80%**	
Rigid and semi-rigid **PE, PP**	93% | 92%
Transparent **PET bottles** (without deposit)	81%
Plastic films (large PE films)	82%
Probability > 20% and < 80%**	
Rigid and semi-rigid **PS**	63%
Small-size flexible **PE** packaging	50%
Flexible **PP** packaging	27%
Probability < 20%**	
PET trays, e.g. rigid PET packaging **Flexible PET packaging**	13% – 64% 0%
Other plastics, e.g. PC, PVC, PA, PLA, natural and biodegradable polymers	0%

* Refers to recycling processes that generate secondary raw materials of sufficient quality – compared to the original material – to replace the primary raw material of the same substance in typical applications for that material. The reference point is identical to the prior years and is in line with Article 3 (38) in conjunction with Article 6 (2) (a), (4) (a) no. i PPWR. The term is based on the current drafting of section 21 VerpackG.

** Brade, Dorn, Fabian: Praxis der Sortierung und Verwertung 2023/2024 ('2023/2024 Practice of sorting and recovery', pending publication). Data are the current preliminary results of the evaluation.

Is it true that …

… most plastic packaging never gets recycled at all?

The truth: Despite considerable progress, there is still potential for increasing the statutory quota for plastic packaging.

Progress and potential

– Rates successfully increased from ~42% to 70% within just a few years

– The German Environment Agency investigated ways to increase statutory recovery quotas (UBA publication 44/2025).
– Factors for further increasing mechanical recovery for plastic packaging include in particular:
  ✓ Packaging manufacturers designing for recyclability
  ✓ Consumers separating waste correctly
  ✓ Expanding and optimising waste management infrastructure (sorting and recycling)

  The study also proposed streamlining bureaucracy for the economy.

– The BMUKN based its draft Packaging Law Implementation Act, published in November 2025, on the study and the work of the German Environment Agency. This first draft provides for:
  – Shoring up achieved levels and the German waste management economy
  – Technological openness to encourage new recycling processes
  – Easing bureaucracy by doing away with expert opinion requirements

Quota regime in VerpackDG-RefE

Recycling transfer quota

75% (starting 2028) | 80% (starting 2030)

Mechanical recycling transfer quota

70% (starting 2028) | 75% (starting 2030)

Potential to include other recycling processes

5% (starting 2028)

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Myth 3

Packaging waste collected in glass containers gets mixed back together by bin lorries.

Is it true that …

… glass is mixed back together after it is collected?

The truth: Separated glass that has been collected remains separated from collection to processing to the point it reaches the glass factory.

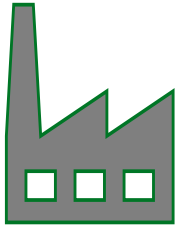
Emptied container glass

Glass containers

Collection vehicle (separate chambers)

Input glass processors (separate delivery and processing)***

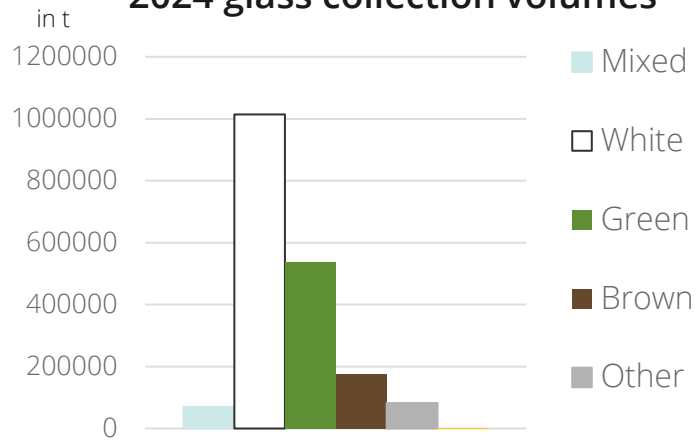
Output shards after processing (white, brown, green glass)***



Glass factory

For the entire process from collection and processing to subsequent usage at the glass factory, the glass remains separated by colour. It is documented and can be audited.
(Exception: collected mixed and stained waste glass)

2024 glass collection volumes*



Intake quality requirements for glass factories**

D MAXIMALE FEHLFARBENANTEILE (WARENEINGANG VERWENDER)

Die Farbbestimmung[3] erfolgt im Kornband > 8 mm-Quadratmasche.

Fehlfarbe	Weiß	Grün	Braun	Bunt
Weiß (%) incl. Lichtgrün & Halbweiß				
Grün (%) Behälterglas incl. red. Grün $\lambda_{Dom.}$ 568 - 575 nm	0,2 / *> 0,4*	Min. 75 / -	10 / *> 15*	Min. 80 / -
Braun (%) incl. aller Brauntöne	0,3 / -	10 / -	Min. 80 / -	
Bunt (%)	0,2 / -			

* Source: Data from volume flow reports from the dual systems, aggregated, after examination by the ZSVR.

