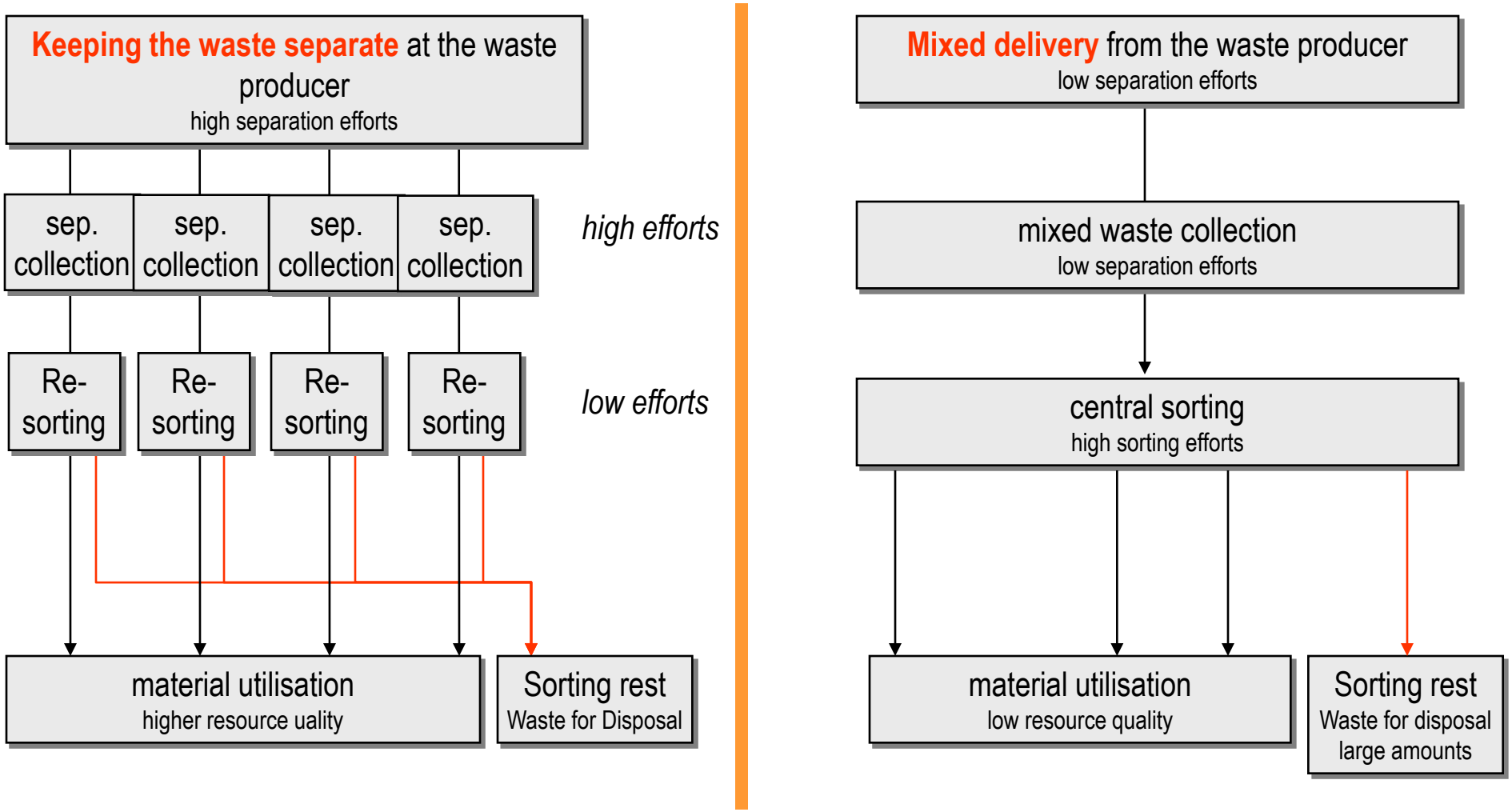
# 3. Collection and Transport

# Waste Collection Tasks

- **Disposal of waste at waste producers to utilisation, treatment or disposal plants**
  - For hygienically risk waste for reasons of public safety, order and hygiene, regular and sufficiently frequent collection:
    for instance collection of residual waste 1 to 4 times per week, combined with other collection rounds of the separate collection.
    In warm climate zones higher frequency.
  - For financial reasons: frequency as low as possible
- Separate collection at the waste producer according to types of waste as preliminary sorting for high-quality material utilisation [§ 5, Abs. 2 KrW-/AbfG].
- **At the waste producer:** adequate equipment for waste separation!

# Utilisation via separate or mixed collection



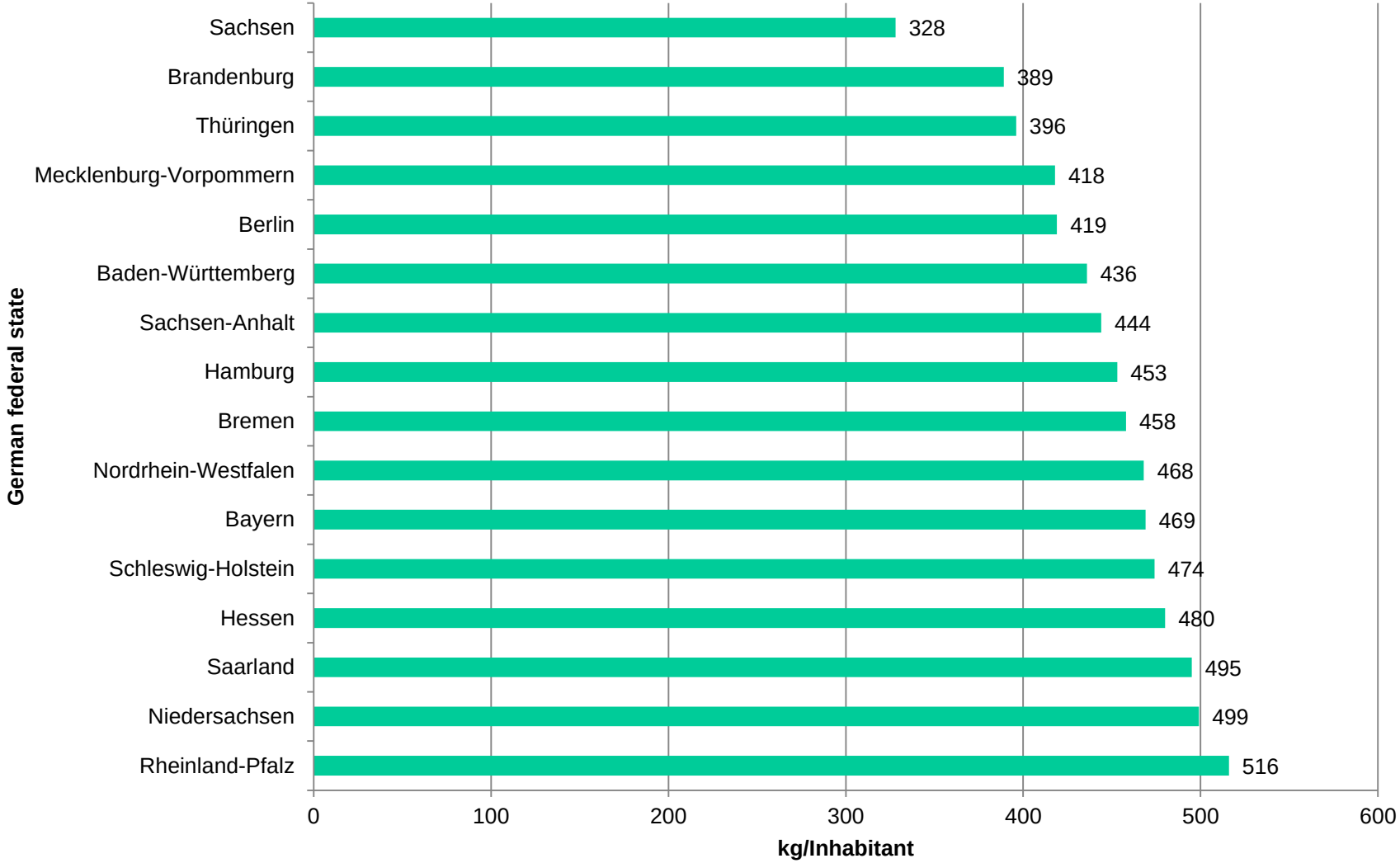
# Impacts on the Collection System

- The organisation of waste collections from households and collecting systems must be geared to the following influence parameters:
- Area structure; locations
- Economic structure
- Size of the collection area
- Amount of the waste per container or location and bulk weight
- Concept of separate collection of resources and pollutants
- Quality requirements of the ensuing disposal (e.g. sortability)
- Guarantee that the individual usage of the disposal services can be identified for the accounting of fees

# Area Structures

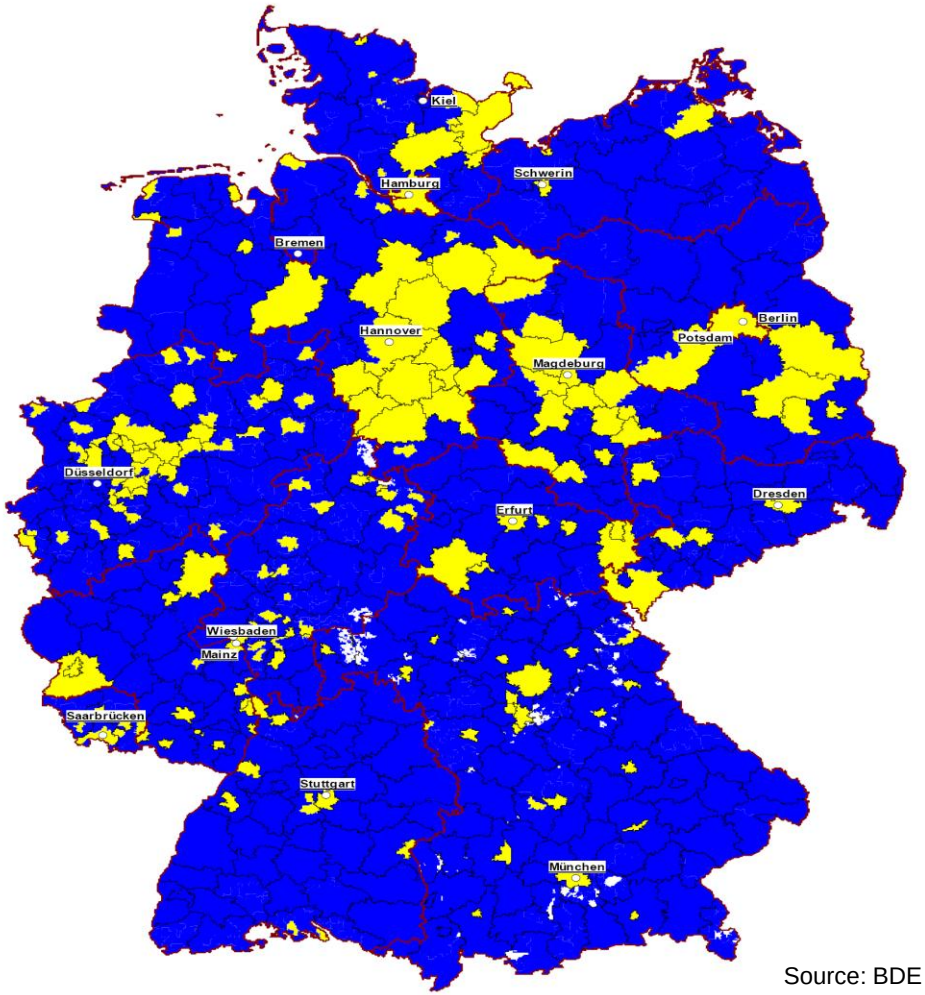
| Superior regional affiliation | | | | A. Metropolis; B. Mid-size town; C: Rural district |
|---|---|---|---|---|
| Area structure | A | B | AS | Differentiation and explanation of the area structures and housing types |
| City-areas | | > 1.000 | I | compact intra-urban housing, marked by the high ratio of businesses with mainly mixed container usage |
| closed multi-Family housing | | | II | closed intra-urban housing with at least three, at most five storeys proper |
| | | | II a | Block housing with larger inner yards or open spaces, partly with small front gardens. Usage of the open spaces as flower gardens with larger lawn areas. |
| | | | II b | Terraced houses with smaller, partly sealed courtyards and little green |
| open multi-family housing | > 2.000 PE/sq. km | 500 – 1.000 PE/sq. km | III | anonymous housing estates with single high-rise buildings and high ratio of council housing, greens, if any, limited to the areas between the buildings |
| | | | III a | 3 to 5 storeys proper |
| | | | III b | > 5 storeys proper |
| Detached and terraced house areas | 1.000 – 2.000 | | IV | Residential areas with one to six family houses, mainly with their own gardens; subdivision according to accommodation units per lot |
| | | | IV a | 3-6 accommodation units per lot |
| | | | IV b | 1-2 accommodation units per lot |
| Low density housing | | | V | Low density housing in rural structures (single farmsteads, dispersed sttlements, rural settlements centres) |
| | < 1.000 | < 500 | V a | dispersed settlements |
| | | | V b | rural settlement centres |

# Domestic Waste Amounts in 2009

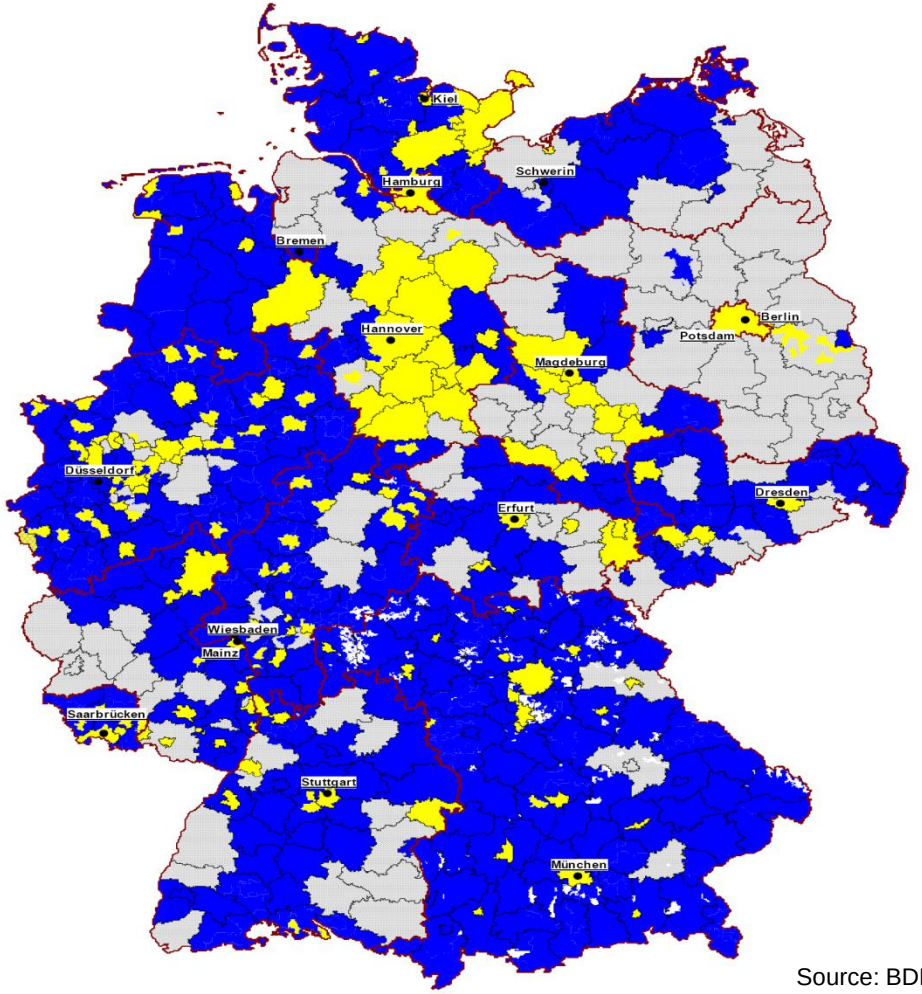



Source: Statische Ämter des Bundes und der Länder

# Waste Collection through Public or Private Disposal Contractors




Source: BDE




Source: BDE

**Collection of residual waste:** 37 % municipal
63 % private disposal contractors

**Collection of Bio-Waste**: 32 % municipal
51 % private disposal contractors
17 % no collection

# Utilisation via Separate Collection

| | | Collection system Container | Collection system open | Delivery system | Product return | regulated by Ordinance, law, statutes |
|---|---|---|---|---|---|---|
| 1. | Domestic waste | + | | | | |
| 2. | Bulky waste | | + | + | | |
| 3. | Metal articles | | + | + | | **Statutes, Pro-Rata Packaging Ordinance** |
| 4. | Green waste | | + | + | | **Bio-Waste Ordinance** |
| 5. | Bio-waste | + | | | | **Bio-Waste Ordinance** |
| 6. | Recovered paper | + | + | + | (P) | **Statutes, Pro-Rata Packaging Ordinance** |
| 7. | Recovered glass | (+) | | + | P | **Packaging Ordinance** |
| 8. | DSD-LWP | + | | + | P | + |
| 9. | Used textiles | + | | + | | |
| 10. | Used shoes | | | + | | |
| 11. | Used cars | | | + | P | **Used Car Ordinance, Used Vehicle Law** |
| 12. | Timber waste | + | | + | | **Timber Waste Ordinance, Renewable Energy Law** |
| 13. | Construction and renovation waste | + | | + | | |
| 14. | Problematic waste | | + | + | | **Waste Law, TI Waste, Waste Register List** |
| 15. | Old drugs | | | + | P | |
| 16. | Oil residues | | | + | P | **Oil Residues Ordinance** |
| 17. | Asbestos waste | + | | + | | |
| 18. | Used batteries | | | | P | **Batteries Ordinance** |
| 19. | Cooling appliances | | + | + | | |
| 20. | Electronic scrap | | + | + | (P) | **EU WEEE, Electronic Scrap Law** |
| 21. | Used IT appliances | | + | + | (P) | |

