



Reuse and Recycling Systems for Selected Beverage Packaging from a Sustainability Perspective

An analysis of the ecological, economic and social effects of reuse and recycling systems and approaches to solutions for further development

Aggregation of Selected, Significant Findings

A General consideration of different systems for collecting and recycling beverage packaging

Refillable beverage packaging

- From an **ecological** viewpoint, refillable beverage containers provide advantages when compared to single-use beverage packaging as long as they are not transported over very long distances and their reuse is ensured.
- Refillable beverage packaging causes significantly less packaging waste than single-use beverage packaging.
- After having been established, reuse systems usually show return rates of almost 100%.
- Usually, there is no littering with refillable bottles due to the financial incentive to return them. A precondition for this – as is the case with deposit systems for single-use beverage packaging – is that consumers have sufficient and easily reachable possibilities to return the packaging.
- From an **economical** viewpoint, the investment expense associated with refillable beverage packaging increases for beverage manufacturers due to the necessary investments in washing facilities, pool bottles and logistics structures. On the other hand, however, through the acquisition of reusable beverage containers (which avoids the need to purchase bottles for each filling), beverage manufacturer can benefit from significant operating cost savings, which more than compensate for the higher investment costs. Beverage manufacturers with regional production and distribution structures, in particular, can take advantage of this savings potential, but it can also be realised by international groups which have a number of regional filling locations.
- Under otherwise similar conditions, reusable beverage systems are usually more cost-intensive for food retailers than non-reusable systems.
- From a **social** aspect, reuse systems have a positive impact on the employment situation as more personnel are required to operate a reuse system than for single-use beverage packaging.
- The reuse deposit system complies fully with extended producer responsibility.

Deposit systems for single-use beverage packaging

- An **ecological** advantage of deposit systems for single-use beverage packaging is the realisation of very high collection rates (proportion of empty packaging returned), which averages more than 80% internationally, and in some countries is even above 95%.
- Single-use beverage packaging that is collected separately within the scope of deposit systems can be more easily recycled due to targeted sorting of packaging waste. Consequently, in deposit systems, recycling rates that essentially correspond to the respective collection rates can be achieved. This promotes the use of secondary raw materials in the manufacture of new products and so reduces resources consumption.
- A relevant and rising proportion of the collected single-use plastic beverage packaging is fed into bottle-to-bottle recycling (closed loop recycling), which is possible in mixed collection (see green

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dot system) only under more difficult conditions (the need to sort out residual waste, sorting and separating a large number of different materials as well as getting rid of impurities resulting from other packaging and foodstuff residues).

- Mandatory deposit systems contribute significantly to reducing total littering due to high return rates, in particular when compared to deposit-free beverage packaging.
- From an **economical** viewpoint, it can be determined that systems costs (costs for the central system, logistics, counting centers, reverse vending machines, deposit clearing) are mostly borne by beverage manufacturers or by trade.
- The initial investment costs are relatively high for trade as it must ensure that beverage packaging is returned. In particular, retail, as the place where deposit beverage packaging is collected can, however, balance out the costs over the medium term through a well-organised and well-applied mandatory deposit system.
- Lower initial costs arise for beverage manufacturers as, here, only the labelling has to be adjusted and the packaging used must be registered with the system. Revenue may be generated for beverage manufacturers through e.g. unredeemed deposits.
- As a result of mono-fraction collection, a mandatory deposit system may provide for higher and more stable proceeds as the quality of the collected packaging is superior to that of green dot systems. Under otherwise similar conditions, this then leads to deposit systems being less affected by difficult market conditions.
- From a **social** viewpoint, a need for additional personnel arises, e.g., for manual take-back or the operation of reverse vending machines (e.g., cleaning, maintenance), as well as for transport, counting centers, clearing services and recycling capacities whereby, in comparison to a situation without a deposit system for beverage packaging, additional workplaces can be created.
- In deposit systems for single-use beverage packaging, beverage manufacturers and retailers bear the entire extended producer responsibility.

Curbside collection and recycling systems (green dot systems)

- In relation to beverage packaging, beverage packaging from mixed curbside collection and recycling systems (green dot systems) achieves lower collection and recycling rates than deposit systems. As a rule, beverage packaging in this system is not fed into closed-loop recycling as it is collected together with other types of packaging and packaging materials and so requires increased subsequent sorting and cleaning efforts. Consequently, from an **ecological** viewpoint, overall the reduction potential concerning resources consumption and greenhouse gas emissions is lower than with deposit systems for beverage packaging.
- In green dot systems there is no incentive for consumers to reduce littering. Consumers usually have no direct financial incentive to dispose of packaging in a green dot system. In the event of consumption outside the household, in particular, there is very little incentive to take empty beverage packaging home or to use a collection bin. It is likely that this packaging will probably be disposed of in a public waste bin or even through littering.

- From an **economic** viewpoint, a green dot system incurs high costs for setting up a curbside return and licencing structure. As these costs relate to the collection and sorting of packaging used in households (and not only to beverage packaging), a direct comparison with the costs for implementing a deposit system is not possible. Maintaining the system involves costs for operating the collection system, for sorting and disposal (e.g. sorting residues, wrong disposal of items and – in the case of poor quality material, for example – recycling of the collected material. In a green dot system also, revenue is mainly generated from the sale of secondary materials. The license fees to be paid by manufacturers are calculated from the costs and revenues (and in Germany, additionally from the profit margin of the dual system operator).
- From a **social** aspect, green dot systems (depending on the system design), also have a positive impact on overall employment due to the increased recycling requirements.
- In shared producer responsibility systems which, in a European comparison are most frequently used, extended product responsibility is implemented with restrictions as beverage manufacturers and retailers need only bear some of the costs, and the municipalities bear financial responsibility through passing on costs to the citizens.
- In the case of full-cost systems (as in Germany, for example), manufacturers assume comprehensive cost responsibility for their products.
- In green dot systems, consumers only have a financial incentive to participate responsibly in the system if residual waste charges are to be paid depending on quantities.

