Berlin, Germany

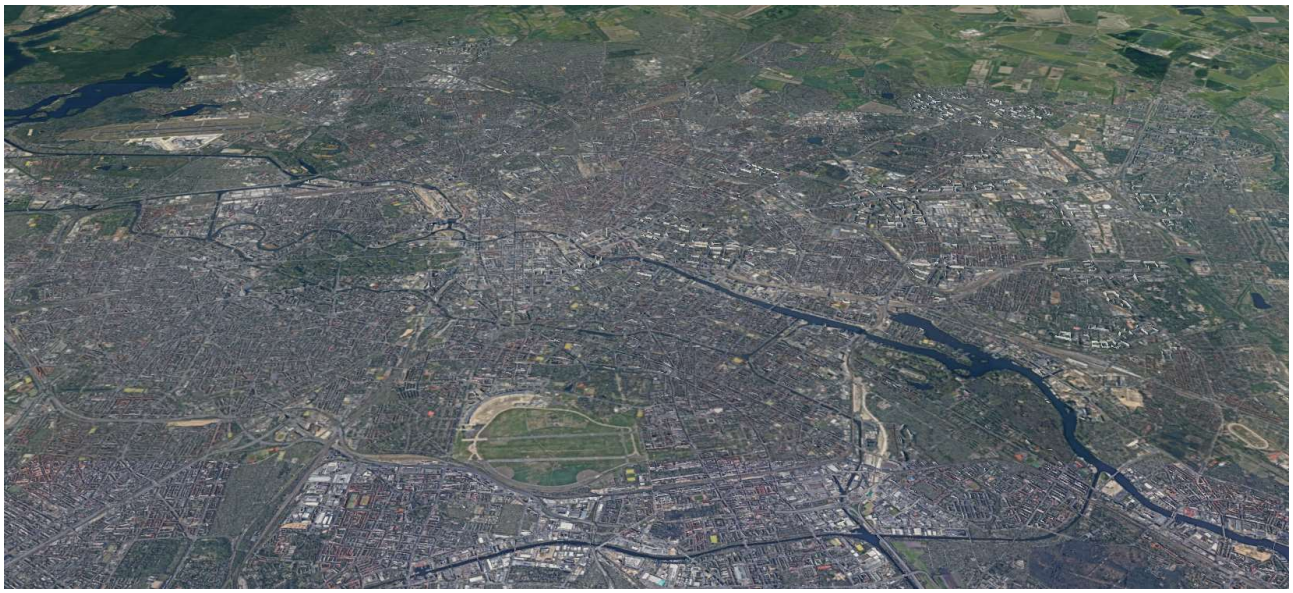

Figure 1 The Municipality of Berlin. Map data Google, Landsat / Copernicus.

This summary presents the main conclusions of one of the regional case studies conducted during the COLLECTORS project. The studies included a life cycle assessment, a cost-benefit assessment, and a circularity assessment. Social aspects were analysed on a general level based on information provided by the municipality and using focus group discussions in different European regions. References to original research reports are provided at the end of this document.

Description of the region

Berlin (see Figure 1) is a large capital city with over 3.5 million inhabitants. 1,350,457 tonnes of municipal solid waste (MSW) was generated in 2016. Currently Berlin collects 59% of the generated paper and packaging waste (PPW) separately from residual waste and has an estimated recycling rate of 54%.

PPW collection system

Berlin has implemented a PAYT-based waste collection system focused on the separate collection of PPW. The waste collection is organised and carried out by the Berliner Stadtreinigungsbetrieben. This includes the waste materials considered for the so-called Dual Systems (German producer

responsibility scheme for the packaging waste): paper, cartons, glass and light packaging. Glass is collected separately (white, green, brown) and Berlin has 1,467 bring points for glass waste. Berlin also employs a PMD (plastic and metal packaging and beverage cartons) commingling method; PMD is collected in yellow shared containers and wheelie bins at 27,600 bring points throughout the city. Additionally, it is possible to get specific household waste bags (6€ per bag) at civic amenity sites, which can be ordered in case of an unusual high amount of waste. Berlin has 15 civic amenity sites. Co-mingled waste is collected using household waste bins ('Hausmülltonne'). There are five different sizes available, which can be ordered depending on the amount of household waste arising in a specific household (varying from 60 – 1100 litres). The frequency of collection is bi-weekly. Berlin also has a deposit scheme, whereby plastic bottles can be returned to machines in exchange for store credit.