# Discharge System Container/Swap Container

- **Discharge system containers** (remain after emptying on the premises of the waste producer):
  - RB- **R**efuse **b**in35 to 50 l (out-dated)
  - WB- **W**heelie **b**ins 60 to 110 l (out-dated)
  - MWC- **M**ovable **w**aste **c**ontainer 60l, 80l, 120l, 240l, 360l, 660l, 770l, 1,1m³, 2,5m³, 4,5m³, 5,0m³
  - DLTS- **D**iamond **L**ifting and **T**ipping **S**ystem, like MWC, but with grabber lugs on the container with loading arm without loading staff
  - MUCHA- **Mu**lti-**cham**ber container for integrated separate collection of 2 waste fractions with the corresponding vehicle superstructure

**Müll Großbehälter (MGB)**

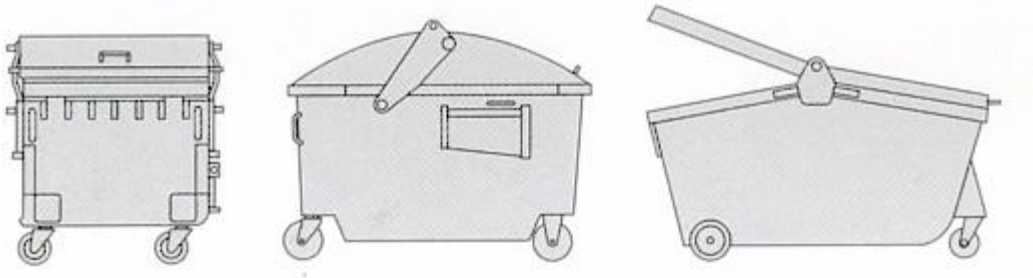
- **Swap containers** (collected with their contents by the dumptruck and swapped with a supplied empty container) for waste with a bulk weight of 300 - 400 kg/m³ and/or for container volumes > 5 m³ :
  - STC- **S**liding **t**ipping or sliding roller **c**ontainer > 4 m³
  - TC- **T**ipping **c**ontainer > 4 m³

# Standardised Waste Containers


Ring bucket 35 and 50 l

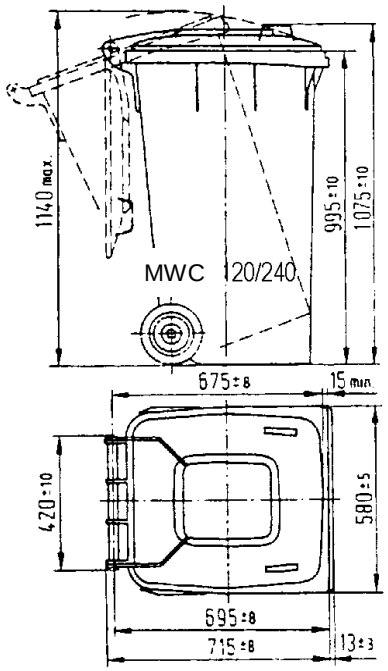
Refuse bin 110 l

2-wheel MWC 80 / 120 / 240 / 360 l

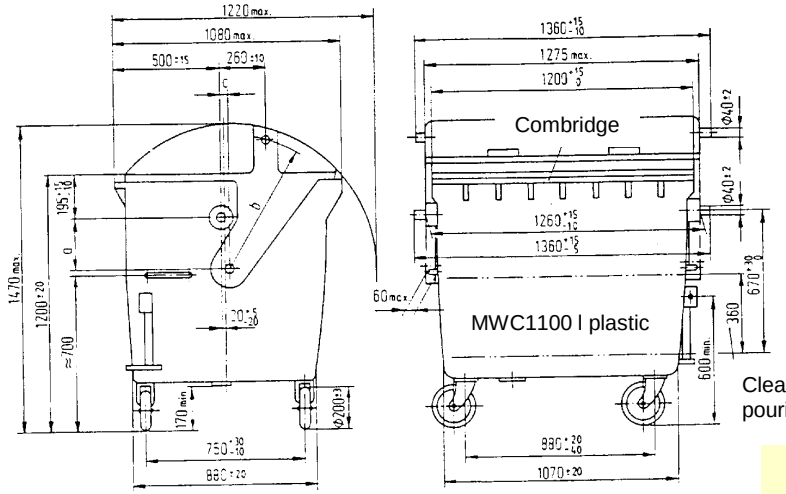


4-wheel MWC 660 /1000 / to 5000 l

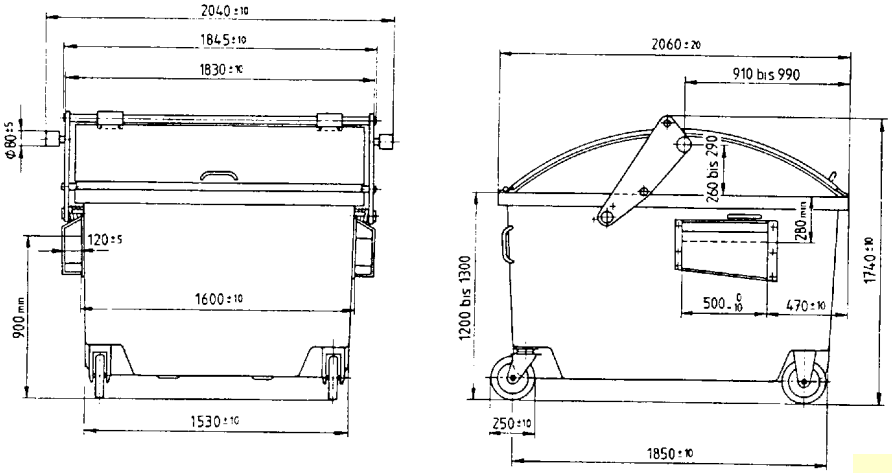
# Discharge System Container




MWC 120 / 240




MWC 660 / 1100




MWC 4500

# Waste Collection Containers

| Container System<br>L or m³ | Collection system and standardisation | | Container empty weight<br>Steel (kg) | Container empty weight<br>Plastic (kg) | Staff strength for removal<br>1 driver + ... chargers<br>U=User transport<br>P=Personnel transport |
|---|---|---|---|---|---|
| RB 35/50 ** | U | DIN 6628 | 7,7/9,5 | 2,9/3,3 | 1 + (1 to 2) U |
| WB 110 ** | U | DIN 6629 | 25 | 6 | 1 + (2 to 4) P |
| MS 35/50/90*** | E | curr. DIN 55465 | - | ..../0,04/.... | 1 + (0 to 2) U |
| MWC 40 / 60 (also as DLTS) | U | - | - | 6,0 | 1 + (0 to 2) U |
| MWC 80 (also as DLTS) | U | DIN EN 840-1 | - | 7,7 | 1 + (0 to 2) U |
| MWC 120 (also as DLTS) | U | DIN EN 840-1 | 26**** | 11 | 1 + (0 to 2) U |
| MWC 240 (also as DLTS) | U | DIN EN 840-1 | 31**** | 16 | 1 + (0 to 2) U (or P ) |
| MWC 360 (also as DLTS) | U | DIN EN 840-1 | - | 23 | 1 + (0 to 3) U (or P ) |
| MWC 660 (also as DLTS) | U | - | - | 45 - 52 | 1 + (0 to 2) P (or U) |
| MWC 770 (also as DLTS) | U | DIN EN 840-3 | 120 - 140 | 48 - 58 | 1 + (0 to 2) P (or U) |
| MWC 1100 (also as DLTS) | U | DIN EN 840-3 | 150 - 170 | 65 - 92 | 1 + (0 to 2) P (or U) |
| MWC 2,5; 4,5; 5,5 m³ | U | DIN 30737/38 | 200 - 400* | - | 1 + 0 (1) P |
| MUCHAM 140, 210, 260 | U | | | | 1 + (1 to 2) U |
| STC 4 - 40 m³ | W | DIN 30722 | 1200 - 3400* | - | 1 + 0 P |
| TC 4 - 20 m³ | W | DIN 30720 | 400 - 2100* | - | 1 + 0 P |

# Individual fee determination by anonymous usage


> Home > Stadtmöbel > SuCasa Müllschleuse

Simply more justice
**SUCASA Lock Technology**
**Here opens the lock to more fee equity**

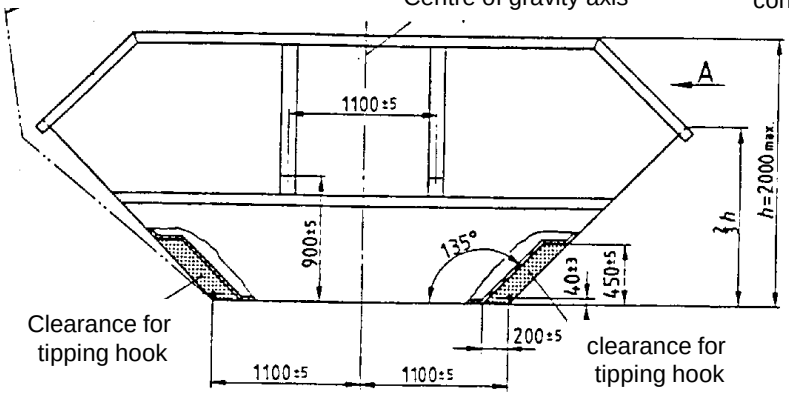
Innovative lock technology b SULO. For more fee equity in fee accounting. Through automatic determination of the waste volume and modern data processing. Reliable technology, fool-proof handling, and absolutely safe in its function. Integrated into shapely SUCASA enclosures for 4-wheel waste containers. The trend-setting disposal concept, particularly for large condominiums.

**Safe and practical: the SuCasa Waste**

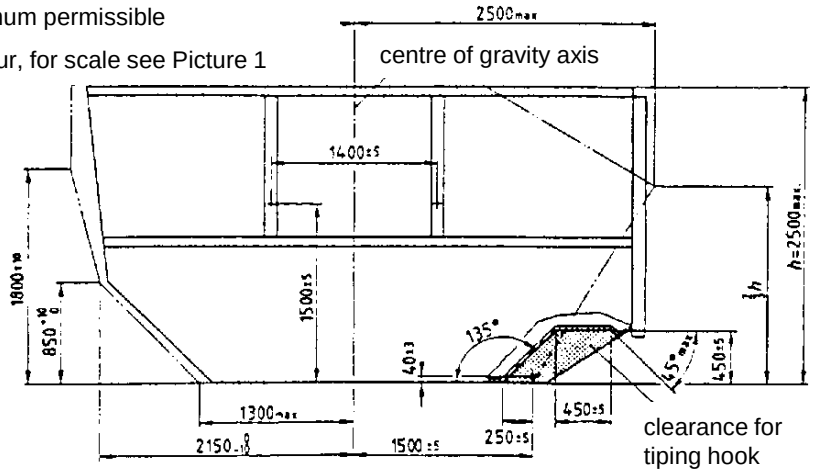
- More fee equity through automatic determination of the waste volume
- Even filling through alternating release of the two filling apertures
- Power supply via mains connection
- Easy to operate
- Reliable function through sturdy mechanism
- Lock completely made of high-grade steel

