Waste Management Technologies in Regions, Georgia

EPR Policy Options for Beverage Producers in Georgia

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List of Acronyms

AP	National Waste Management Action Plan
Code	Law of Georgia – Waste Management Code
EPR	Extended Producer Responsibility
NWMS	National Waste Management Strategy
WEEE	Waste Electrical and Electronic Equipment
WMTR	Waste Management Technologies in Regions

1. Introduction

Packaging waste constitutes a large fraction of household waste in industrialized countries. In Germany, for example, some 14 million tonnes of residual household waste collected in 2014 have to be contrasted to 18 million tonnes of packaging waste collected by the dual systems¹. Developing countries and countries in transition are catching up quickly. Landfilling glass, paper, aluminum, and plastic waste requires a lot of space, and takes away valuable land resources. This might be a problem for countries with scarce land resources and or those oriented on agricultural development, like Georgia. Therefore it is very important to curb the consumption of packaging material and to recover and recycle packaging waste.

The following report develops a system for the collection and recycling of empty drinks containers. This system follows the legal regulations in Georgia, which point to the waste hierarchy and to an EPR policy for organizing collection and recycling with incentives for a design-for-environment².

In order to motivate and explain the various steps of an EPR policy, the report first briefly refers to the Georgia's legal regulations. Compliance with these regulations is, of course, required. Next, the concept of an EPR policy is carefully explained. As EPR policy is dependent on certain local conditions, relevant stakeholders have to be integrated into the policy in an appropriate way. A list of the various steps required for an EPR policy is provided in this section.

Section 4 provides facts and figures regarding packaging waste in Georgia. Missing and incomplete data create a problem for waste management in Georgia in general, and should therefore be reliably collected in the near future and continuously updated. Recycling activities are often considered profitable. This is, again in general, true, in particular for low income countries. Nevertheless, there are some aspects of recycling which should be observed.

After a brief summary about what Georgia needs to do to preserve the environment, the next section then introduces the goals of an EPR policy regarding drinks packages and discusses the relevant stakeholders and appropriate policy tools.

Section 7 starts with the design of the EPR policy. The first subsection is devoted to a discussion of various collection systems, followed by a recommendation for Georgia. The core section of the EPR policy is provided by the structural properties of the system to implement the EPR policy. According to Georgian legislation, this system can be individual or collective. These options are introduced and thoroughly discussed in this section, again followed by a carefully considered recommendation for Georgia.

¹ cf. https://www.umweltbundesamt.de/sites/default/files/medien/384/bilder/3_tab_abfallaufkommen_2016-09-27.png

² A design-for-environment (DfE) is a design approach to reduce the overall human health and environmental impact of a product, process or service, where impacts are considered across its life cycle. Different software tools have been developed to assist designers in finding optimized products or processes/services. DfE, thus, implies a design that makes it easier to disassemble and recycle a product after use. For the case of drinks containers this could mean lighter glass and plastic bottles or refillable containers, for example.

The next section illustrates the financial consequences of a system with independent compliance schemes in a competitive framework. It can be shown that such a system will add approximately 2 tetri to the cost of each 0.5 l glass or plastic bottle. Moreover, this competitive system likely constitutes a system of minimum costs regarding the obligations of collecting, sorting and recycling the waste drinks containers. Some hints on how to establish such a system conclude this section.

The report closes with information on comparable systems in Germany, Austria, and Bulgaria. Germany and Austria, highly industrialized countries, have collective systems with independent compliance schemes. Nevertheless, some minor misspecifications have led to slight policy failures in both countries. Bulgaria, on the other hand, is a country in transition. As a member of the EU, it is required to follow EU waste directives and legislation. Due to incomplete and unclear specifications for individual and collective systems in the packing directive, managing packaging waste is far from what it should be. Thus, these examples point out once more that clear regulations, taking into account the incentives of all relevant stakeholders, are required for a functioning EPR policy.

