Capital factsheet on separate collection

Note: This 'Capital factsheet' has been prepared within the EC study "**Assessment of separate collection schemes in the 28 capitals of the EU**". The document represents the status-quo of the EU Member States capitals in May2015. The information included in this document has been elaborated for all 28 EU-capitals based on expert interviews with various stakeholders on capital level, e.g. capital administrations, waste management operators, associations etc. as well as further publically available reports, statistics and websites.

All information is cited in the factsheet and a complete list of information sources including the interviews held can be found at the end of this document.

BERLIN	GERMANY

SUMMARY: Berlin has almost 100% coverage of separate door to door collection for the source separated collection of paper, glass and bio-waste as well as for the co-mingled collection of the recycling bin (of metal and/or plastics, or composite materials). A PAYT scheme is in place. Output data of recycling shows the good effectiveness of the system paper and glass rates are 90% and plastic, metal and composite material is 41% with some improvement possibilities.

1 Capital general data [1]	
City population (inhabitants)	3 398 526 (2013) [2]
City area (km²)	892 km²
City density (persons/km²)	3 785 persons/km²
City climate (mediterranean, continental, oceanic, nordic; relevant for bio-waste collection)	Continental
2. Capital waste data [2]	
Total (municipal) waste generation (t in indicated year)	1 341 515 t (2013) (recycling 27 %, other recovery 73 %)
Total (municipal) waste generation (kg/cap)	394.7 kg/cap
Total separate collection (kg/cap) & (% of generation)	139.7 kg/cap, 35.4 % (total separate collection: 474,614 t)
Percentage breakdown of total collection for separate collection by fraction	• 36 % paper and cardboard (170 992 t) • 14 % glass (66 607 t) • 18 % light packaging/non-packaging material of the same type (plastic, metal, and composite materials) (85 377 t) • 16 % bio-waste (brown bin, esp. kitchen waste 63 296 t, green waste 12 646 t) • 16 % Other (75 696 t): 10.9 % treated wood (51 557 t)

3. Description of overall separate collection systems operating in capital
[2] [3] The responsible organisation for dealing with the waste accumulated in the City of Berlin is the city's waste management utility BSR (Berliner Stadtreinigungsbetriebe www.bsr.de), as a statutory body in 100 % ownership of Land Berlin (Administration: Senate Department for Urban Development and Environment www.stadtentwicklung-berlin.de). Collection and disposal is organised from 4 BSR depots, organising 194 trips for residual waste collection daily and 42 "BIOGUT" trips for bio-waste. **Packaging waste and other recyclables are collected selectively from households.** BSR operates 15 civic amenity sites (about 2.2 million customers annually) and 6 collection points for small household hazardous substances, collecting 20 different recyclable

materials and 30 different hazardous waste categories. Members of the public can hand in domestic recyclable substances, e. g. bulky waste items, wood, paper, electric and electronic waste, as well as problem waste.

It has to be emphasised that in January 2013, Berlin was one of the first German federal states to introduce a model waste separation strategy, with **a single recycling bin for light packaging together with similar materials**.

Paper and cardboard: Separate collection system for old newspapers, magazines, catalogues, office paper, packing paper, cardboard and card covers the whole city; door-to-door collection via blue wheelie bins, occasionally "bundled" collections by various organisations; bring system: BSR civic amenity sites which are located throughout the city.

Light packaging/non-packaging material of the same type (plastic, metal, or composite materials): since 2013 one recycling bin (~ 180 000 – 190 000) for packaging and similar materials (united the previously separate systems "Yellow bin", "Yellow bin plus" and "Orange Box").

Glass: separate collection throughout the city; door-to-door collection: green and brown wheeled containers are provided for apartment buildings (~ 90 000); bring system: in total ~ 6,000 public "bottle bank" containers.

Bio-waste: in Berlin's inner-city area, organic waste is collected in separate brown wheelie-bins by the BSR (some 80 % of apartment buildings are now included in this system); in the suburbs of the city, only about 21 % of the properties are covered by the so-called "BIOGUT" collection [12] [14]; However, many of these households have their own garden and can compost much of their organic waste themselves (approx. 20 % of total population).