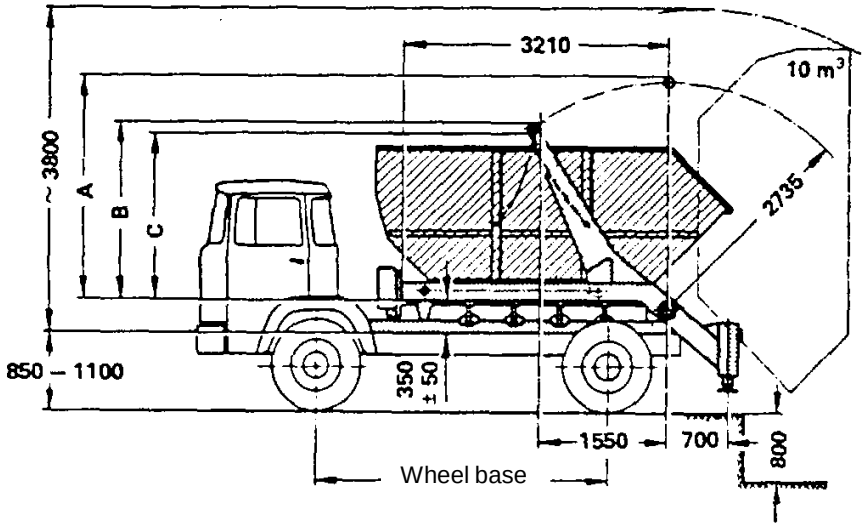
# Bulky Waste Containers

maximum permissible container contour, for scale see Picture 1

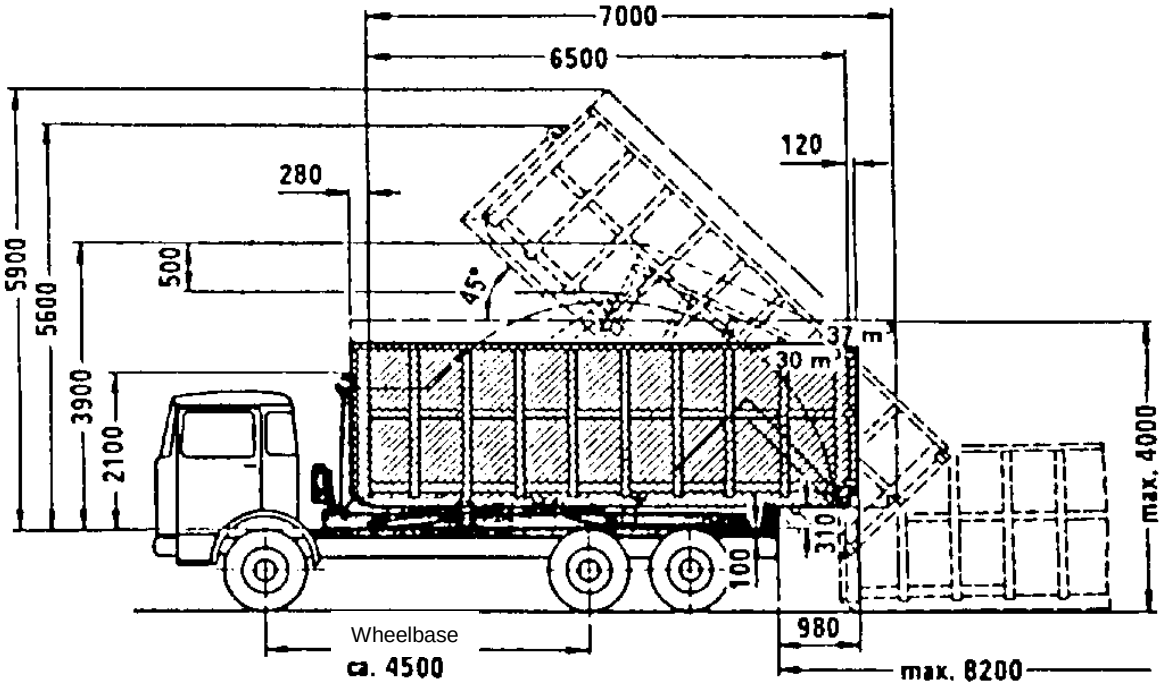



maximum permissible container contour, for scale see Picture 1

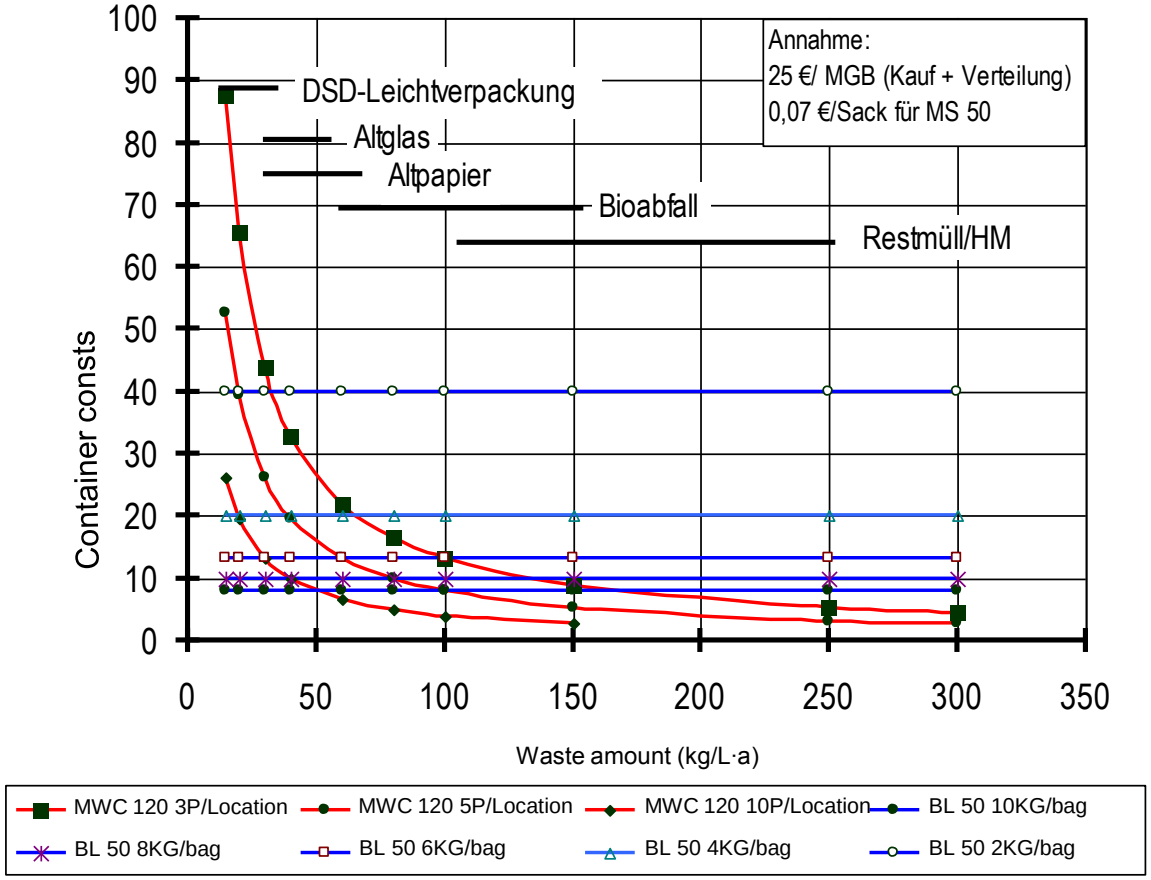


# Sliding Tipping Container – Waste Removal



# Firm Containers or Bags




- firm container
  - better for residual waste and bio-waste
- Bin-liner:
  - Material demand
    3-4 times higher
  - add. waste amount 0,5 to 3 %
  - higher loading capacity; lower collection costs
  - predestined for low and varying waste amounts

# Bio-Waste Bags in the Hanover Region

# Reference Values of Specific Residual Waste Container Volumes

## Minimum volume 15-20 % acknowledged by OVG (Higher Administrative Court)

1) Without compacting of the waste in the container; variation range due to different container systems
2) 70 - 90 kg/(Person·a) separately collected resources
3) 110 - 160 kg/(Person·a) separately collected resources
4) 115 - 135 kg/(Person·a) separately collected resources
5) 210 - 250 kg/(Person·a) separately collected resources

| | Residual Domestic Waste Amount<br>kg/Person·a | Minimum container volume for residual domestic waste[1)]<br>L/Person·week |
|---|---|---|
| Medium to bad separation behaviour | | |
| **with separate collection of recovered paper, used glass, and light materials** [2)] | 200 - 250 | **30 – 50** |
| **with separate collection of recovered paper, used glass, light materials, and bio-waste** [3)] | 150 - 200 | **25 -40** |
| Good to excellent separation behaviour | | |
| **with separate collection of recovered paper, used glass, and light materials**[4)] | 120 - 180 | 20 – 30 |
| **with separate collection of recovered paper, used glass, light materials, and bio-waste** [5)] | 80 - 150 | 8 – 20 |

# Collectable Amounts/Bulk Weights/Container Volumes

| Resource fraction or collection system | collectable amount | Bulk weight | Filling level | Volume weight | Specific container volume in relation to removal intervals (e.g. 2w = twice per week) | | | |
|---|---|---|---|---|---|---|---|---|
| | kg/ (P·a) | kg/m³ | % | kg/m³ | L/( P·1w) | L/(P·2w) | L/(P·3w) | L/(P·4w) |
| **Recovered paper** (mono-substance container) | (40-60) 50 | 100 | 80<br>90 | 80<br>90 | 12 | 24 | <br>33 | <br>43 |
| **Light material container DSG for SP, scrap metal and composite packing material** | (10-25) 20 | (25-70) 45 | 80 | 36 | 11 | 21 | 32 | 43 |
| **Bio-waste and green waste** | | | | | | | | |
| Delivery system green waste | 5 - 30 | | | | | | | |
| Collection system Bag+Bag | (20-60) 40 | 200 | 90 | - | 4 | 9 | 13 | 17 |
| **Bio-waste container** | | | | | | | | |
| kitchen waste only | (30 -70) 65 | 300 | 70 | 210 | 6 | (12) | - | |
| Bio-waste (kitchen + garden waste) | 115<br>180 | 250<br>220 | 60<br>70 | 150<br>154 | 15<br>22 | 30<br>45 | -<br>- | -<br>- |
| Bio-waste | | | | | | | | |

# Locations and Container Volumes

- Locations → < 15m; Building Code; area demand for separate collection
- Calculation of the required container volume

$$V_{B,min}(L) = \frac{w_p \cdot P}{\rho \cdot 52 \cdot R_w} \cdot S$$

| | |
|---|---|
| $V_{B,min}$ [L] | mathematical minimum container volume |
| $w_P$ [kg/(I·a)] | waste weight per inhabitant (person) per year |
| P [-] | inhabitants/persons connected to the collection container |
| ρ [kg/L] | bulk weight of the waste (contents weight/filled container volume) |
| 52 [-] | weeks per year |
| $R_W$ [1/W] | removals per week |
| S [-] | peak factor (peak amount/average amount)<br>or = 1/average filling level<br>with residual waste= ca. 1,2 -1,3<br>with bio-waste (seasonal) = up to approx. 2 |

- Comparison $V_{B,min}$ with standardised container sizes and container selection
- available container volume

$$V_{B,Person}[L/(P \cdot week)] = \frac{V_B}{P} \cdot R_W$$

Example

# Model Calculation

$$V_{B,min}[L] = \frac{w_p \cdot P}{\rho \cdot 52 \cdot R_w} \cdot S$$

| | |
|---|---|
| $V_{B,min}$ [L] | mathematical minimum container volume |
| $w_P$ [kg/(P·a)] | 200 kg/L·a |
| P [-] | 4 |
| ρ [kg/L] | 0,155 (0,15-0,17 for pre-sorted DW) |
| 52 [-] | weeks per year |
| $R_W$ [1/W] | 1 |
| S [-] | 1,2 |

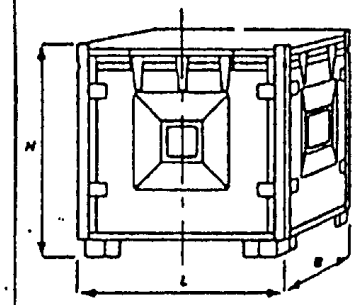
$$V_{B,min}[L] = \frac{200[kg/(P \cdot a)] \cdot 4\,[P]}{0{,}155\,[kg/L] \cdot 52\,[week/a] \cdot 1[1/week]} \cdot 1{,}2 \approx 120\ [L]$$

- Comparison $V_{B,min}$ with standardised container sizes and selection
- available container volume

$$V_{B,P}[R/(P \cdot week)] = \frac{V_B}{P} \cdot R_W$$

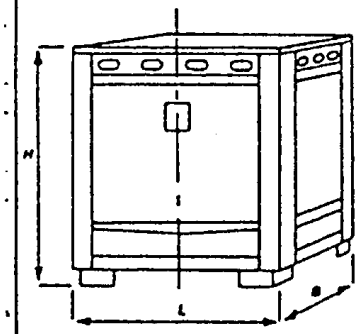
Example

# Special Containers for Special Types of Waste



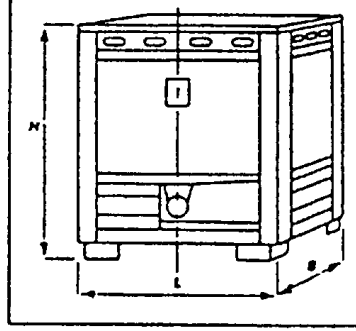
**ASP**

| Typ | ASP 240 | ASP 800 | ASP 1000 |
|---|---|---|---|
| | 240 | 800 | 1000 |
| | 700 x 700 | 1140 x 970 | |
| | 715 | 1170 | 1170 |
| | 715 | 1000 | 1000 |
| | 875 | 1255 | 1540 |
| | 70 | 195 | 210 |



ASF without bottom cleanout

| Typ / Sizes | ASF 425 | ASF 800 | ASF 1000 |
|---|---|---|---|
| Nominal volume [L] | 425 | 800 | 1000 |
| Stacking size [mm] | 1200 x 1000 | | |
| Length [mm] | 1225 | 1225 | 1225 |
| Width [mm] | 1025 | 1025 | 1025 |
| Height [mm] | 860 | 1250 | 1430 |
| Weight [ca. Kg] | 180 | 220 | 240 |



ASF with bottom cleanout

| Typ / Sizes | ASF 425 | ASF 800 | ASF 1000 |
|---|---|---|---|
| Nominal volume [L] | 425 | 800 | 1000 |
| Stacking size [mm] | 1200 x 1000 | | |
| Length [mm] | 1225 | 1225 | 1225 |
| Width [mm] | 1025 | 1025 | 1025 |
| Height [mm] | 1000 | 1390 | 1570 |
| Weight [ca. Kg] | 215 | 255 | 275 |

- for hazardous waste, there are special swap containers according to DIN 30741-43, which comply with the Technical Regulation for Inflammable Liquids and with the Transport of Dangerous Goods Ordinance
- for hospitals, there are combustible one-way plastic containers available

# Special Waste Containers for solid and pasty substances, from the Bauer company

Typ SAP 800, 4 Verschlüsse

Selbsttätige Deckelarretierung bei 270°

Special Waste Container Type SAP
Contents 450/640/800 l

Application
• international conveyance of solid and pasty substances according to ADR/RID/IMD G-Codes
Packaging Classes I, II, and III

Design
• IBC according to DIN 30741, Part 1
• study construction
• patented edge profiles
• maximum density 1.5 kg/l
• walls and bottom 3 mm
• 4 top lids
• lids with clip relief
•automatic lid locking device at 270°
• lid support at 70°
• robust stacking corners with lifting brackets
• lid sealing
• clipping device for accompanying documents
• lockable
• support for pallet stacker, fork lift truck, and crane

Surface
• hot-dip galvanised EN ISO 1461

Accessories
• PE bag
• PE tray
• name embossment

§ UN Approval

(UN) 11 A/X/D/BAUER/0410

# Milestones of Separate Collection

- ca. 0 BC in Rome separate collection of urine as base material for soap
- 1366 Venice: privilege for a paper factory in Tarvis to obtain all separately collected rags for the paper production
- 1904 Resolution of the Potsdam Magistrate: Introduction of a „Tripartition System"
  - **Refuse:** as mixture of ashes and sweepings
  - **Kitchen and domestic waste**: sterilised and sold as animal fodder
  - **Dry resources:** Shards, glass, rags, and tin-cans
- 1936-45 Intensive salvage management in the „Third Reich" under supervision of a Reich commissioner for dry resources and food leftovers
- 1949-90 SERO (Delivery) System in the GDR for dry resources, as well as "Specki-Ton" for food leftovers
- 1950-75 continuous reduction of the separate collection of domestic waste in the FRG
- 1974 first containers for glass waste
- since 1978/79 multi-chamber waste system (MCMS, today MUCHAM)

# Tripartition System in Potsdam / Charlottenburg 1904

- Refuse = Ashes + Sweepings
- Shards, glass, rags, tin-cans = „dry resources “
- Kitchen and other domestic waste → Sterilisation → Fodder

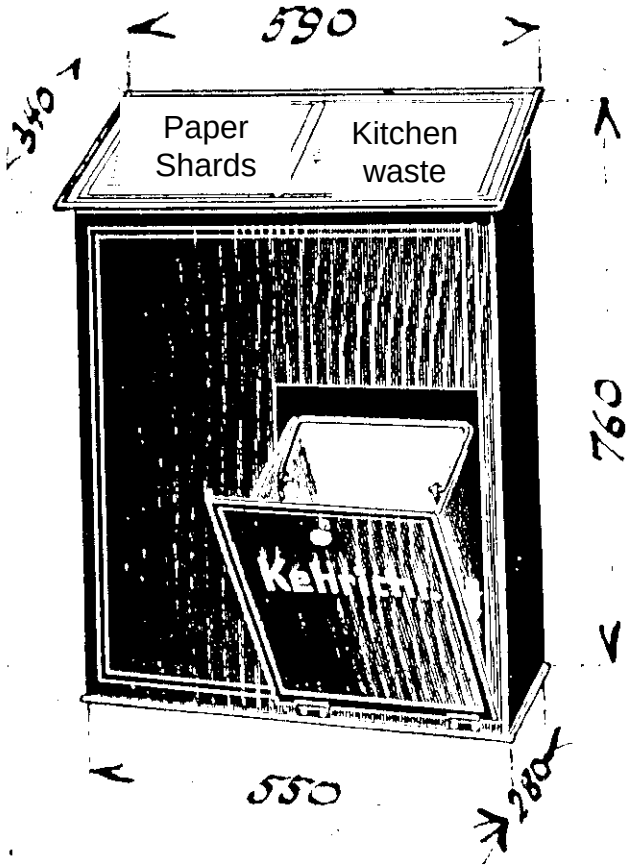




Fig. 160: Tripartition system: Backyard containers

# Salvage Collection in the Third Reich

Anerkennung
für hervorragende Leiſtungen
in der Altmaterial-Sammlung

Compliments
for outstanding performances
in the salvage collection

In the months …. of the war year 1941, the pupils of the …. school
collected a total of ….. kg of secondary raw materials with a value of …. points
with an average result of …. points.
With this excellent performance, the abovementioned school now stands at
place … among the school collection points in the area of the economic authorities of the Stade region.
We thank all teachers and pupils for their war efforts rendered to our Führer and our Fatherland and commend and acknowledge their services.