The first entry point for paper waste is the sorting facility WUB Wertstoff-Union Berlin GmbH, where the collected paper is sorted. Different material types are for example carton board, mixed paper and de-inking capable paper. During this step, all non-paper material is removed. Plastic waste from the PMD entry point is sorted at the ALBA Recycling GmbH sorting facility, providing the material to the market for subsequent recycling steps. Glass waste is handled fully by the dual systems. The residual waste is sent to one of Berlins' waste incinerators.

Actions to improve collection

In January 2013, Berlin was the first German federal state to introduce a model waste separation strategy, with a single recycling bin for light packaging together with similar materials. A new recycling bin for PMD was introduced in Berlin, uniting the previously separate systems ("Yellow bin", "Yellow bin plus" and "Orange Box") into the Wertstofftonne (=recycling bin). In addition to light packaging, these bins are also used to collect equivalent non-packaging waste. Equivalent non-packaging recyclables include objects made of metal and/or plastics, e.g. watering cans, flowerpots, plastic bowls, toys, pots and pans, tools, cutlery, etc.

Material flows in the region

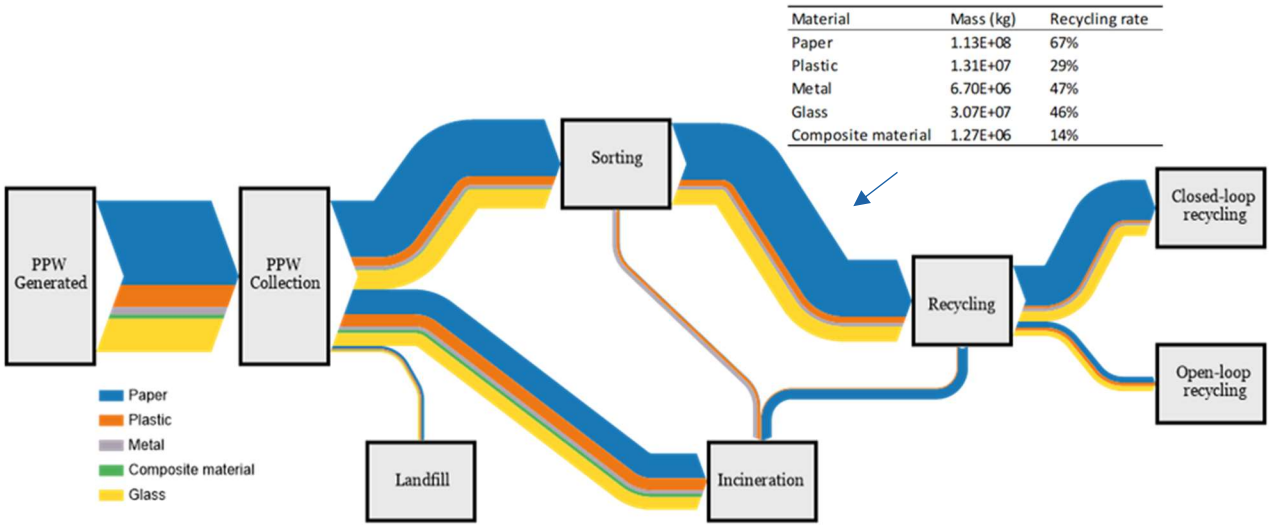

Figure 2. Material flows in the municipality of Berlin (Source COLLECTORS D3.3).

The municipality of Berlin reported to have generated 169,473 tonnes of paper, 45,000 tonnes of plastic, 14,400 tonnes of metal, 66,830 tonnes of glass and 9,000 tonnes of composite material (see Figure 2.). Berlin achieved a capture rate of 67%, 40%, 47%, 57% and 18% for these materials respectively. 90% of the material that enters the residual waste is incinerated in Germany. Berlin is currently not meeting the 2025 recycling targets of the European Union for any PPW material. The organisation of Berlin's waste collection is complicated due to historic reasons. Collection and sorting are not completely aligned. For instance, some areas collect brown and green glass together and for other areas, these are collected separately. Berlin employs a PET bottle deposit scheme and it is likely that the collection of plastic is underestimated here.