Annual Running Costs: [16] Average annual costs to consumer: € 246.9 Million (includes all tariffs to be paid by consumer for waste management, average value of 2013/14)

→ estimate: average annual running costs: € 246.9 Million + 10 % = ~ € 272 Million (rough estimate BSR)

Setup costs: Not available

Coverage:

- Nearly 100 % of households with door-to-door separate collection for paper, 80 % of households with door-to-door separate collection for bio-waste (inner city area), 45-71 % of households with door-to-door separate collection for glass
- 100 % households with door-to-door co-mingled collection
- 20 % households with neither (applies for **bio-waste** in inner city area (areas with low overall waste arisings), no separate collection of bio-waste there, to be disposed of via residual waste bin)

4. Elements of the collection system

MUNICIPALITIES OR THEIR CONTRACTORS*:*

[3] Waste management utility **BSR** has subsidiaries through which it offers commercial waste disposal services. One of these is **Berlin Recycling**, which collects sorted glass on behalf of the Dual System in Berlin, and offers additional services such as the collection of waste paper and container services for all types of waste, as well as waste management and the destruction of data storage media. Berlin Recycling is a 100% subsidiary of BSR. Further, BSR has a 50% holding in **BRAL Reststoff-Bearbeitungs GmbH**, which recycles and recovers materials from refrigerators, electrical and electronic waste, and disposes of waste food from the gastronomy sector. BSR also has a 51% holding in gbav *(Gesellschaft für Boden- und Abfallverwertung mbH)*. This provides dry and wet mechanical treatment for contaminated soil, building waste, and road sweepings.

BSR and the firm **ALBA** share the responsibility for emptying the recycling bins, whereas BSR empties a fifth of the recycling bins in Berlin.

Door-to-door collection of source separated waste

Fractions collected [3]	<u>**Paper**</u> (blue wheelie bins) <u>**Glass**</u> (green and brown wheeled containers, usually only 2 containers for separation of white and coloured glass) <u>**Bio-waste**</u> (brown wheelie-bins called "BIOGUT" bins)
Collection frequency	<u>**Paper**</u> [6][12]: • for private households: usually 120/240 l bin: 4- or 8-weekly (on request) • for businesses/public bodies: 240/660/1100 l (very rare: 2500/4500 l) bin/container: weekly, 2-weekly, 4-weekly (on request) <u>**Glass**</u> [7]: for businesses/public bodies: 240/360/660/1100 l bin/container: 4-weekly;