Für den dadurch unſerem Führer und Vaterlande geleiſteten wehrwirtſchaftlichen Kriegsdienſt ſprechen wir allen an der Sammlung beteiligten Lehrern und Lehrerinnen ſowie Schülern und Schülerinnen unſeren beſonderen Dank und eine lobende Anerkennung aus.

Stade, den

Landrat Kreisleiter

# Milestones of Separate Waste Collection

- since 1980 Compound containers for dry resources (replaced by LWP collection as part of the Dual System)
- 1981/83 first separate collection of bio-waste "OMA" in Würzburg / first bio-waste container in Witzenhausen
- 1981 beginning of separate collection of pollutants from households; since 1991 also collection of small amounts of special waste from businesses
- ca. 1985 separate collection and processing of refrigerators (CFC Inventory)
- 1986 ff. AbfG § 3,2 demands utilisation and strict separation; State Waste Law with detailed information about separation and prescriptions for separate collection and the obligation to deliver the waste
- since 1991 Packaging Ordinance and thus Introduction of the Dual System Germany (DSD); strong extension of the utilisation of bio-waste and green waste
- since 1996 Recycling Waste Management Law stresses that manufacturers and commerce are obliged to take back materials and demands separation in § 5, Section 2

# Milestones of Separate Waste Collection

- 1998 Product re-acceptance of batteries according to the Batteries Ordinance and voluntary re-acceptance of electric appliances and electronic scrap
- 2002 Separation and utilisation according to the Matured Timber Ordinance
- 2003 Introduction of a deposit on one-way beverage containers according to the Packaging Ordinance
- 2005 Increased collection trials („Zebra Bin“, „Dry Bin“, „Yellow Bin plus“)

HOME plus INFO plus SERVICE plus GAME plus INSIDE plus

**There's more in it for Leipzig**
**Be a part of it!**

Welcome to the Yellow Bin plus

The Yellow Bin plus can do more: it does not only serve for the disposal of packaging material with the Green Dot, but also of same-material articles and small electric appliances. The Yellow Bin plus is a pilot project of the City of Leipzig,

ALL Ltd. company and DSG Ltd. + Partners +

**The Leipzig Pilot Project is a Big Success**

Initial results show that with the Yellow Bin more resources are collected and

recycled, and that the collection mix is cleaner and contains less residual waste. Moreover, the

cost balance is positive, too: both the participating municipality and the domestic resource collection

companies profit from savings. + Success story +

**Sorting Help: This is how you sort it out**

Got an out-dated mobile phone, an old iron, broken pots and pans, leaky pails or a rubber duck

that has lost its voice? Bring them all in – the Yellow Bin is open for a long of things, if not

for anything. Want to know how it works? Please click here. + Sorting Help *

# Milestones of Separate Waste Collection

- 1998 Product re-acceptance of batteries according to the Batteries Ordinance and voluntary re-acceptance of electric appliances and electronic scrap
- 2002 Separation and utilisation according to the Matured Timber Ordinance
- 2003 Introduction of a deposit on one-way beverage containers according to the Packaging Ordinance
- 2005 Increased collection trials („Zebra Bin“, „Dry Bin“, „Yellow Bin plus“)

- 2005 Taking back of electric appliances according to the Electronic Scrap Act (Implementation of the EU Directive 2002/96/EU **W**aste **E**lectric and **E**lectronic **E**quipment (WEEE) and (**R**estriction **o**f the use of certain **H**azardous **S**ubstances in electric and electronic equipment (RoHS) - EU Directive 2002/95/EU

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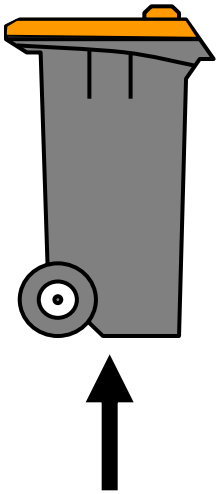
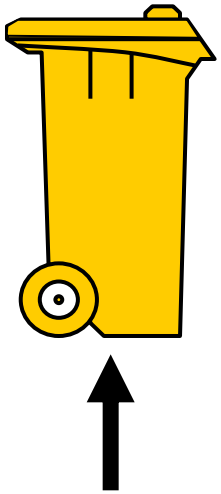
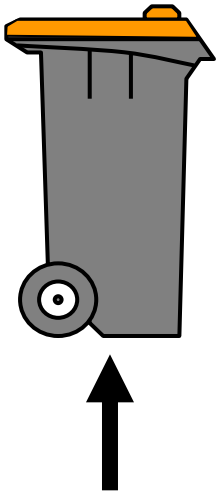
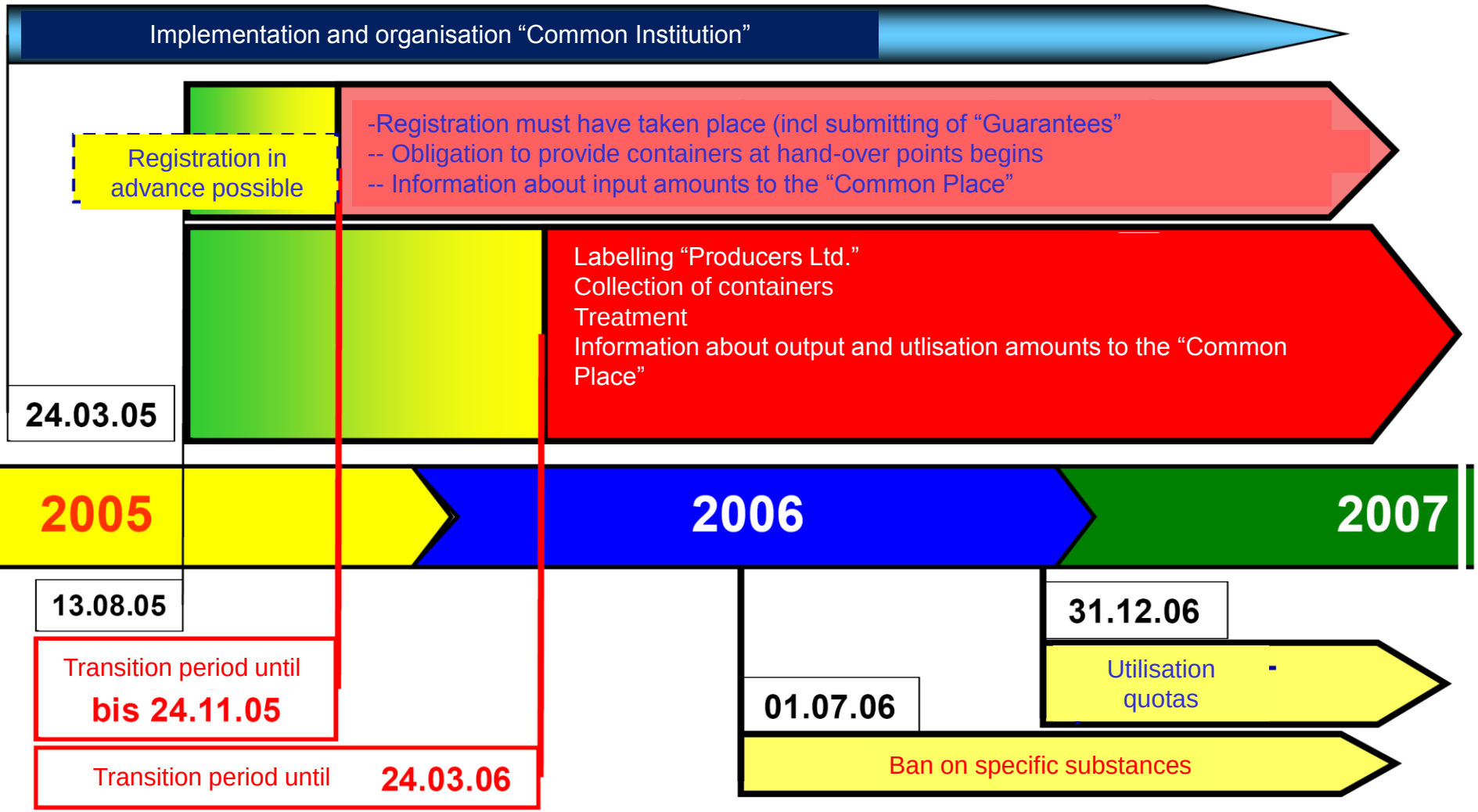
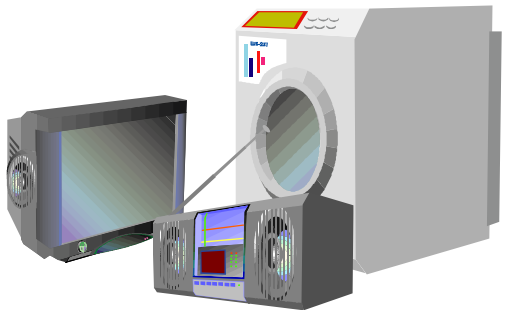
- 2011 “Wertstofftonne”, O-Tonne, Orange bin, Recycling Bin

| 1. municipal recycling bin | 2. recycling bin and yellow bag | 3. yellow bin Plus/ modell Aurich | 4. combined recycling bin |
|---|---|---|---|
|  |  |  |  |
| Dual Systems® participates | municipal disposal + Dual Systems® | municipality participates (for recycleables) | common use by Dual Systems® and municipality |

Source: GGSC, Dr. Ralf Gruneberg Fachtagung VKS Landesgruppe 04.11.2010


Implementation and organisation “Common Institution”
Registration in advance possible
-Registration must have taken place (incl submitting of “Guarantees”
-- Obligation to provide containers at hand-over points begins
-- Information about input amounts to the “Common Place”
Labelling “Producers Ltd.”
Collection of containers
Treatment
Information about output and utlisation amounts to the “Common Place”
24.03.05
2005
2006
2007
13.08.05
Transition period until
bis 24.11.05
Transition period until
24.03.06
31.12.06
Utilisation quotas
01.07.06
Ban on specific substances

1) Large domestic appliances
2) Small domestic appliances
3) IT and telecommunication
4) Entertainment electronics
5) Lighting gear
6) Tools
7) Toys, leisure and sports equipment
8) Medicinal equipment
9) Monitoring and control instruments
10) Automatic output devices



# Structural Elements

- Cost-free return options for the consumers
- Separate financial responsibility for the collection of used appliances as well as the treatment and utilisation (electric appliances from private households)
- Coordination and monitoring of the disposal tasks through the „Common Institution (CI)“ of the manufacturers
- Sovereign mortgaging of the CI for the tasks „Registration“ and „Collection Regulation“ through the Federal Environment Agency.
- Collection through trade or manufacturers/service optional next to municipal collection (voluntary re-acceptance)

# Two-Stage Retraction

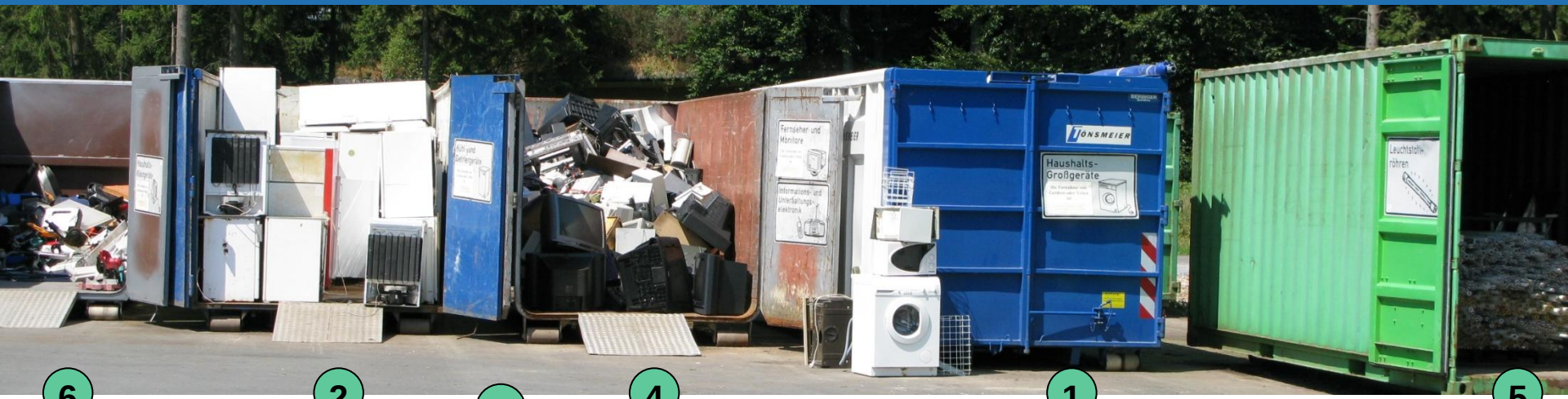
Public Disposal Contractors

- Collection
  - Delivery systems (Civic amenity sites, mobile pollutant collection)
  - Collection systems (Removal)
- Provision
  - Product groups

Manufacturers

- Taking back of the used appliances
- Transport to utilisation plant
- Utilisation

# Provision




**1.**

Large domestic appliances

and

automatic output devices

**2.**
Cooling appliances

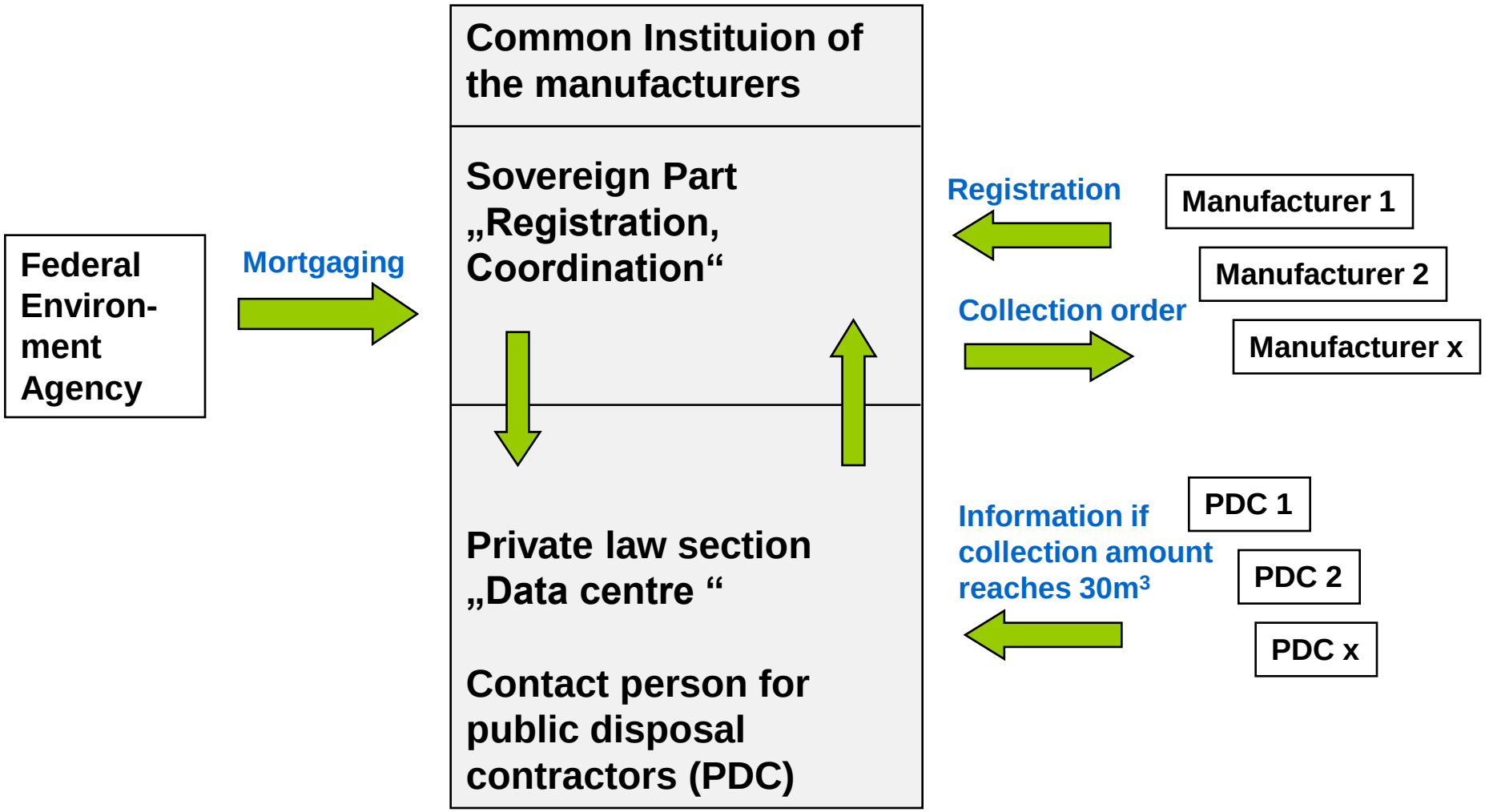
**3.**
IT and deep-freeze appliances, entertainment electronics