B Detailed assessment of the systems for collecting and recycling beverage containers existing in Germany

- A comprehensive analysis of the **ecological impact indicators** shows the ecological advantages that refillable beverage containers have for Germany when compared to single-use beverage containers.
- Due to the present market development in the mineral water, soft drinks and fruit juice segment, which indicate an increasing tendency towards the use of single-use beverage containers, the stability of reuse systems is at risk in these beverage segments.
- In green dot systems, collection rates (after residues have been extracted) amount to between 43 and 54 % for PET single-use bottles, 53 % for drinks cartons, and 76 to 82 % for single-use glass bottles. The recycling rates (relating to the quantity put into circulation and after residues have been extracted as well as energy recovery) in a green dot system amount to 25 to 31 % for PET single use bottles, 39 % for drinks cartons, and 76 to 82 % for single-use glass bottles.
- The mandatory deposit system shows collection rates of 96 to 99 % and recycling rates of 81 to 98 % (depending on the type of packaging material). These rates are thus significantly higher than is the case with dual systems.
- In an **economic** comparison of German return systems for single-use beverage containers - the mandatory deposit system and the green dot system – it has been determined that it is not possible to make any general statement about which is the more cost-intensive system. While earlier analyses arrived at the finding that the deposit system gives rise to higher costs, current data

indicates that, taking costs and revenues into account, developments are tending to favour mandatory deposit systems and that participation in a deposit system can be less costly than participation in a green dot system. If the return and recycling rates of the systems are included in the assessment, a mandatory deposit system can be viewed as being more cost efficient.

- The cost and revenue options in the systems examined depend on a number of influencing factors, in particular the price of secondary materials and the weight of the packaging, but also, for example, on the number of beverage containers in the system.
- The reuse rate and the recycling rate are central success and steering parameters for the German systems for collecting and recycling beverage packaging. In Germany, the mandatory deposit system is proving to be a meaningful measure for supporting the political targets (promotion of ecologically beneficial beverage packaging, high return rates, high recycling rates, less littering), and in practice is thus a meaningful supplement to the green dot system for the beverage packaging segment.
- If the **social impact** on system participants is considered, the additional requirements in German reuse systems for filling, sorting and logistics create additional workplaces, especially where regional beverage manufacturers are concerned. In comparison, single-use filling is more strongly automated. In the event of conversion from reuse filling to single-use filling, it is to be assumed – all else being equal – that workplaces will be lost.

C Recommendations for action re optimising the systems that exist in Germany for collecting and recycling beverage packaging

- Stabilising and increasing the reuse rate in some beverage segments is just as necessary as raising the qualitative and quantitative collection and recycling rates (including the bottle-to-bottle recycling rate) respecting non-deposit single-use beverage containers.
- Provided the following suggested measures are implemented, an immediate stabilisation and medium-term increase in the proportion of ecologically advantageous beverage packaging as well as positive effects on return and recycling rates can be expected:
 - Clear labelling of beverage packaging (deposit amount, single use/reuse)
 - Inclusion of other beverage segments in the deposit obligation
 - Information campaign on ecological properties of types of beverage packaging
 - Incentive levy on economically detrimental types of beverage packaging: To be charged directly by the retailer and shown separately on the sales receipt

D Guideline for political decision-makers concerning the introduction of systems for collecting and recycling beverage packaging

- In countries without - or with very little - recycling infrastructure, return systems for beverage packaging can be a manageable and effective first step towards creating a flow of high quality recyclable fractions.
- In this respect, achieving high return rates (collection rates) and recycling rates as quickly as possible as well as ensuring the high and consistent quality of collected packaging material are important success factors. For single-use beverage containers, this can best be achieved through the introduction of a deposit system.
- European member states that wish to introduce mandatory single-use deposit systems must observe certain requirements in order to ensure that a good compromise is found between environmental targets and the requirements of the domestic market. These requirements apply primarily to the following aspects:
 - Adequate transition periods
 - Fair, open and transparent design of the system
 - Labelling of packaging
 - Clearing system
 - Exemptions for smaller businesses
 - Ensuring the easy import and export of products
- In countries where, to date, no system exists for curbside collection of packaging and/or other recyclable fractions, green dot systems can generate large quantities of packaging (not only beverage containers) that can be fed into the recycling market.
- However, these quantities tend to be more suitable for open loop recycling. In order to aim for high-quality closed loop recycling, the focus should be on higher quality, both with respect to collection (e.g. minimising the quantity of wrong disposal of items, maximising return rates, pre-sorting to the extent possible, a lower amount of impurities, etc.) as well as with respect to recycling (e.g. mandatory minimum recycling rates and minimum quality criteria).
- In many countries, green dot systems (also for taking back and recovering beverage containers) have already been introduced to varying extents. If the recycling rate and, in particular, the bottle-to-bottle recycling rate is to be increased, it is recommended that a deposit system for beverage containers be additionally introduced.
- Mandatory deposit systems and green dot systems for single-use beverage containers are aimed in part at different segments. Green dot systems are primarily targeted at household use. However, a significant proportion of beverage packaging, in particular, is used outside the home. Green dot systems usually cover this packaging only to a limited extent, whereas the deposit system also covers consumption outside the home due to the financial incentive provided. Consequently, the two systems supplement one another and can co-exist very well.