	for private households [11]: 2-weekly, on request **Bio-waste** [7][12]: brown bin (60/120/240 l, very rare: 660/1100 l): weekly (exceptional cases only, i.e. during summer), usually 2-weekly
Coverage of collection	**Paper**: [11] [12] households nearly 100 %, businesses 100 % **Glass**: [11] Four contractual areas: in 3 areas: **71 % door-to-door collection**, 29 % bring collection points; in 1 area: **45 % door-to-door collection**, 55 % bring collection points (until 2013: 58 % door-to-door collection) **Bio-waste**[12]: households 80 % (inner city area), businesses: no data, small businesses use regular bio-waste bin, in addition e.g. catering industry: bins for kitchen/canteen waste (individual responsibility)
Annual collected quantities [2] [11] [12]	**Paper**: 160 574 t **:** 47.2 kg/cap **Glass**: 41 994 t **:** 12.4 kg/cap (calculation: Area 1-3: 71 %*(65 107*0.75) = 34 669 t; Area 4: 45 %*(65 107*0.25) = 7 325 t) **Bio-waste** (brown bin, esp. kitchen waste): 63 296 t **:** 18.6 kg/cap (green waste: Christmas trees 1 953 t)
Setup costs	**Not available**
Running costs	**Bio-waste** [16] ("BIOGUT" collection) 2013: Total costs: € 19.6 Million / Average costs per tonne: € 310
Source of funding	[3] Basically, **BSR finances itself from the collection fees and other charges for services** (cost recovery principle) but it does not generate profits and cost reductions directly benefit the fee-payers. PAYT scheme is in place, e.g. collection fee for 60 l residual waste bin: € 55.45, for 60 l bio-waste bin: € 25.06, recycling bin free of charge; extra cost for additional "grey sacks" if needed etc. **Basic waste collection fee** [12] (charged by BSR, **introduced in 2015**) contributes to financing of overall waste management system (i.e. add. subsidisation of biowaste collection, civic amenity sites etc.); incentive (i.e. especially for homeowners) for waste prevention/improved source separated collection
Cost to consumer (annual)	**Average annual costs [16]:** € 246.9 Million (includes all tariffs to be paid by consumer for waste management, average value of 2013/14) **Average annual costs per capita**: € 72.9 Since 2015 [8]: **basic waste collection fee (since 2015)** (Tariff per utilisation unit and quarter): € 6.15 **Paper and cardboard**: [5] Collection partly financed by "dual systems" for packaging waste (producer responsibility), however for share of non-packaging waste in most cases consumer has to pay additional fee for collection, but sometimes collection is free of charge (rather applies for suburban areas); also depending on particular market price for waste paper -> [6] Example Berlin Recycling (100% subsidiary of BSR): collection fee of € 2.38 per emptying per bin for private households, in large tenement buildings often included in rent). [12] Range € 2 - € 2.70 (240 l bin, per month) **Glass**: [6] Collection completely financed by "dual systems" for packaging waste (producer responsibility) **Bio-waste**: [8] Brown bin (tariff per quarter & weekly emptying frequency (usually: 2-weekly)): 60 l/€ 26.06; 120 l/€ 26.10; 240 l/€ 29.23; 660 l/€ 64.73; 1100l/€ 78.30 Additional leaf sack: € 4 per removal
	Door-to-door collection of co-mingled recyclables
Fractions collected together in one bin	Recycling bin [3] (and "recycling sacks", former yellow sacks, especially for one and two-family houses or in case additional volume for waste disposal required): collection of light packaging and equivalent non-packaging waste, meaning any objects made of metal and/or plastics, or composite materials (e.g. including watering cans, flower pots, plastic bowls, toys, pots and pans, tools, cutlery, etc.).

Collection frequency	weekly, bi-weekly [5]
Coverage of collection	Households [11]: 100 % (recycling bin or recycling sacks (especially one family houses, share recycling sacks 7 - 18 %)) businesses: 100 % (still "yellow bin" or "yellow sacks" since equivalent non-packaging waste from businesses is defined as commercial waste, businesses are responsible to dispose of such waste, not BSR/"dual systems")
Annual collected quantities	Light packaging/non-packaging material of the same type (plastic, metal, and composite materials): 83 898 t **:** 24.7 kg/cap [2]
Setup costs	Confidential, not to be published [13]
Running costs	Confidential, not to be published [13]
Source of funding	Packaging waste collected via recycling bin: collection financed by "dual systems" (producer responsibility) [5] Non-packaging material of the same type collected via recycling bin: funding from revenues either stemming from recycling operations or resale of recyclables
Cost to consumer (annual)	Free of charge
Bring Collection Points	
Fractions collected	Glass
Number of collection points	~ 6,000 public "bottle bank" containers [3] (3 containers for separate collection of white, green, and brown glass) ~ 176.5 (per 100 000 inhabitants) Emptying [11]: bi-weekly, on request
Annual collected quantities [2] [11]	23 113 t **and** 6.8 kg/cap (calculation: Area 1-3: 29 %*(65 107*0.75) = 14 161 t; Area 4: 55 %*(65 107*0.25) = 8 952 t)
Setup costs	Confidential, not to be published [14]
Running costs	Confidential, not to be published [14]
Source of funding	Financed by "dual systems" for packaging waste (producer responsibility)
Cost to consumer	Free of charge
Bring-in Civic Amenity sites	
Fractions collected	In total 20 different recyclable materials and 30 different hazardous waste categories, including paper, glass, plastic/metal/composite materials from recycling bin, and bio-waste [3]
Number of sites	15 (total) 0.44 (per 100 000 inhabitants)
Collected quantities [4]	**Paper**: 10 418 t **and** 3.1 kg/cap **Glass**: 1 500 t **and** 0.4 kg/cap **Plastic/metal/composite materials from recycling bin:** 1 104 t **and** 0.3 kg/cap **Plastic waste:** 375 t **and** 0.1 kg/cap **Bio-waste:** [4]: 10 510 t **and** 3.1 kg/cap (grass and tree cuttings 1 126 t, leaf sacks 9 384 t)
Setup costs	**Not available**
Running costs	**2013 data (revenues from recycling operations or resale of recyclables not included) [16]:** **Paper**: Total costs: € 1.3 Million