**4.**
TV screens

**5.**
Gas discharge lamps

**6.**
Small domestic appliances, lighting gear, tools, sport and leisure appliances, toys, measuring and regulation technology, medical technology

# Interface „Common Institution “



# Financing

- Financing at least from the place to which the disposables are returned
- Obligation for registration (registration only with an annual guarantee of an insolvency-proof warranty to bear the costs)
- Pro-rata disposal of „vintage appliances“ by all manufacturers (market share)
- Disposal of „new products“ (manufacturing date: after 13 August 2005) by each manufacturer individually or by participation in a collective system.
- In order to be able to allocate the costs to the manufacturers, all „new products“ have to be marked in such a way that the manufacturer and the production date can be identified unequivocally.
- Financing of disposal and utilisation in the business-to-business range

# Evaluation of Separate Collection

- *Costs:*
  - Collection (containers; trucks);
    increasing with lower amounts (Mg/km²) and bulk weight (kg/m³)
  - Transport to the sorting plant and to the utilisation company
  - Proceeds from the salvage material (rarely cover the costs alone)
  - Credits for prevented waste disposal
- *Benefits:*
  - Pollutant reduction
  - Precondition for utilisation; reduction of residual waste amounts
  - Reduction of environment pollutions (verify in comparison to disposal!)
  - Saving of original (renewable and non-renewable) resources

# Advantage and Disadvantages of Separate Collection

- *Advantages:*
  - low investment costs
  - quickly realisable and adaptable
  - through „two-stage“ sorting (at the place of production and centrally in the resorting) high resource quality as precondition for marketing
  - promotes insights into the waste management relevance of single products
  - promotes „problem-consciousness of waste“ and environmental awareness; saving of resources and, partly, energy

- *Disadvantages:*
  - Resource quality, collection degree and economic efficiency depend on motivation and participation rates
  - high efforts for continuous motivation; work efforts at the waste generator for sorting (approx. 4 h/week*household (investigation of ARGUS))
  - Storing positions for additional containers; demand for intermediate salvage material storage; thus necessary restriction to relevant substance groups or substances

# Suitability for Separate Collection - Examples

| | | |
|---|---|---|
| **SINGLE FRACTIONS** | Recovered Paper (RP) | high amounts; average bulk weight; print products; packaging |
| | Recovered Glass (RG) | High amounts; high bulk weight; container glass should be separated according to colour; a low loss of quality allows for highest utilisation of recovered materials |
| | Scrap Plastic (SP)) | Low amounts and lowest bulk weight; foils, packaging; large range of different products; high sorting losses; resource utilisation difficult; very high collection costs |
| | Scrap Metal (SM) | Low bulk weight and amounts Fe metals (predominantly tin cans) and NE metal; recovery of Fe from mixed waste with magnetic separation simpler and cheaper |
| | Recovered Aluminium | packaging; low mass ratio < 1 weight-% in DW; high proceeds; low piece weight; frequently as composite material |
| | Composite Materials | For instance composite packing materials (RP+SP+Recovered Aluminium) |
| **MIXED FRACTIONS** | Bio-Waste | Largest amounts and high bulk weight; low-pollutant compost raw material; sales not fully guaranteed in case of nationwide introduction in Germany |
| | Mixed Dry Resources | Multi-material containers for RP, RG, SM; sorting efforts and salvage material quality comparable to single-material systems |
| | Light Fraction in the DSG | Low amounts and bulk weights; packaging from composite materials, metal and plastics; high sorting efforts |
| | Wet Waste | Residual waste after separate collection of dry resources; because of higher pollutant contents than in bio-waste not acceptable as compost raw material |
| | Pollutants | Low amounts and mass reduction; high specific costs; reasonable because of pollutant reduction in the residual waste, for instance via the collection of used batteries, electronic scrap, cooling appliances, etc. |

# Collection Rates – Potentials beyond DW/RW

Example RP 30 ?? 70

- The utilisation **potential** of any substance group consists of **3 blocks**:
  1. resources contained in domestic or residual waste via a sorting analysis
  2. amounts otherwise disposed of (private composting of bio-waste; burning of old paper (RP) in the fire-place, etc.)
  3. amounts collected via the separate collection (if need be with different systems, e. g. collection system + delivery system)
  - Part (2) often remains unconsidered as it is not ascertainable
- <u>Collection rates</u> of separate collection = (3) / ((1)+(3)); the rate grows with the convenience (collection systems are more comfortable than deliver systems), duration, awareness level, and waste-management relevance.

70/ (30+70) = 0,7

- other potentials

| Type of Waste | Resource potential [kg/P·a] |
|---|---|
| Bulky waste (e.g. Fe metal and green waste) | < 10 |
| Green waste from public parks etc. | 10 - 80 |
| DW-like commercial waste | 100 - 400 |
| Production-specific waste | Can be determined only locally! |
| Sewage sludge | Related to 75% WC: 70 - 200 |
| Construction site waste | 50 - 150 |
| Soil, building rubble, roadway rubble | 1000 - 3000 |

# Collection Rates- Potentials beyond DW/RW

Utilisation **potential** =

$$\mathbf{R + (R_{fraction}(DW)\% \cdot DW)} + (R_{fraction}\%(BW) \cdot BW) \qquad [kg/(P \cdot a)]$$

$$\text{Collection rate} = \frac{\text{separately collected resource amount}}{\text{recycling potential}} \qquad [\%]$$

$$\text{Utilisation rate} = \frac{\text{utilised amount of resource}}{\text{recycling potential}} \qquad [\%]$$

$$\text{Pollutant content} = \frac{\text{not utilised ratio of resource}}{\text{entire collected amount of resorce}} \qquad [\%]$$

R = resource amount, DW = domestic waste, BW = bulky waste

# Utilisation Rates of the Major Waste Fractions (November 2005)

| Utilisation Ratio of the Major Waste Fractions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1999[2)] | 2000[3)] | 2001 | 2002[4)] | | 2003 | 2004 |
| **Municipal Waste** | 1000 t | **49 653** | **50 085** | **49 371** | **52 772** | | **49622** | **48434** |
| of which: (material) utilisation | Thou. t | 24 634 | 25 573 | 25 110 | 29 590 | | 26702 | 27339 |
| thermal utilisation | | | | | 153 | | 177 | 371 |
| *Utilisation rate* | *%* | *49,6* | *51,1* | *50,9* | *56,1* | | *53,8* | *57,2* |
| | | | | | | | | |
| **Mining refuse** (no particular supervision need) | 1000 t | **52 251** | **48 187** | **49 187** | **45 461** | | **46689** | **50452** |
| of which: utilised | 1000 t | 0 | 0 | 0 | 0 | | 0 | 0 |
| | | | | | | | | |
| **Production and commercial waste** | 1000 t | **37 274** | **39 754** | **37 173** | **42 218** | | **46712** | **53005** |
| of which: material utilisation | 1000 t | 22 692 | 19 654 | 18 058 | 12 321 | | 15167 | 22911 |
| thermal utilisation | | | | | 3 933 | | 4625 | 7687 |
| *Utilisation rate* | *%* | *60,9* | *49,4* | *48,6* | *38,5* | | *42,4* | *57,7* |
| | | | | | | | | |
| **Building rubble, excavation, roadway rubble, building site waste** | 1000 t | **252 377** | **253 700** | **243 660** | **240 812** | | **223389** | **187478** |
| of which: material utilisation | 1000 t | 220 453 | 222 383 | 215 271 | 205 914 | | 192484 | 160880 |
| thermal utilisation | | | | | 162 | | 142 | 884 |
| *Utilisation rate* | *%* | *87,4* | *87,7* | *88,3* | *85,6* | | *86,2* | *86,3* |
| | | | | | | | | |
| **Waste** | 1000 t | **13 507** | **14 937** | **15 830** | ***19 636*[5)]** | | **19515** | **18401** |
| of which: utilised | 1000 t | 2 654 | 2 991 | 3 536 | *5 056* | | 5374 | 12634 |
| *Utilisation rate* | *%* | *19,6* | *20,0* | *22,3* | *25,7* | | *27,5* | *68,7* |
| **Total** | **1000 t** | **405 062** | **406 663** | **395 222** | **381 262** | | **366 412** | **339 368** |
| **of which: utilised** | **1000 t** | **270 433** | **270 602** | **261 974** | **252 075** | | **241 272** | **220 072** |
| ***Utilisation rate*** | ***%*** | ***66,8*** | ***66,5*** | ***66,3*** | ***66,1*** | | ***65,8*** | ***64,8*** |
| | | | | | | | | |

# Packaging Ordinance 1998

Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

- **Targets (§1):**
  - Product responsibility for manufacturers and trade – Consideration of disposal during product development
  - Relief of municipal waste disposal – Reduction of packaging waste through prevention and utilisation
  - Support (preservation) of the multi-cycle system
  - Priority of (material) utilisation over disposal

"§ 1 Waste Management Targets (30.12.2005)

(1) This ordinance purposes **to prevent or to reduce** the effects of packaging waste on the environment. Packaging waste must generally be prevented; otherwise, the re-use of packaging material, the **material utilisation and other forms of utilisation have priority** over the disposal of packaging waste.

# Packaging Ordinance 1998

Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

"§ 1 Waste Management Targets

**(2) The ratio of beverages bottled in multi-cycle beverage packaging and in ecologically favourable one-way beverage packaging shall be strengthened by this ordinance with the objective of achieving a ratio of at least 80 percent.**

The Federal Government runs the necessary surveys of the respective ratios and publishes the results annually in the German Federal Gazette. The Federal Government will assess the waste management effects of the regulations in §§ 8 and 9 no later than January 1, 2010. The Federal Government will report the results of this assessment to the Federal Parliament and the Federal Council.

# Packaging Ordinance 1998

Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

**(3) By December 31, 2008,** of **the entire annual amount of packaging waste**
**- at least 65% of the mass should be utilised, and**
**- at least 55% of the mass should be utilised materially.**

The rates for material utilisation of the single types of packaging material should be:

| | | |
|---|---|---|
| Wood | 15 % | |
| Plastic | 22,5 % | |
| Metals | 50 % | |
| Glass | 60 % | |
| Paper and cardboard | 60% | in mass |

In the plastic fraction, only those materials are considered which through material utilisation become plastic again.

The Federal Government will run the necessary surveys and induces the information of the public and the market actors. (...)

# Packaging Ordinance 1998

Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

- **Re-acceptance, Deposit-Levying and Utilisation Obligations (§ 4-8):**
  - (chargeable) taking back of the **transport packaging** through the manufacturer and distributor for utilisation since December 1991
  - cost-free taking back of **outer packaging** through the trade since 4/1992
  - cost-free taking ack of **sales packaging since** 1/1993 (at point of sale)
  - obligatory deposit of ≥ 0,25 or 0,50 € on one-way packaging for beverages and washing and cleaning agents, as well as ≥ 1,00 € on packaging for emulsion paints from 2 kg contents onwards

- Transport packaging
- Outer packaging
- Sales packaging
- Beverage packaging

- Multi-cycle packaging
- Composite packaging
- Ecologically favourable one-way packaging
- Durable packaging

# Packaging Ordinance 1998

Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

- There is no obligation to take sales packaging back (§ 6),
  - if the manufacturers and distributors provide a regular and cost-free collection system at or near the final consumer with documentation of the licensed packaging since 01.01.1999 of :

*(For packaging material made of renewable primary products (RPP), the quotas can also be fulfilled through energetic utilisation.)*

| Packing Material | Packaging Ordinance 91 since 1.7.1995 | **Packaging Ordinance 98 since 01.01.1999** |
|---|---|---|
| Glass | 72 % | **75 %** |
| Tinfoil | 72 % | **70 %** |
| Aluminium | 72 % | **60 %** |
| Paper, cardboard, carton | 64 % | **70 %** |
| Composite materials | 64 % | **60 %** |
| Plastics, of which since 1996 ≥. 60% material; bio-degradable plastics fromRPP | 64 % | **60 %**<br>**since July 2002, at least 60 % composted** |

- **Utilisation** (with the exception of plastics) only material, but no energetic utilisation.
- **No deposit obligation** (§ 9) if
  - collection systems according to § 6,3 have been established, and
  - a multi-cycle quota of at least 72% for multi-cycle suitable beverages and at least 20% for pasteurised consumption milk (incl. PE tubular bags) is observed.

# Packaging Ordinance 1998

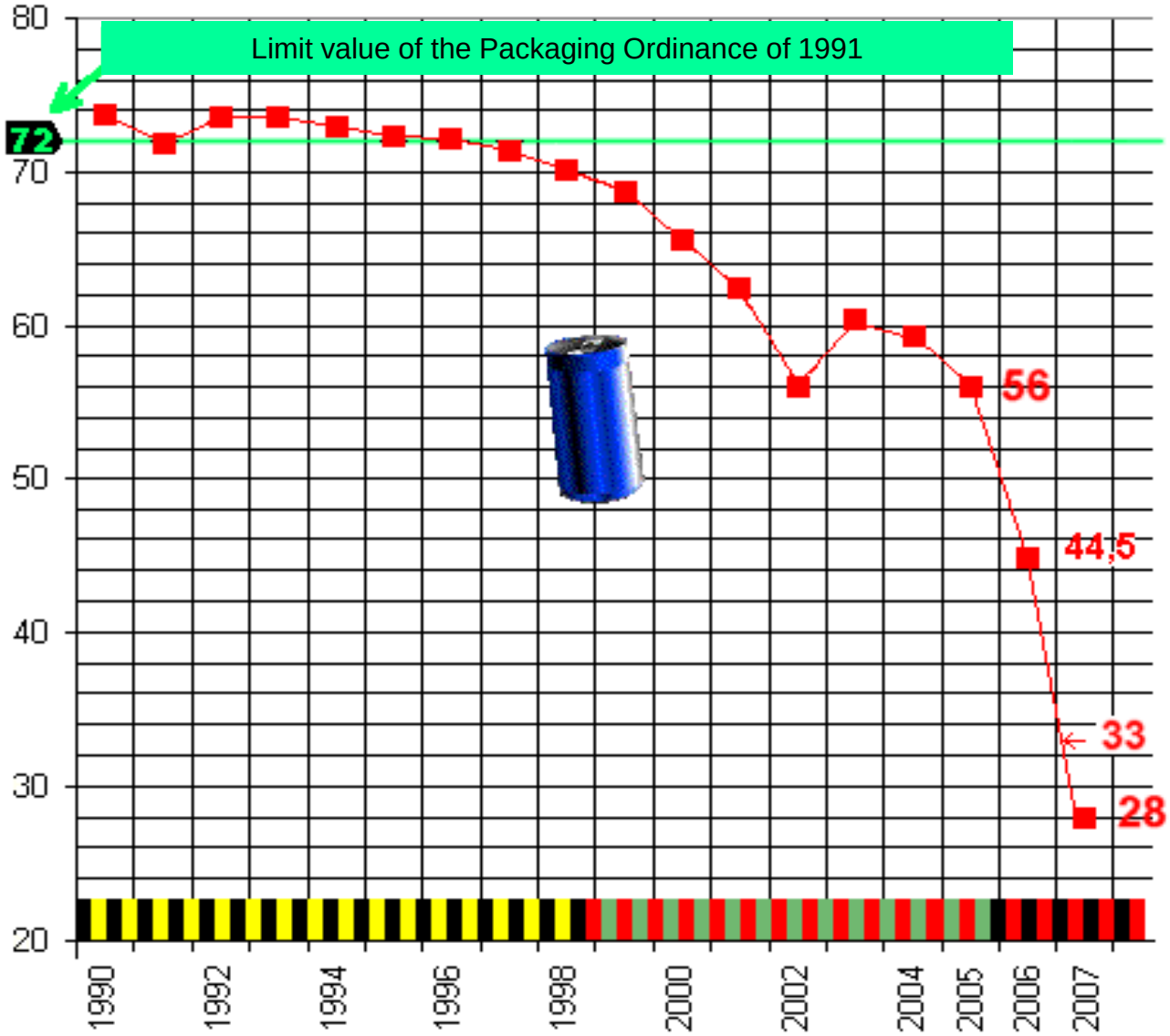
Utilisation + Prevention of Packaging Waste (1991)/ 27. 08.1998/ 30.12.2005/ 19.7.2007/ 02.04.2008/ 09.11.2010)