Findings from environmental assessment

In Berlin, reducing capture losses has the largest effect on the environmental performance of the system compared to reducing sorting or recycling losses. Reduced losses of plastic at the collection and sorting stages leads to reduced plastic incineration with energy recovery. Recycling more plastic in Germany, as in the Netherlands and Belgium, leads to increased associated fresh water eutrophication potential.

The system level assessment shows how systemic improvements to the waste management, at all three stages (collection, sorting and recycling) could lead to a 5.5% improvement in the associated global warming potential (greenhouse gas emissions) of the system.

Findings from economic assessment

Despite the change in collection approach to comingled collection of packaging materials and equivalent non-packaging packaging materials in the Wertstofftonne, no detailed information on investment costs has been found. Since the 'previously used yellow and orange bins' area still in use, it is assumed no additional investments have been made during the assessed period.

BSR is 100% owned by the State of Berlin and as a public legal entity it is organized like a public limited company (management board, supervisory board) since 1994. BSR owns the waste management equipment for Berlin and 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. Potential investments in equipment will be made by BSR. Revenues from material recovery, incineration and from the EPR scheme (dual system) are collected by BSR.

Der Grüne Punkt is Germany's producer responsibility for the packaging industry, founded in 1990 as the first dual system. As the first system of its kind worldwide, it has been providing nationwide collection of used sales packages and obtains raw materials from them for the closed-cycle economy. The dual system fees in Berlin are payed on a weight basis, so producers have been incentivised to use less material. Where in 1991 a yogurt cup weighted 7.2 grams, nowadays in 2016 it weighs 4.7 grams. In addition, the system managed to increase the recycling rate from plastic recycling rates of 3% in 1991 to 54% in 2016.

Overall, an average of 38% of income is coming from the citizen waste fee; 52% comes from the EPR fees; and ca. 10% comes from incineration benefits.

Unfortunately, limited information on Berlin's waste fee development is available. However, the BSR does claim to have relatively low operational costs and therefore can charge low waste fees from its citizens. For instance, in the tariff period 2015-2016, only Munich charged slightly lower waste fees than Berlin. Due to the lack of data, the waste fee is assumed stable for all years.

In order to present a quick overview of the projected shifting of incomes, the items below are listed as a percentage of the total revenues (% of the total revenues);

- the revenues form incineration decrease from 14% in 2012 to 10% in 2021;
- the EPR fee contribution increases from 47% in 2012 to 52% in 2021.

Two aspects that can be noted are the significant drop in residual waste and increase in recyclable packaging collection after implementing the new selective collection system, of respectively 24% and 19%.

Initiatives for citizen participation and social acceptance

As the waste collection system is handled by private companies, the societal acceptance is dually managed. The waste management companies in charge of the waste collection are communicating and educating on the concrete ways the system is working through sorting guidelines or visits to sorting centres. Communication is done in different languages, as the city is multicultural. Although the division is not so clear, the Berlin ministry of the environment is communicating more about the environmental aspects.

General customer analyses are regularly conducted but citizens' waste collection preferences are gathered to ensure a smoothly operating system.

Selected highlights:

- Website available in seven languages;
- Diversity of means to contact the waste management entity;
- Substantial use of social media platform;
- Strong awareness raising in schools;
- Self-regulated system in which citizens can personally indicate their preferences about the type and size of the bin, as well as the collection frequency.

For more information, please see

D2.4 Report on solutions for tackling systemic and technical boundary conditions. Available at: https://www.collectors2020.eu/results/analysis-of-boundary-condition/

D2.5 Report on implemented solutions and key elements in selected cases for societal acceptance. Available at: https://www.collectors2020.eu/wp-content/uploads/2020/06/Collectors-Deliverable2.5.pdf

D3.2 Report on the economic and financial performance of waste collection systems. Available at: https://www.collectors2020.eu/wp-content/uploads/2020/04/Deliverable3.2_COLLECTORS-project-1.pdf

D3.3 Report of recommendations for improvement of single systems and optimum operation conditions. Available at: https://www.collectors2020.eu/results/environmental-impact/

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