	Average costs per tonne: € 124.9 Average costs per civic amenity site: € 86 721.9 Average costs per inhabitant: € 0.38 **Glass:** Total costs: € 0.1 Million Average costs per tonne: € 64.3 Average costs per civic amenity site: € 6 432.2 Average costs per capita: € 0.03 **Plastic/metal/composite materials from recycling bin:** Total costs: € 0.1 Million Average costs per tonne: € 117.5 Average costs per civic amenity site: € 8 651.5 Average costs per inhabitant: € 0.04 **Leaf sacks:** Total costs: € 2.5 Million Average costs per tonne: € 271.7 Average costs per civic amenity site: € 169 948.6 Average costs per inhabitant: € 0.75 **Grass and tree cuttings:** Total costs: € 0.3 Million Average costs per tonne: € 234.4 Average costs per civic amenity site: € 17 592.6 Average costs per inhabitant: € 0.08
Source of funding	Yr. 2013: 66 % contribution of collection fee for residual waste, 34 % contribution of revenues either stemming from recycling operations or resale of recyclables [12] [14] [16] **Since 2015: In addition, basic waste collection fee** (charged by BSR) contributes to financing of overall waste management system (including civic amenity sites)
Cost to consumer	Free of charge (relevant waste streams)
PRODUCERS OR THEIR AGENTS	
	"Bundled" collections of paper and cardboard by various organisations (commercial collection) [3]: Typically, piles of old newspapers and magazines are tied into bundles and these are then collected by the organisation for recycling.
Products covered	Paper and cardboard
Quantity covered by system (in t)	[Not available] [11] However, estimated share of packaging waste ("dual systems") 12-25 % on total quantity of paper waste collected; a share of 12-25 % of total "bundled" paper and cardboard collection therefore should be included in overall volume flow records for paper packaging waste; non-packaging paper should be included in reporting of private waste management companies (in coordination with BSR & the firm ALBA) to the Statistical Office of Berlin-Brandenburg
Funding mechanism	Dealer, resale
Consumer cost	Free of charge
	Commercial "buying stations" for scrap paper (bring system) [5]
Products covered	Paper (old newspapers, magazines, catalogues, etc.)
Quantity covered by system (in t)	[Not available] [11]; However estimated share of packaging waste ("dual systems") 12-25 % on total quantity of paper waste collected; a share of 12-25 % of total "bundled" paper and cardboard collection therefore should be included in overall volume flow records for paper packaging waste; non-packaging paper should be

	included in reporting of private waste management companies (in coordination with BSR & the firm ALBA) to the Statistical Office of Berlin-Brandenburg
Funding mechanism	Consumer obtains ~ 5-7 cent/kg scrap paper from commercial dealer (resale), however not very common, strongly influenced by paper price [12]
Consumer cost	Beneficial for consumer
Extended Producer Responsibility scheme (EPR scheme) for packaging waste in Germany	
Products covered	Packaging material: paper and cardboard, glass, plastic, metals, composite material, mixed packaging, (wood), (textiles)
Funding mechanism	In Germany, the packaging regulation (Verpackungsverordnung) assigns the task of waste management product stewardship to product manufacturers, who are required to take back the packaging that they have placed on the market and either reuse or recycle it, or have this done by a third party. Funding: obligatory fees for companies which need to be paid to a Producer Responsibility Organization (PRO) which in turn organises separate collection and recycling of used products, for packaging waste in Germany these are the "dual systems".
Consumer cost	Consumer pays for collection and treatment of packaging waste in advance when buying a product (fee included in sales price of a product)
Deposit scheme in Germany	
Products covered	Plastic bottles, glass bottles, beverage cans
Funding mechanism	Compulsory deposit for **one-way drinks packaging and beverage cans** (DPG-Deposit Scheme) [9] [10]: ➔ One-way drinks packaging that is not categorised as ecologically advantageous packaging pursuant to section 3 (4) of the Packaging Ordinance is generally subject to the deposit ➔ Each distributor of compulsory-deposit one-way drinks packaging is obligated to accept returned one-way drinks packaging made of such types of materials (glass, plastics, metals, composite materials) as the distributor supplies in his own product range (exceptions apply) **Reusable packaging:** no public law provisions on reusable packaging for the compulsory deposits or the obligation to take back packaging. It is in the best interest of the fillers themselves to see reusable drinks packaging returned. The respective fillers and distributors can therefore set the deposit for reusables as they see fit. [10]
Consumer cost	Standard deposit for one-way drinks packaging and beverage cans: € 0.25 (incl. VAT) Deposit for reusable drinks packaging: € 0.08 - 0.15 (incl. VAT)