- Bringing packaging into circulation (§ 13),

§ 13 Sect. 1

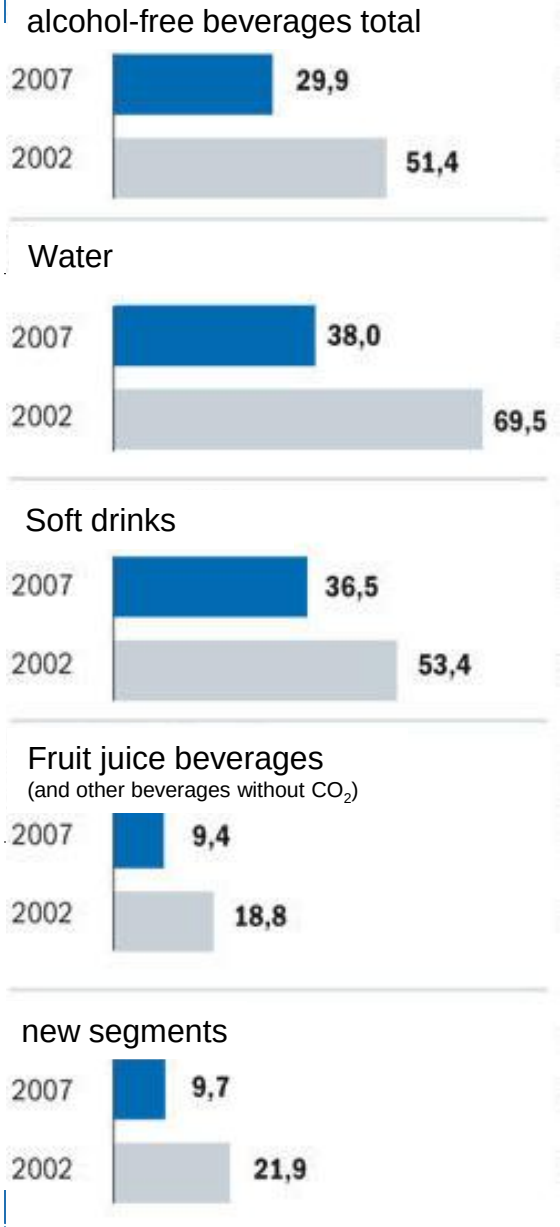
(1) „Packaging or packaging components must only be brought into circulation if the cumulative concentration of lead, cadmium, mercury and chromium does not exceed 100 ppm."

## Multi-cycle Ratio
## Ratio of multi-cycle packaging in percent of all beverage packagingl




Source: GfK
Graphic: Regenbogen Nachrichten

## Multi-cycle ratios of the alcohol-free beverages in percent




Source: GFK
Consumer Scan

DIE WELT INFOGRAFIK

# Packaging total

Consumption, utilisation, quotas 1991 – 2006, total amount of packaging May 2008

| Packaging Material | 1991 | 1997 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| Consumption Glass | 4.636,6 | 3.750,3 | 3.266,4 | 3.130,1 | 3.073,3 | 2.878,5 | 2.894,9 |
| Utilisation amount | 2.491,5 | 3.132,3 | 2.814,3 | 2.687,4 | 2.504,1 | 2.376,7 | 2.384,8 |
| Utilisation ratio in % | *53,7* | *83,5* | *86,2* | *85,9* | *81,5* | *82,6* | *82,4* |
| Metals | | | | | | | |
| Consumption Aluminium | 108,4 | 87,2 | 94,2 | 92,5 | 85,9 | 83,5 | 88,3 |
| Utilisation amount | 18,0 | 69,5 | 68,9 | 65,9 | 62,6 | 63,6 | 67,6 |
| Utilisation rate in % | *16,6* | *79,7* | *73,1* | *71,2* | *72,9* | *76,2* | *76,6* |
| | | | | | | | |
| Consumption Tinplate | 818,3 | 712,3 | 713,5 | 576,6 | 544,0 | 534,4 | 520,5 |
| Utilisation amount | 303,9 | 566,4 | 551,1 | 466,9 | 444,6 | 447,9 | 469,6 |
| Utilisation ratio in % | *37,1* | *79,5* | *77,2* | *81,0* | *81,7* | *83,8* | *90,2* |
| | | | | | | | |
| Consumption Other Steel Types | 409,9 | 321,9 | 282,8 | 280,8 | 274,2 | 280,3 | 278,4 |
| Utilisation amount | | 286,6 | 246,9 | 241,6 | 239,2 | 247,4 | 250,8 |
| Utilisation rate in % | | *89,0* | *87,3* | *86,0* | *87,2* | *88,3* | *90,1* |
| | | | | | | | |
| Consumption Metals total | 1.336,6 | 1.121,4 | 1.090,5 | 949,9 | 904,1 | 898,2 | 887,2 |
| Utilisation amount | 321,9 | 922,5 | 866,9 | 774,4 | 746,4 | 758,9 | 788,0 |
| Utilisation rate in % | *24,1* | *82,3* | *79,5* | *81,5* | *82,6* | *84,5* | *88,8* |
| Consumption Plastics | 1.655,9 | 1.502,1 | 2.073,0 | 2.070,5 | 2.254,8 | 2.367,9 | 2.591,2 |
| Utilisation amount | (192,9) | 916,2 | 1.042,7 | 1.139,2 | 1.101,0 | 1.127,0 | 1.444,4 |
| Utilisation rate in % | *11,6* | *61,0* | *50,3* | *55,0* | *48,8* | *47,6* | *55,7* |

# Packaging total

Verbrauch, Verwertung, Quoten 1991 – 2006, Ges. f. Verpackung, Mai 2008

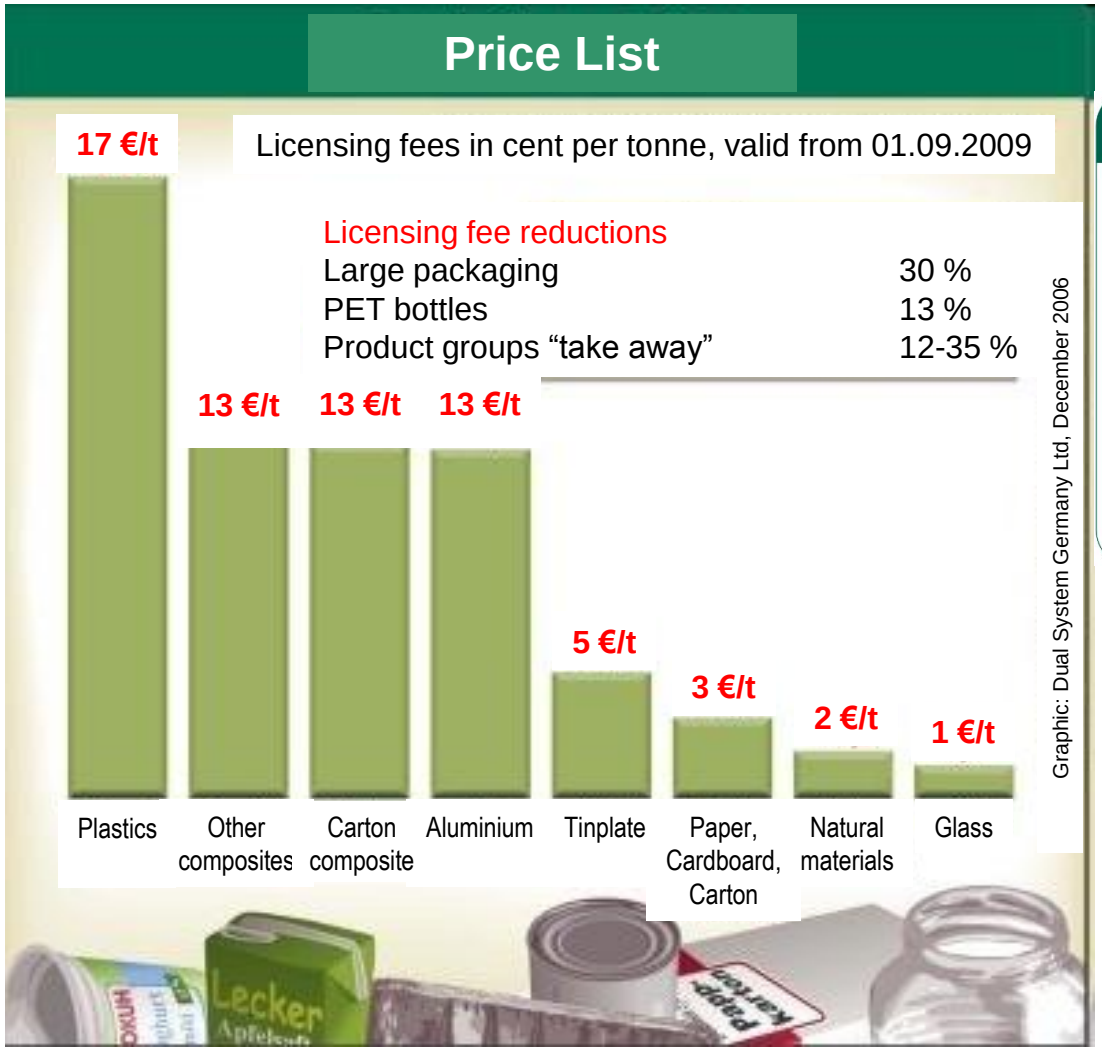
| Packaging Material | 1991 | 1997 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| Paper, Cardboard, Carton | | | | | | | |
| Consumption Paper | 5.598,2 | 5.238,1 | 6.380,1 | 6.537,7 | 6.701,8 | 6.658,1 | 6.868,9 |
| Utilisation amount | 3.121,0 | 4.640,8 | 5.663,0 | 5.760,5 | 6.096,4 | 6.067,9 | 6.143,3 |
| Utilisation rate in % | *55,8* | *88,6* | *88,8* | *88,1* | *91,0* | *91,1* | *89,4* |
| | | | | | | | |
| Consumption Cartons for Liquids | 193,0 | 209,7 | 227,2 | 250,8 | 245,4 | 238,2 | 235,2 |
| Utilisation amount | 0,0 | 129,2 | 144,0 | 156,0 | 153,4 | 148,7 | 156,1 |
| Utilisation rate in % | *0,0* | *61,6* | *63,4* | *62,2* | *62,5* | *62,4* | *66,4* |
| | | | | | | | |
| Consumption Paper, cardboard, carton, cartons for liquids | 5.791,2 | 5.447,8 | 6.607,3 | 6.788,5 | 6.947,2 | 6.896,3 | 7.104,1 |
| Utilisation amount | 3.121,0 | 4.770,0 | 5.807,0 | 5.916,5 | 6.249,8 | 6.216,6 | 6.299,4 |
| Utilisation rate in % | *53,9* | *87,6* | *87,9* | *87,2* | *90,0* | *90,1* | *88,7* |
| | | | | | | | |
| Consumption Wood | 2.184,0 | 1.892,2 | 2.382,2 | 2.508,2 | 2.319,1 | 2.408,3 | 2.633,0 |
| Utilisation amount | | 1.600,0 | 1.500,0 | 1.550,0 | 1.570,0 | 1.670,0 | 1.790,0 |
| Utilisation rate in % | | *84,6* | *63,0* | *61,8* | *67,7* | *69,3* | *68,0* |
| | | | | | | | |
| Consumption other packaging materials | 16,0 | 16,9 | 15,3 | 19,0 | 18,4 | 21,3 | 22,4 |
| Utilisation amount | | 0,0 | 0,0 | 7,0 | 0,0 | 0,0 | 0,0 |
| Utilisation rate in % | | *0,0* | *0,0* | *0,0* | *0,0* | *0,0* | *0,0* |
| | | | | | | | |
| Total consumption | 15.620,3 | 13.730,7 | 15.434,7 | 15.466,2 | 15.516,9 | 15.470,5 | 16.132,8 |
| Total utilisation | 5.741,5 | 11.341,0 | 12.030,9 | 12.074,5 | 12.171,3 | 12.149,2 | 12.706,6 |
| Total utilisation rate in % | *36,8* | *82,6* | *77,9* | *78,1* | *78,4* | *78,5* | *78,8* |

# Development of the Utilisation Rates for RP and PCC

| | | | | | |
|---|---|---|---|---|---|
| **PCC** | Households | before 1986 at higher RP prices; since 1986 nationwide | Bundsystem; MGB mono; AP-Sack; Depotcontainer | Packaging Ordinance | (2003) |
| **Recovered Glass** | Households and bottlers | since 1974 | Depotcontainer; MGB mono | Packaging Ordinance | ca. 0,85*2,8=2,38 at DSG DSD (2003) 2,266 |
| **Used wood** | Households and commerce | Commerce always when economically sound; ...GewAbfV | Bulky waste; (pre-) sorting; building waste | Statues; Matured Timber ordinance; REL ...EEG | ca. 2,8 |
| **Recovered plastics** | Commerce | whenever economically sound; ...GewAbfV | container compacted and uncompacted | voluntary; Packaging Ordinance | |
| | Households | since 1991 DSG-LWP | LWP bag; LRB mono | Packaging Ordinance 1991/98 | 0,6 |
| **Composites in LWP** | Haushalte | since 1991 DSG-LWP | LWP bag; MGB mono | Packaging Ordinance 1991/98 | 0,4 |
| **Used cars** | all car owners | always at higher scrap prices | Product re-acceptance | AltautoV 1997; AltfahrzeugG 2002 | decreasing due to export of used cars |
| **Old drugs** | households | ca. since the mid-80s | Problem waste collection; re-acceptance in pharmacies | voluntary | |