** Source: BDE, BV Glas, bvse: T 120 guideline on quality requirements for glass fragments to be used in the container glass industry (version dated 14 August 2014).

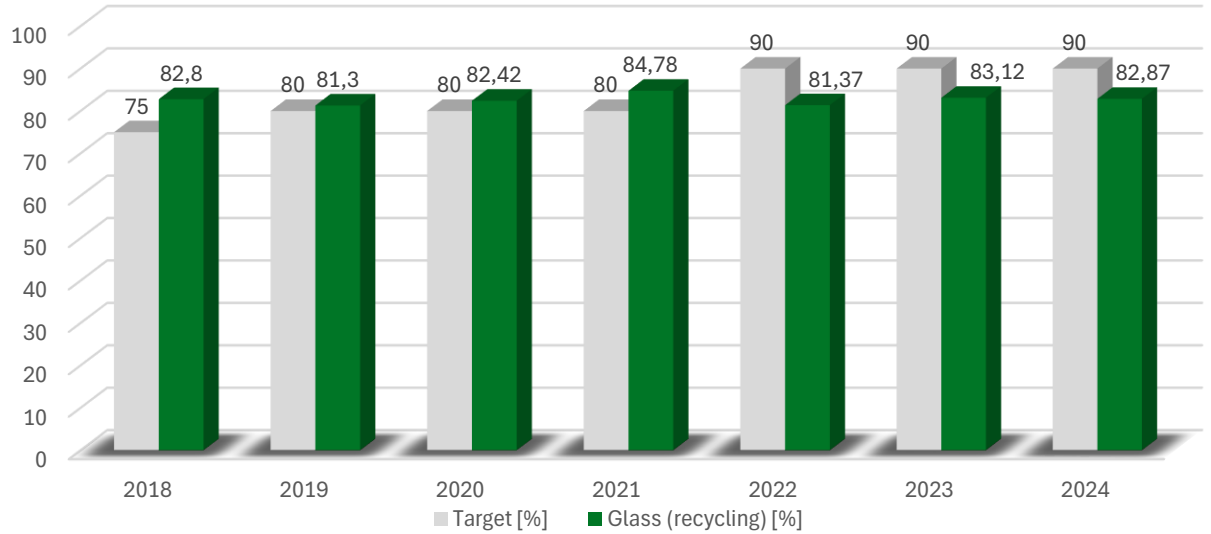
*** Source: Reiling Glas Recycling GmbH & Co. KG

Is it true that …

… glass is mixed back together after it is collected?

The truth: Not enough glass packaging has been properly sorted when waste glass is collected.

Systems have missed** the statutory quotas* since 2022

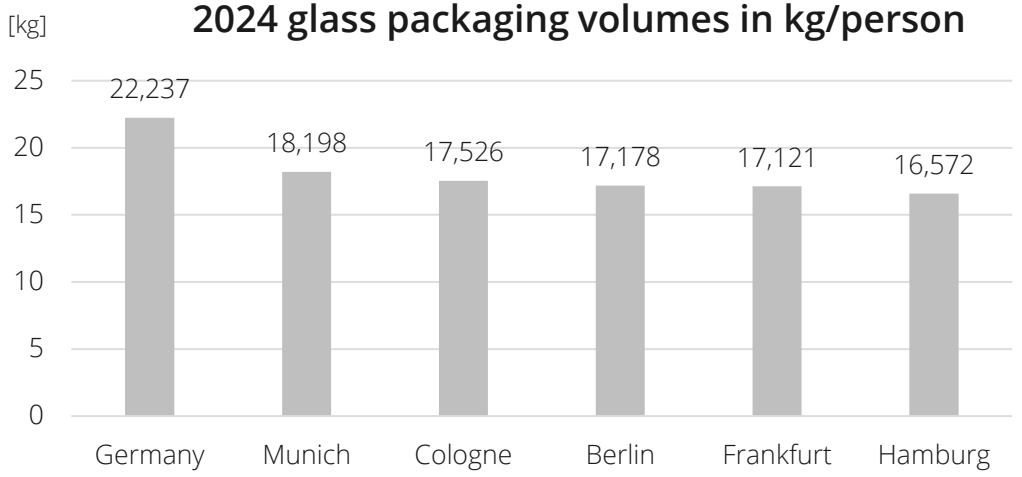


Waste glass collection problem:

The share of separated collected waste glass has not increased significantly.