BARRIERS TO IMPLEMENT SEPARATE COLLECTION [11] [12]:

<u>**Glass:**</u>

In contractual area No. 4 (as described above): door-to-door collection of glass until 2013: 58 %, since 2014: door-to-door collection 45 % (reduction of door-to-door collection); <u>main problem is the low quality</u> of the collected glass (usually only 2 containers for separation of white and coloured glass) with regard to further recycling operations (impurities, esp. white glass, "miss-sorting" of non-packaging glass etc.); local protests of residents to get back containers directly in front of building (rejection of bring system), matter of habit and convenience;

-> <u>measures to tackle the problem:</u> ongoing survey report to identify appropriate measures to solve the issue of "door-to-door collection" vs. "lack of quality" (final results not yet available)

<u>**Bio-waste (brown bin):**</u>

Lack of acceptance mainly due to hygienic problems, especially during summer month -> <u>measures to tackle the problem:</u>

- increase of emptying frequency: weekly (regular: 2-weekly)

- pilot projects have been implemented (final results not yet available), i.e. bins equipped with cover filters, or foot pedals for bio bins, however main problem for area-wide implementation of such measures is the financial burden (would lead to higher waste fees, lack of acceptance);

Separate collection (all fractions):

- convenience instead of environmental awareness
- lack of living space, no room for pre-sorting of several fractions in the flat
- anonymity in apartment blocks (little incentive to personally contribute to improved waste separation/waste prevention since all residents as one "group" influence waste fee, i.e. overall tariff for grey bin) -> measures to tackle the problem: i.e. in certain areas, PAYT scheme for residual waste bin in apartment blocks to revoke anonymity (chip system);

  i.e. in certain areas: "waste scouts" (work on behalf of residential company, manpower provided by waste management companies): post-sorting of waste delivered by residents directly at waste collection place, positive experience has been made since improved source separated collection reduces further treatment cost etc., in addition: awareness raising among residents, face-to-face contact with waste scout;
- Garbage chute system for residual waste: in some apartment blocks still in place, main problem again: anonymity, no incentive for separate collection, convenience (matter of habit)

ADDITIONAL FINDINGS [11]:

Additional system in place for separate waste collection in Berlin: underground containers

- separate collection of: residual waste, light packaging and equivalent non-packaging waste (recycling bin), paper, and glass (white/brown/green)
- 16 locations, covering ~ 3000 households
- established/financed by residential companies, free of charge to consumer, lockable, optical advantages

5.Materials, Quantities and costs

SUMMARY OF COLLECTION SYSTEMS IN PLACE [2] [4]

<table>
<tr><th>Collected waste (t)</th><th>Paper</th><th>Glass</th><th>Plastic</th><th>Metal</th><th>Bio-waste</th><th>City Coverage</th></tr>
<tr><td>Door-to-door</td><td>160 574</td><td>41 994</td><td colspan="2"></td><td>63 296 t</td><td>Paper: ~ 100 %, Glass: 45-71 %, Bio-waste: 80-90 % (households)</td></tr>
<tr><td rowspan="2">Co-mingled</td><td rowspan="2"></td><td rowspan="2"></td><td colspan="2">83 898[1]</td><td rowspan="2"></td><td rowspan="2">100 % (households)</td></tr>
<tr><td>41 949[2]</td><td>13 424[2]</td></tr>
<tr><td>Bring points</td><td></td><td>23 113</td><td colspan="2"></td><td></td><td>6,000 public "bottle bank" containers, 176.5 (per 100 000 inhabitants)</td></tr>
<tr><td rowspan="3">Civic amenities</td><td rowspan="3">10 418</td><td rowspan="3">1 500</td><td colspan="2">1 104[1]</td><td rowspan="3">10 510</td><td rowspan="3">15 (total), 0.44 (per 100 000 inhabitants)</td></tr>
<tr><td>552[2]</td><td>177[2]</td></tr>
<tr><td>375</td><td></td></tr>
<tr><td>Producer / Retailer take-back</td><td></td><td></td><td colspan="2"></td><td></td><td rowspan="2"></td></tr>
<tr><td>Total</td><td>170 992</td><td>66 607</td><td colspan="2">85 377[1]</td><td>73 806[3]</td></tr>
</table>