2. The Basic Legal Framework for an EPR System

The Waste Management Code of Georgia (Code) provides the legal conditions for all aspects of dealing with waste in order to reduce its environmental impacts, thus, protecting the environment and human health. The National Waste Management Strategy (NWMS) for 2016-2030, and the Waste Management Action Plan of Georgia (AP) for 2016-2020, are in accordance with the Association Agreement between the EU and Georgia and the Code. The AP is a living document that can be revised.

It should be emphasized that the Code stipulates the waste hierarchy: prevention first, then preparation for re-use, thereafter recycling including energy recovery, and disposal last (cf. Article 4). Moreover, the precautionary principle and the polluter-pays principle are present (cf. Article 5), together with extended producer responsibility (cf. Article 9).

This concept of extended producer responsibility (EPR) introduced in Article 9 of the Code is of particular importance. It is considered a means to ensure that producers take care of the separate collection, transport, recovery (including recycling) and environmentally sound disposal of waste generated by their products. These obligations can be implemented individually or collectively by an "association" of producers.

Article 10 allows for the introduction of charges or subsidies on the use of certain products, and the Municipal Waste Management Plan postulates measures for separate collection and recovery of waste, including biodegradable waste and packaging waste (cf. Article 13).

Thus, in summary, the most important legal framework conditions of relevance for the issue of beverage containers are given by compliance with the waste hierarchy, and the implementation of an EPR policy regulating obligations of drinks producers.

In order to provide a clear picture of the functioning of EPR policies, the following section discusses various aspects which are of utmost relevance and which have to be observed in the context of implementing such a policy.

3. The Concept of an EPR Policy

3.1. Definition

The fundamental guidelines of the OECD define EPR as "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle". More precisely, an EPR policy is mainly characterized by "the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities" (cf. OECD (2001)).

Typically, EPR is meant to provide incentives for producers to design for the environment (DfE). In the context of beverage containers, DfE could mean that less material is used for all kinds of drinks packages, that the quantity of drinks packages are reduced through reusable or refillable containers, and that waste containers are efficiently collected and consigned for recycling. This is in accordance with the regulations in Article 9 of the Code.

From a practical point of view, the central question is: how to implement an EPR policy for beverage producers? Before providing an answer to this question, further important issues associated with EPR policies have to be discussed.

3.2. Necessary Integration of the Consumers

The above definition of EPR raises the fact that if an EPR policy should motivate producers to DfE, then this definition blames, at least to some extent, the producers for environmental problems associated with their products — they are the polluters. In the context of beverage containers, drinks producers are thus responsible for the waste they produce with their drinks. The role of the consumer is neglected, although demand for a particular design of certain commodities, demand for drinks in plastic single-usesingle-use bottles, for example, may lead to the environmental problem in question. Without any further policy guidance, it is in the interest of producers to pay more attention to the market situation and less to the environmental situation. In this context, one must not forget that typically only producers have the knowledge required and relevant for DfE in their products. Policy-makers are therefore dependent on the cooperation of producers, and this cooperation must be stimulated through appropriate policy tools. Thus, DfE will only happen if the market situation is – by chance – in favor of environmentally friendly designs.

In the context of drinks producers, this means that they will, in general, be mostly concerned with the demand for their products, including the packaging (plastic or glass, single-usesingle-use or refillable bottles, etc.). This is, once again, in their legitimate self-interest. Of course, they will defend their position against any attempts from public authorities to force or motivate changes which contradict their business interests. This can be seen in the so far failed

attempts by certain governments to ban large plastic containers for beer.³ Although this proposed ban is aimed at curbing alcoholism, this example nevertheless indicates the potentially harsh reaction from industry, if socially-minded or environmentally-minded policies threaten their interests and their profits.

Consequently, efforts to implement an EPR policy by postulating DfE in the form of a simple command policy, will, in general, not work. More sophisticated approaches have to be considered in order to reach the desired environmental goals.

EPR seems to provide an easy way to put the burden of environmental pollution on producers. Of course, producers should not and cannot be dismissed – they too are responsible for the protection of the environment, and, therefore, for the waste they are producing jointly with their beverages. However, they are also dependent on their customers, and EPR policies should therefore integrate consumers.