2018 – 2024 difference		
Participation volumes		+ 3.98%
2,167,431 t	2,253,852 t	
Recycling transfer volume		+ 4.08%
1,794,633 t	1,867,793 t	

2024 glass packaging volumes in kg/person



- The shortfall in meeting the target rates was roughly 160,000 t in 2024. That is about 2 kg per person in Germany.
- The glass collection volumes depend on population and the built environment. Increased population density correlates with a lower collection volume/person.
- A major driver is the ongoing reduction in or declining desirability of locations for glass collection containers.***

* Calculation of this rate: Transfer volume for mechanical recovery / participation volume (cf. Annex I VerpackV 1998, section 16 (2) VerpackG).

** Source: Data from volume flow reports from the dual systems, aggregated, after examination by the ZSVR

*** Source: Study by the Institut für Abfall, Abwasser und Infrastruktur-Management GmbH (Institute for Waste, Waste Water and Infrastructure Management), Ahlen; November 2023

Is it true that …

… glass is mixed back together after it is collected?

The truth: Properly disposing of waste glass is easy – and an important part of protecting the environment and the climate.

What belongs in the waste glass collection?
All empty glass packaging

For example:

- Food jars made from glass (e.g. for vegetables and fruit)
- Flacons or flasks made from glass (e.g. for perfume, medicine)
- Glass bottles without deposit (e.g. for oil, wine, spirits)

What you need to know:
Please sort by colour.
Lids can stay on.

This means

- Transparent glass goes in the white glass bin
- Brown glass goes in the brown glass bin
- All other colours go in the green glass bin
- Not sure about the colour? → Green glass bin

Do not put in the waste glass collection:
Window glass, crockery, mirrors, ceramics, porcelain

Why is that important?

- Glass packaging is made from a different type of glass than other glass products.
- These different types of glass interfere with recycling and have to be sorted out at great expense.

Background: Environmental benefits of waste glass collection

- Container glass is often highly recyclable* and can be kept in circulation without limitation as long as it is separated and sorted by colour when it is disposed of.**
- The use of waste glass (shards) saves energy (and raw materials). For every 1% of waste glass used, the energy demand for melting decreases by roughly 0.2% to 0.3%.**
- Container glass manufacturers use roughly 60% shards on average in their furnaces, and up to 90% in the case of green glass**.

Please do your part!

Use and spread the word about this initiative and its tools:

müll trennung- wirkt.de
Eine Initiative der dualen Systeme.

Glass container search:
Overview of waste glass container locations in Germany

* Source: UBA publication 78/2023
** Source: German Environment Agency

Closing remarks and questions

Sources and list of references

- CHI Institut cyclos-HTP GmbH, December 2025, Dr Joachim Christiani: Infocharts zur Sortierung von Leichtverpackungen (Informational charts on sorting lightweight packaging)
- CHI Institut cyclos-HTP GmbH, December 2025: Infochart Basis Analyse von LVP-Sammelware 2017 (Informational chart on the basis analysis of collected lightweight packaging in 2017)
- Brade, Dorn, Fabian (publication pending): Praxis der Sortierung und Verwertung 2023/2024 (Practice of sorting and recovery in 2023/2024) BDE (Federal Association of the German Waste, Water and Raw Materials Management Industry), BV Glas (Federal Association of the German Glass Industry), bvse (German Association for Secondary Raw Materials and Waste Management), August 2014: T 120 guideline on 'Qualitätsanforderungen an Glasscherben zum Einsatz in der Behälterglasindustrie' (Quality requirements for glass fragments, to be used in the container glass industry) (https://www.bvse.de/dateien2020/2-PDF/03-Themen_Ereignisse/FV_Glas/Standardblatt_T_120_2014-08-14_2.pdf)
- Reiling Glas Recycling GmbH & Co. KG, January 2026: Bereitstellung Bilder Input Glasaufbereiter und Output Scherben nach Glasaufbereitung (Generating pictures of input glass processors and output shards after glass processing)
- Schüler, Wilhelm, June 2023: Ermittlung des Anteils hochgradig recyclingfähiger systembeteiligungspflichtiger Verpackungen auf dem deutschen Markt (Determining the share of highly recyclable packaging subject to system participation on the German market) (https://www.umweltbundesamt.de/publikationen/ermittlung-des-anteils-hochgradig-recyclingfaehiger)
- Recommendation for optimising glass collection from the Advisory Board for Collection, Sorting and Recovery based on the study by the Institut für Abfall, Abwasser und Infrastruktur-Management GmbH (Institute for Waste, Waste Water and Infrastructure Management), November 2023 (https://www.verpackungsregister.org/stiftung-und-behoerde/gremien/beirat/beiratsempfehlungen)
- German Environment Agency, November 2025: Glas und Altglas (Glass and waste glass) (https://www.umweltbundesamt.de/daten/ressourcen-abfall/verwertung-entsorgung-ausgewaehlter-abfallarten/glas-altglas#massenprodukt-glas)
- ZSVR, December 2025: Auswertung Mengenstromnachweise der dualen Systeme für das Jahr 2024 (evaluation of the dual systems' volume flow reports for 2024).