[1] Plastic, metal, composite materials (light packaging and equivalent non-packaging waste)

[2] **Rough estimate based on exemplary composition recycling bin** [13]:

metals ~16 % / plastic ~50 % / composite materials & paper/cardboard ~ 10 % / "miss-sorting" ~ 24 %

[3] excluding door-to-door collection of Christmas trees: 1 953 t

SUMMARY OF COSTS FOR SEPARATE COLLECTION SYSTEMS IN PLACE (setup costs should be total, running costs annual)				
Costs (€)	**Authorities / waste management companies**		**Consumer costs**	
	Setup (€)	**Running (€/year), BSR data [16]**	**Funding type**	**Amount (€)**
Door-to-door	Not available	Part of total costs (clear distinction not available, rough overall estimate below) **Specified:** Bio-waste ("BIOGUT" collection) 2013: Total costs: €19.6 Million	<u>collection fee (tariff per quarter & weekly emptying frequency):</u> for 60 l residual waste bin: €55.45, for 60 l bio-waste bin: €25.06 **since 2015:** add. <u>basic waste collection fee</u> (tariff per utilisation unit and quarter): €6.15 (blue paper bin in some cases not free of charge, range €2 - €2.70 (240 l bin, per month))	
Co-mingled		[not applicable]	Free of charge (cross-financing/dual systems/revenues)	
Bring points		[not applicable]	[not applicable]	
Civic amenities		€4.3 Million (for collection of paper, glass, plastic/metal/composite materials from recycling bin, leaf sacks, grass and tree cuttings)	Free of charge (cross-financing via collection fees, revenues)	
Producer / Retailer take-back		[not available]	Standard deposit for one-way drinks packaging and beverage cans: €0.25 (incl. VAT) Deposit for reusable drinks packaging: €0.08 - 0.15 (incl. VAT)	
Total		**~ €272 Million** **(rough estimate BSR)**	**~ €246.9 Million, €72.6/capita**	

6. Recycling and losses

RECYCLING OF THE COLLECTED WASTE [1]

Recycled (t)	**Paper**	**Glass**	**Plastic, metal, and composite materials** [2] (light packaging/non-packaging material of the same type)	**Bio-waste**	**Total**
Generated	260 567[1]	123 609[2]	231 954 t[3]	469 513[5]	1 085 643
Collected	170 992	66 607	85 377 t	75 942[6]	398 918
Recycled (nationally) (<u>output</u> data)	153 893 (90 %)	59 946 (90 %)	35 005 t (41 %)	72 904 (96 %)	321 748
Exported for recycling	Not available	Not available	Not available	Not available	Not available
Rejected	17 099 (10 %)	6 661 (10 %)	50 372 (59 %)	3 038 (4 %)	77 170

[1] **<u>rough estimate, based on:</u>** a) sorting analysis of residual waste (grey bin) from 2008 -> estimated share of share paper & cardboard: 11 %; b) Total residual waste amount (grey bin) 2013: 814 319 t -> 11 % of 814 319 t = 89 575 t additional waste generation

[1] Data of **waste generation** per waste stream have been calculated on the basis of residual waste sorting analysis, if data was not directly available. Based on the composition of residual waste (% of each waste fraction) and its total weight amounts per waste fraction can be calculated.