# Licensing Fees for the DSG

## Licensing fees for the Green Dot



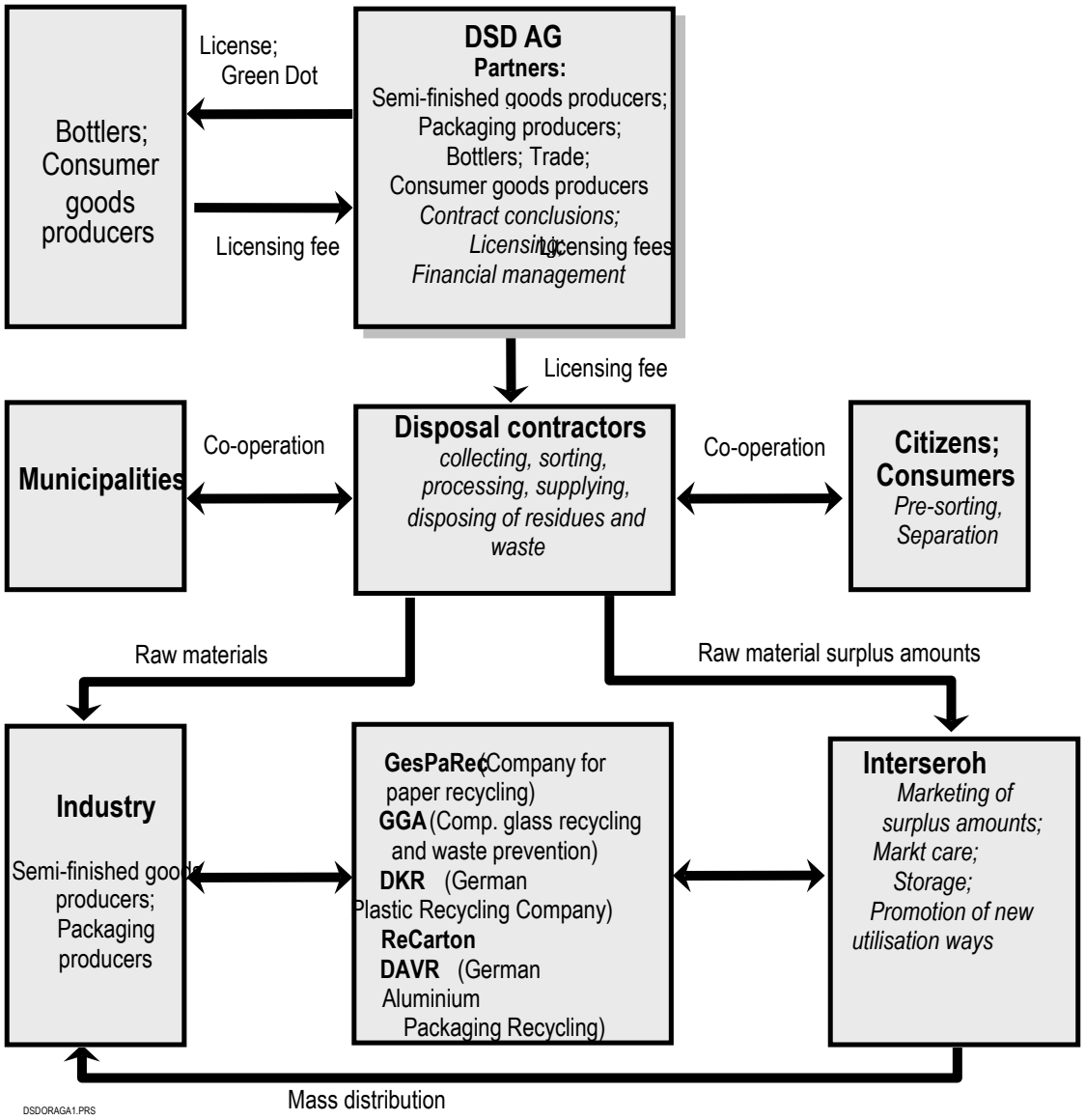


- Germany >

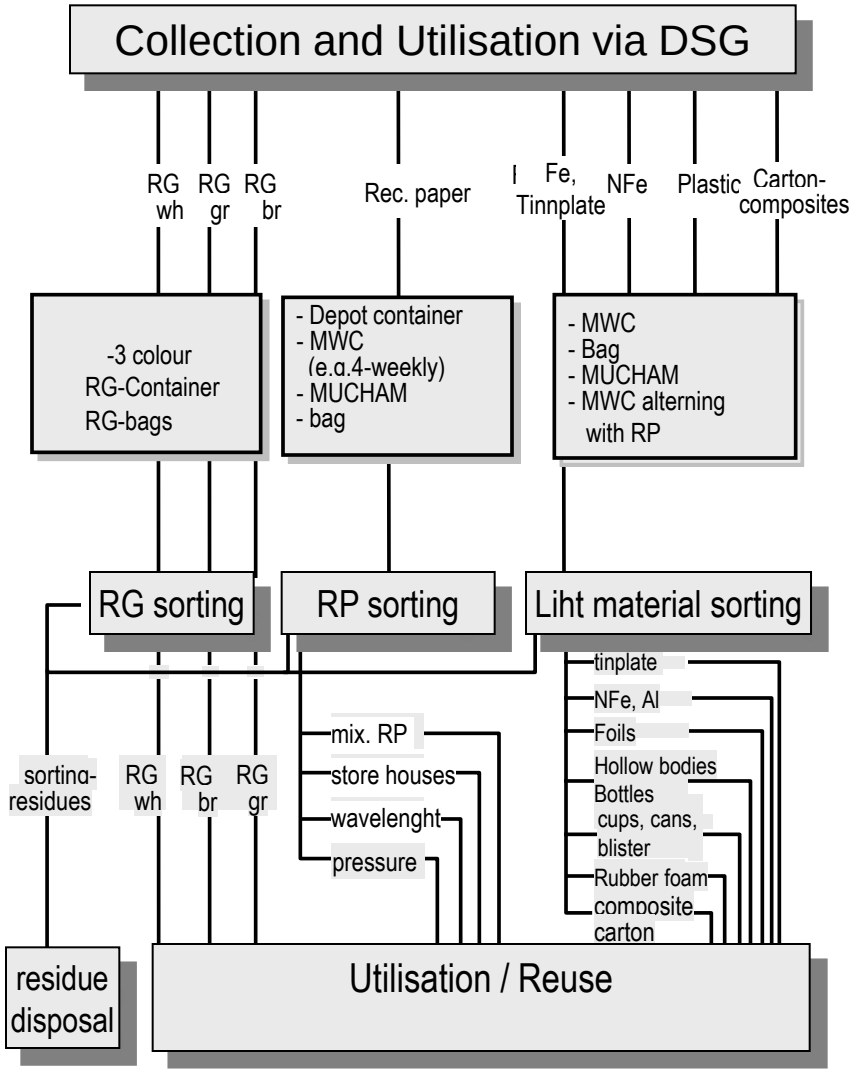
Packaging Recovery Organisation Europe
PRO EUROPE

Pro Europe s.p. r.l.
Packaging Recovery Organisation
1200 Brussels, Rue Martin V 40

# Organisation of the DSD



# Collection Systems of the DSD

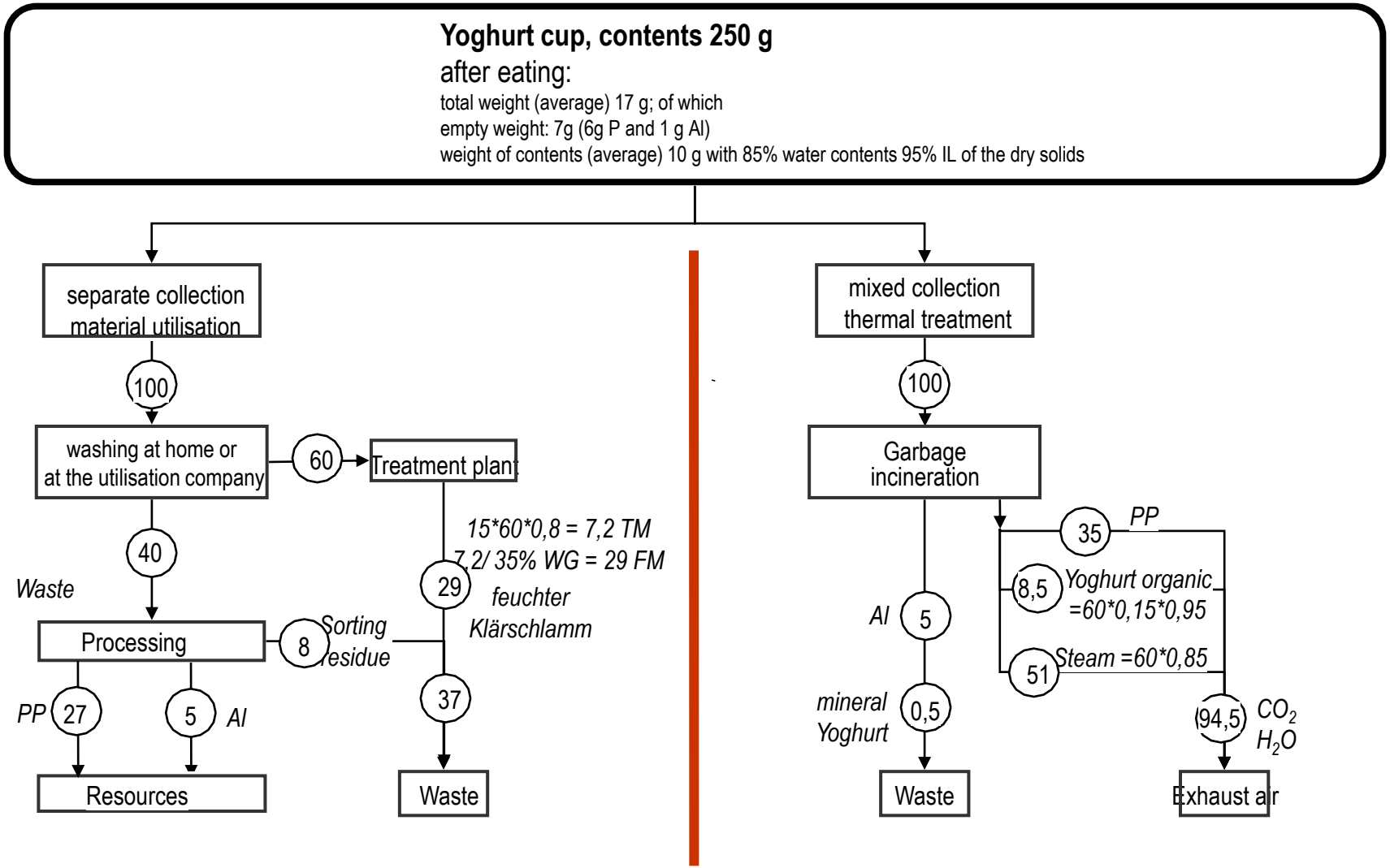



Preferred collection systems of the DSG

- Prevention of parallel systems for non-packagings of identical material

- For RP:
  75 % print products
  25 % wrapping paper

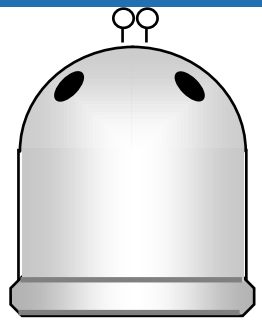
# Yoghurt Cup


Yoghurt cup, contents 250 g
after eating:
total weight (average) 17 g; of which
empty weight: 7g (6g P and 1 g Al)
weight of contents (average) 10 g with 85% water contents 95% IL of the dry solids
separate collection
material utilisation
100
washing at home or
at the utilisation company
60
Treatment plant
40
Waste
Processing
8
Sorting
residue
PP
27
5
Al
Resources
15*60*0,8 = 7,2 TM
7,2/ 35% WG = 29 FM
29
feuchter
Klärschlamm
37
Waste
mixed collection
thermal treatment
100
Garbage
incineration
35
PP
8,5
Yoghurt organic
=60*0,15*0,95
51
Steam =60*0,85
Al
5
mineral
Yoghurt
0,5
Waste
94,5
CO2
H2O
Exhaust air

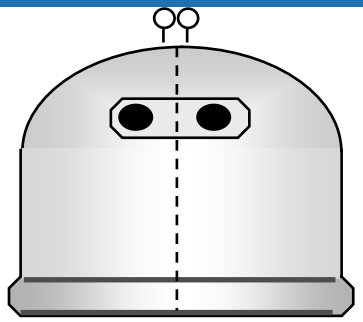
# System Survey Separate Collection

| | integrated systems | additive systems | | | |
|---|---|---|---|---|---|
| | integrated collection system | alternating or additive; collection system | additive collection system | additive delivery system | Additive delivery system |
| | System container | System container | without container | without container | container; trade |
| | Collection of mixed and single materials | | collection of single materials | | |
| | Bag + Bag; bag in the container; multi-chamber truck (MUCHAM)) | Multi-material container/bag; mono container | Street collection; door-to-door collection; differentiated bulky waste removal | Stationary and mobile delivery points; civic amenity sites | Depot container/ groups; multi-chamber container; return to trade |
| Recovered paper | + | ++ | ++ | + | ++ |
| Recovered glass | + | + | o | + | ++ |
| Scrap metal | + | + | + | + | + |
| Scrap plastic | + | + | o | + | |
| Old textiles | o | o | ++ | ++ | ++ |
| Light-weight packaging | + | ++ | o | + | ++ |
| Bio-waste | + | ++ | o | o | o |
| Green waste | oo | o | ++ | ++ | o |
| Problematic waste | oo | o | + | ++ | o |
| Used batteries | oo | oo | oo | ++ | ++ |
| Old drugs | o | o | o | ++ | ++ |
| Used wood | oo | oo | + | ++ | oo |
| Electronic scrap | o | o | o | ++ | ++ |
| Re-usable furniture | oo | oo | ++ | ++ | oo |

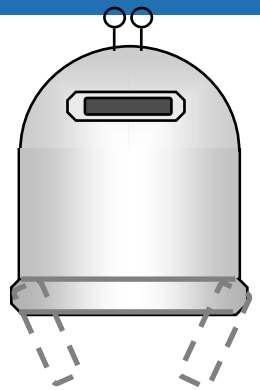
# Containers for Recycling Glass or Paper



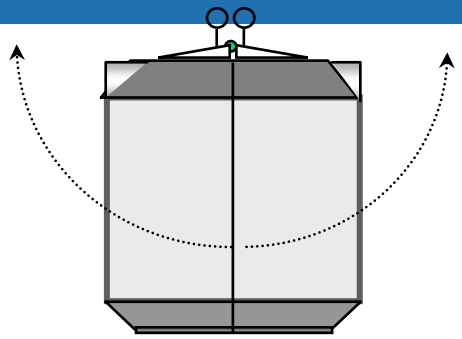
Recycling glass container GFP



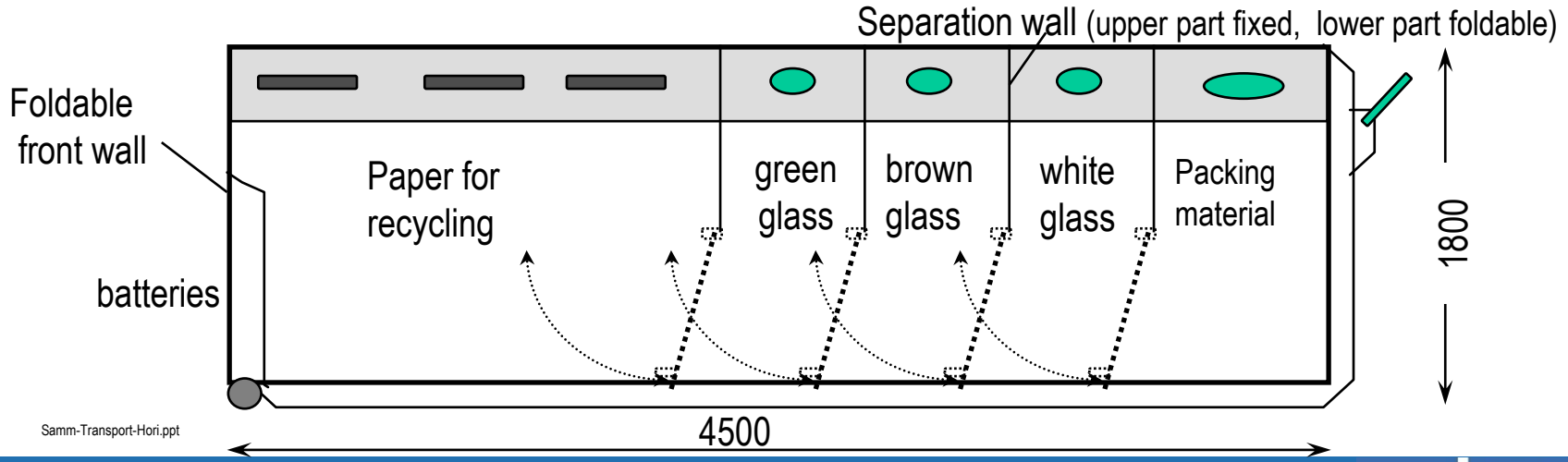
Recycling glass container GFP, 2 chambers



Recycling paper container GFP

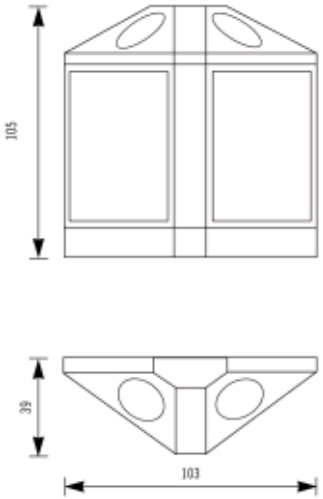


Recycling paper container, steel



# 2 to 4 Chamber Boxes of German Railway

"CITYBOX"- TYP B2

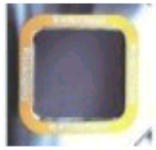




wall-mounted container for canopied areas.
Characteristics: Coloured marking rings
and sidewalls for the motifs Paper, Glass, Packaging, Recycling, or Residual Waste.
Alternative: Transparent side plates.

Filling level:
Dimensions: W 103 cm/ D 39 cm/ H 105 cm
Weight: 40 kg

Designation through coloured marking rings for the separation containers.
On demand, we provide the following slot types


Ø 18 cm


14 cm x 14 cm

Ø 12 cm

B: 25 cm / H: 14cm

# Subsurface Containers

SULO

HOME | SULO Stiftung | Karriere

SULO GRUPPE
UMWELTTECHNIK
UMWELTSERVICE
EMBALLAGEN

> Home > Stadtmöbel > Iceberg > Systemvorteile

- >Portrait
- >Standorte
- >Abfallsammelbehälter
- >Stadtmöbel
  - >Iceberg
  - >SuCasa
  - >SuCasa Müllschleuse
  - >GT1, GT3, GT4
  - >Papierkorb DIN PK
  - >Papierkorb SAB
- >Wäge- und Identtechnik
- >Software
- >Referenzen
- >News
- >Links
- >Kontakt
- >Datenschutz

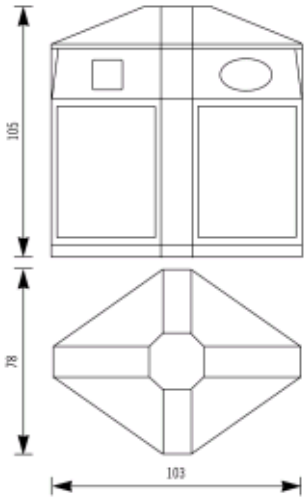
How do you turn a mountain into a molehill?
**Iceberg: The subsurface disposal system**

**Iceberg: a practical system with several advantages**

- ICEBERG subsurface disposal systems are available in three sizes: 3, 4, and 5 $m^3$
- The collection containers are supplied for waste fractions such as glass, paper, light packaging, tinplate (tin-cans), residual waste, bio-waste, old textiles, etc.
- Strongly reduced noise pollution when glass is dumped. This system stays way below the permitted limit values.
- High filling levels of more than 80%
- The loading mechanisms of the collection containers can be adapted to the used removal vehicles.

# 4-Chamber Box German Railway

"CITYBOX"- TYP R4

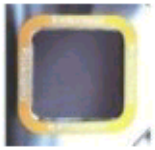




Stand-alone container with 4 chambers for outside. Can also be used inside
if increased fire protection is wanted (provided by
the closed roof).
Lateral slots specially formed.
Characteristics: Coloured marking rings
and sidewalls for the motifs Paper, Glass,
Packaging, or Residual Waste.
Alternative: Transparent side plates.

Filling level: 4 x 50 l or 2 x 60/2 x 40 l
Dimensions: W 103 cm/ D 78 cm / H 105 cm
Weight: 65 kg

Designation through coloured marking rings for the separation containers.
On demand, we provide the following slot types


Ø 18 cm


14 cm x 14 cm


Ø 12 cm

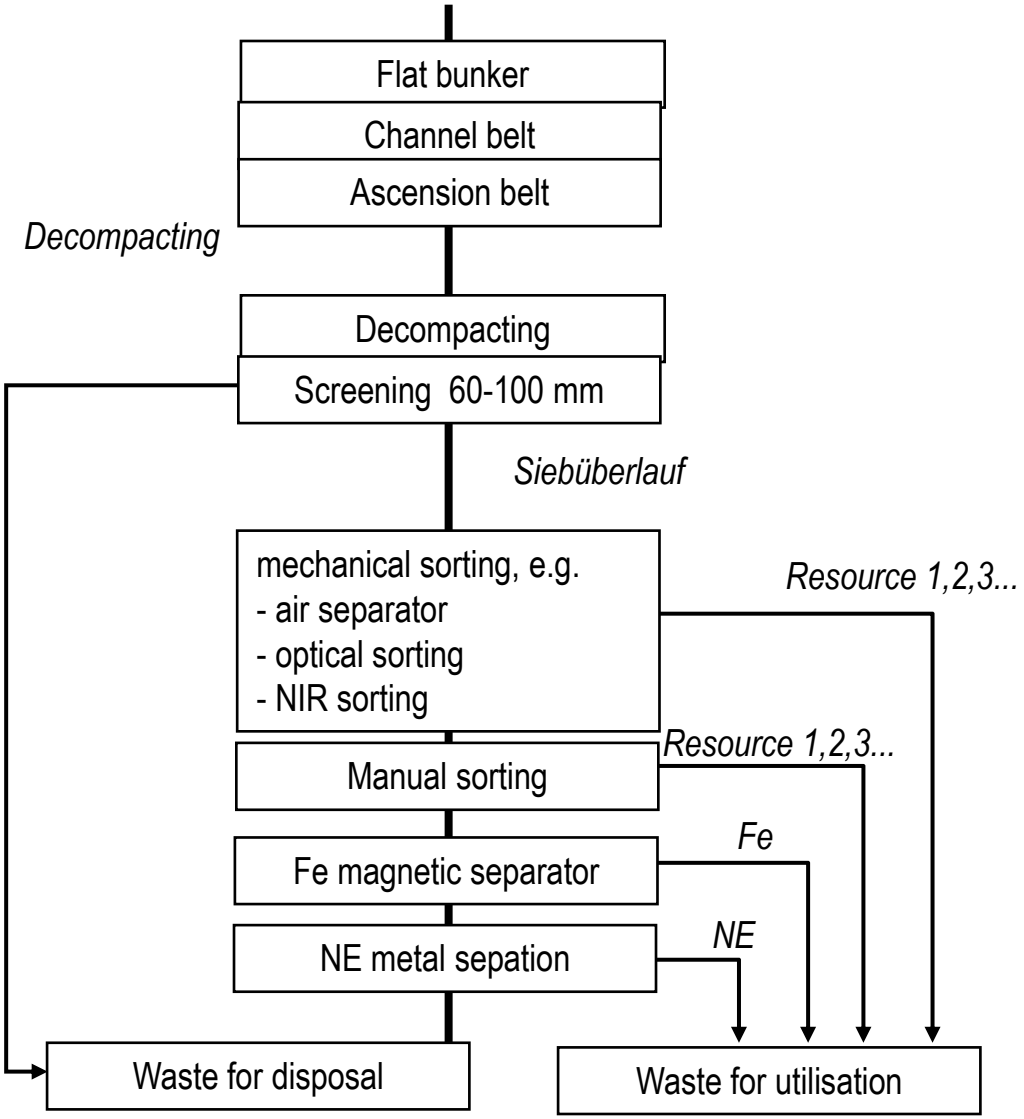

B: 25 cm / H: 14cm

Optional:
ash-tray canopy

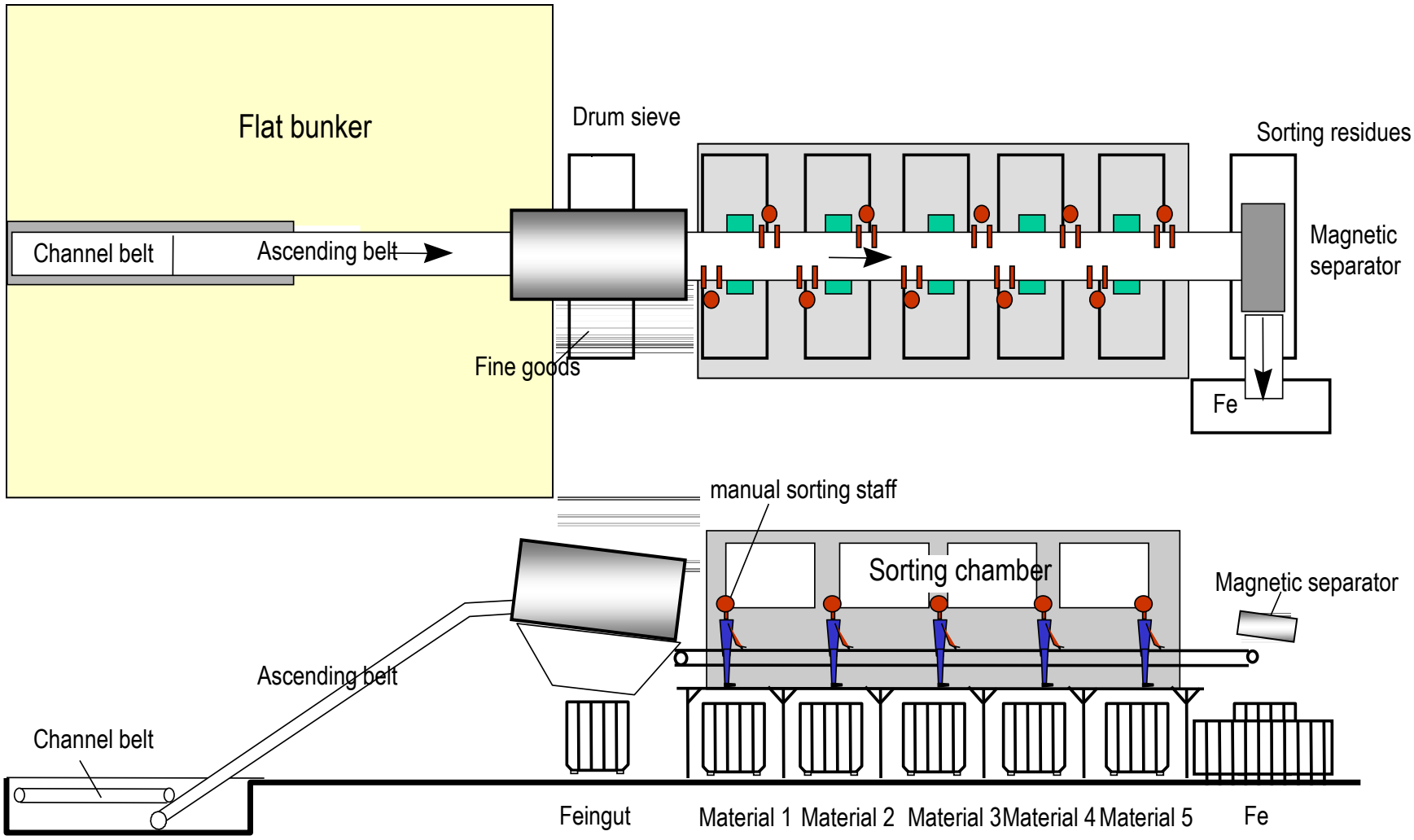
# Collection Systems

- frequently MWC; colour and slots adapted to the collected material; designation should be according to contents, not to container colour!
- clean resources → sufficient volume → for the dimensions, please see above
- Bag + container or bag + bag: very flexible system; also for integrated removal; bag—b-bag sorting; also bag in container; can be combined with collection system
- Multi-material container or Yellow Bag with resorting

# Typical Components of a Sorting plant for Mixed Dry Resources



# Manal Sorting Plant - Positive or Negative Sorting



# Bio-Waste Potential and Bio-Waste Container Application Areas

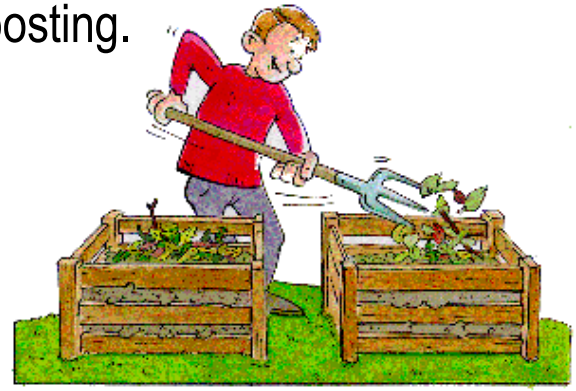
| | Kitchen waste | Garden waste | total |
|---|---|---|---|
| Biowaste potential | 60-90 kg/P·a | 1,5 - 3,5 kg/m²·a<br>20 - 330 kg/P·a | 90 - 400 kg/P·a |
| Collected via residual waste + separate collection (without amounts for private use) | 30-70 kg/(P·a) | 20 - 170 kg/(P·a) | 50 - 240 kg/(P·a) |
| Separately collected **rural** areas via bio-waste container | 20-50 kg/($P_T$·a) | 20 - 150 kg/($P_T$·a) | 80 - 200 kg/($P_T$·a) |
| Separately collected **urban** areas via bio-waste container | 20-50 kg/($P_T$·a) | 20 - 40 kg/($P_T$·a) | 40 - 90 kg/($P_T$·a) |

- Disposal ways
  - private composting
  - private or direct delivery
  - Removal of shrub pruning waste
  - Bio-waste collection
  - Residual waste collection
- Bio-waste container preferably used in 1 to 2 family houses and in open rural housing; caution in multi-storey housing estates!
- Connection voluntary because of private composting

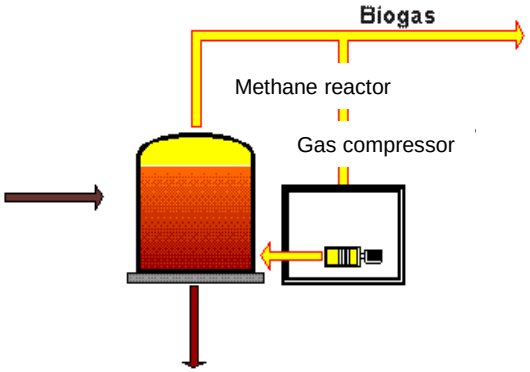
# Bio-Waste Potential and Bio-Waste Container Application Areas

Bio-waste is composed quite homogeneously of kitchen and garden waste.

Garden waste and green waste are rather suitable for composting.



Domestic kitchen waste is suitable for anaerobic treatment due to the high amount of organic material and the high water contents.



# Suitability for Bio-Waste Collection

| compostable | conditionally compostable | not compostable |
|---|---|---|
| Garden and flower waste | Food leftovers (hygiene, salt contents!) | Plastics, aluminium foil |
| Fruit and vegetable waste | Meat and fish | Composite packaging |
| Potato skins | Dairy products | Treated wood residues |
| Tea and coffee grounds (incl. filter paper) | Flour products | Ashes |
| Kitchen rolls | Sauces, mayonnaise | Disposable diapers (aesthetics, hygiene) |
| Newspapers for wrapping | Waste paper | |
| Egg-shells, hair | | |
| Pet litter (Hygiene) | | |

- no food leftovers removal from canteen kitchens and gastronomy via the bio-waste container (hygiene, animal carcass disposal law)

# Limit Values According To The Bio-Waste Ordinance

| | Sewage Sludge Application Ordinance 1992 (AbfKlärV, 1992) max. 5 Mg DM/ 3a | | | Average Waste (SS) Compost | Bio-Waste Ordinance BioAbfV 1998 | | | Typical bio-waste container composts |
|---|---|---|---|---|---|---|---|---|
| | Soil limit value (mg/kg DM) | Sludge limit value (mg/kg DM) | Max. application load (g/ha*a) | Acc. to LAGA M 10 (ca. 1980) | with 30 Mg DM/3a; Class1 (mg/kg DM) | at 20 Mg DM/3a Class 2 (mg/kg DM) | max. application load (g/ha*a) | (mg/kg DM) |
| Lead | 100 | 900 | 1500 | 533 | 100 | 150 | 1000 | 25 - 250 |
| Cadmium | 1,5/ 1 | 10/ 5 | 17 / 8 | 5 | 1 | 1,5 | 10 | 0,2 - 3,3 |
| Chromium | 100 | 900 | 1500 | 71 | 70 | 100 | 700 / 667 | 10 - 110 |
| Copper | 60 | 900 | 1500 | 274 | 70 | 100 | 700 / 667 | 15 - 40 |
| Nickel | 50 | 200 | 333 | 45 | 35 | 50 | 350 / 333 | 1 - 50 |
| Mercury | 1 | 8 | 13 | 2,4 | 0,7 | 1 | 7 / 7 | 0,1 - 3 |
| Zinc | 200/ 150 | 2500/2000 | 4167 / 3333 | 1570 | 300 | 400 | 3000 / 2667 | 40 - 450 |
| PCB | | 200 µg /kg | 0,33 | | | | | |
| Dioxine/Furane | 5 ng TE/kg** | 100 ng TE/kg | 0,00017 | | | | | |