[2] same approach as for paper, share of glass in grey bin 7 % (57 002 t)

[3] same approach as for paper, share of metal in grey bin 2 % (16 286 t)) / share of plastics in grey bin 7 % (57 002 t)/ share of composite materials in grey bin 9 % (73 289 t)

[4] light packaging/non-packaging material of the same type (plastic, metal, or composite materials)

[5] same approach as for paper, share of organic waste in grey bin 42 % (342 014 t)

[6] including christmas trees

Please note: update of 2008 sorting analysis currently under preparation, final results expected by April/May 2015 [14]

ADDITIONAL FINDINGS:

[11] Sorting plant (for wastes from recycling bin): sorting residue ~ 10 %

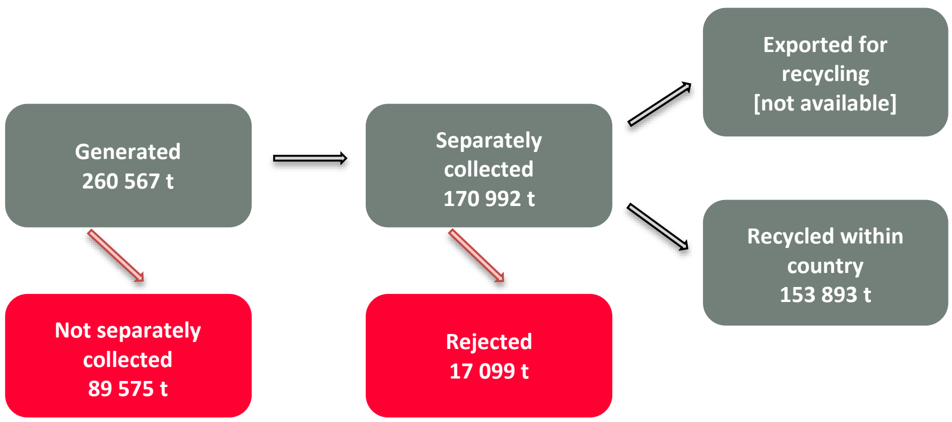
[13] [17] From the technical perspective, material recycling rates of up to 85 % of collected recyclables (via recycling bin) possible; however, in practice, material recycling rates esp. for plastics are strongly influenced by the market situation, meaning the demand for recyclables; nevertheless, minimum recycling and recovery rates as laid down in the packaging regulation (Verpackungsverordnung) are to be taken into account.

Further, ALBA (with sorting plant "Hultschiner Damm") is mainly in charge of sorting collected recyclables; dual systems (share ~ 88 % recycling bin) resp. BSR (share ~ 12 % recycling bin) are mainly in charge of marketing of the sorted recyclables; therefore a detailed overview of material recycling rates per fraction resp. possible exports for recycling cannot be retrieved from sorting data; however, it is assumed that for metal and composite materials material recycling rates of 100 % might apply.

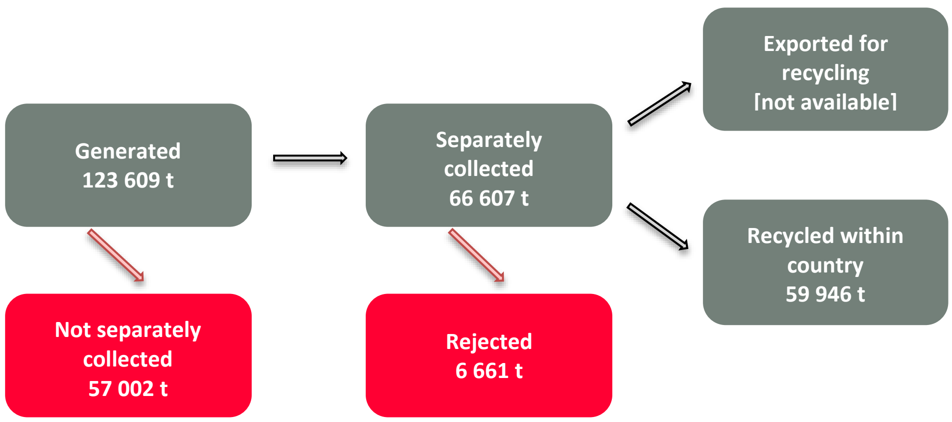
7. Material flows

MATERIAL FLOWS FOR EACH COLLECTED FRACTION (visual representation of the data from section 6 *where possible*)

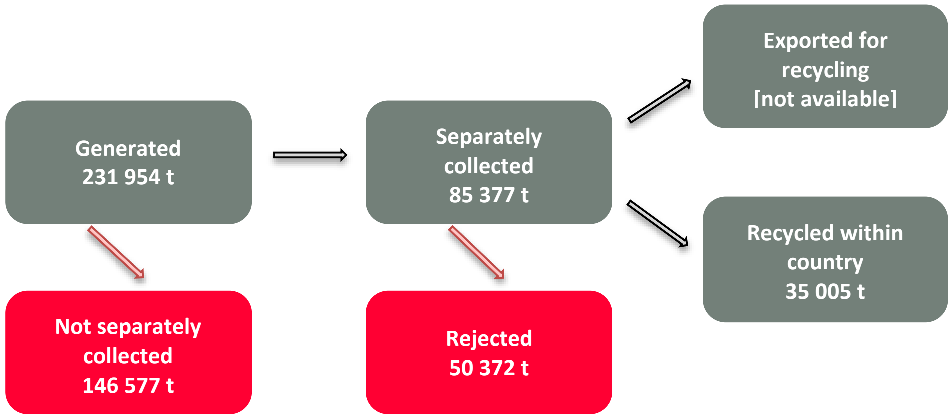
Paper



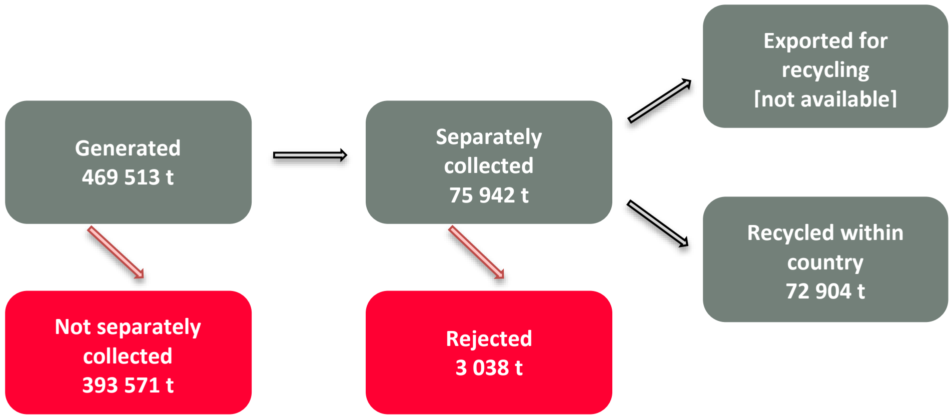
Glass



Plastic, metal, composite materials



Bio-waste



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[3] Senatsverwaltung für Stadtentwicklung und Umwelt, Siedlungsabfallwirtschaft in Berlin/ Berlin Senate Department for Urban Development and Environment, Municipal waste management in Berlin, 1st edition, December 2013, http://www.stadtentwicklung.berlin.de/umwelt/abfallwirtschaft/downloads/siedlungsabfall/Abfall_Broschuere_engl.pdf, accessed 5 March 2015.

[4] Berliner Stadtreinigungsbetriebe, BSR-Entsorgungsbilanz 2013 / Waste management utility BSR, Disposal balance 2013, http://www.bsr.de/assets/downloads/BSR-Entsorgungsbilanz_2013.pdf, accessed 5 March 2015.

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[6] Berlin Recycling (2015), http://www.berlin-recycling.de, accessed 5 March 2015.

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[12] Telephone interview with Berlin Senate Department for Urban Development and Environment, Ms Schulze (Expert on municipal waste), 18 March 2015.

[13] Information provided by Email from Ms Schröder & Mr Küber, ALBA Group, 18 March 2015.

[14] Telephone interview with Der Grüne Punkt – Duales System Deutschland GmbH („The Green Dot“), Mr Schneider, 19 March 2015.

[15] Telephone interview with Waste management utility BSR, Ms Nogueira (Head of the Corporate Secretariat), 20 March 2015.

[16] Information provided by Email from Ms Noguiera & Mr Krug, Waste management utility BSR, 25 March 2015.

[17] Information provided by Email Ms Schröder & Mr Küber, ALBA Group, 27 March 2015.