This adds an additional twist to the question: who is the polluter? Scientific publications are increasingly recognising this aspect of EPR policies: that it is in many cases not straightforward to identify the polluter (cf. Wiesmeth and Häckl (2011), Wiesmeth and Häckl (2016) and the literature cited in these publications).

3.3. Relevance of Local Conditions

The implementation of an EPR policy has to observe relevant local framework conditions. The formal, theoretical, reason for this requirement is that EPR policies, in combination with compliance with the waste hierarchy, serve as a substitute for market mechanisms in allocating environmental commodities. Solutions to the market mechanism, the so-called market equilibria, are, however, dependent on local conditions. The preferences and the income of the consumers, the production possibilities, tradition and religion may influence the market solution. Thus, a similar wide range of information has to be taken into account for environmental policies.

From a more practical point of view, the range of alternatives regarding details of an EPR policy for drinks producers depends on the situation in Georgia: on environmental awareness in general, on the preferences and economic situation of consumers (which defines demand for the product) with respect to drinks packaging, on the economic situation of producers of beverages and beverage containers, on the situation regarding logistics for returning waste containers, on the situation of the local recycling industry, on the alternatives to plastic bottles, etc.

Consequently, there is no unique EPR policy for drinks producers with respect to beverage containers. Rather, Georgia has to find its own way. This does not, of course, exclude the possibility to learn from the success or failure of similar EPR policies in other countries.

³ <u>http://www.plasticsnewseurope.com/article/20150910/PNE/309109994/debate-continues-in-russia-about-banning-large-pet-beer-bottles</u>.

There are some other issues of relevance for a functioning EPR policy. These issues will be explained later in the course of designing an EPR policy for drinks containers in Georgia. The following list mentions "vested interests" and "linked signals", for example.

3.4. How to Implement an EPR Policy?

The following steps should be observed for a successful EPR policy. These steps will be taken into account in the later proposal for an EPR policy for beverage containers in Georgia. They constitute the universal elements of any EPR policy.

a) **[Goals, Local Conditions, Data]** Determine the concrete goals of the planned EPR policy; relevant local conditions must be observed; reliable data should be collected.

Remark: The goals are detailed in the AP, in particular national minimum targets for recycling all kinds of packaging waste are specified.

The local conditions will be investigated in the next section of this report, allowing for some insight into the feasibility of the goals.

Chapter IX of the Code refers to the urgent requirement of establishing, keeping, and constantly updating a database regarding all issues of waste management.

b) **[Relevant Stakeholders]** Who will be affected by the policy? Only producers, or also consumers?

Remark: In view of the considerations above, the group of relevant stakeholders will include drinks producers, drinks importers, producers of drinks packaging in Georgia, and consumers.

c) **[Appropriate Tools]** Which tools are appropriate to integrate the relevant stakeholders, to address a small number of producers, or a potentially large number of consumers?

Remark: There is a comparatively small group of drinks producers and drinks importers in Georgia, which can be addressed, in principle, by command-and-control policies. However, in order to address the large group of consumers, appropriate framework conditions are required. The Code refers in particular to taxes and subsidies as instruments in this context.

d) [Linked Signals] Are the various policy tools linked with the goals of the policy?

Remark: The policy tools should help to link the decisions of the consumers under appropriate framework conditions with the decisions of the drinks producers, such that the goals of the policy can be achieved.

e) [Vested Interests] Are there vested interests of groups of involved economic agents?

Remark: The issue of vested interests gains relevance in situations where one group of stakeholders, let's say the drinks producers, can make decisions on environmental

issues, which are positive regarding their costs or revenues, but detrimental for the environment.

So far, this is the list of issues which are of relevance for an EPR policy. The following section provides facts on drinks containers and framework conditions in Georgia and the local conditions to be observed for an EPR policy.

4. The Current Situation Regarding Beverage Containers in Georgia

4.1. Numbers and Facts

According to a market study by the Waste Management Technologies in Regions (WMTR) Program on the waste management sector in Georgia (cf. WMTR (2016)), annual plastic waste is estimated to be 26–33 thousand tonnes, paper waste 45–50 thousand tonnes, and glass waste 90–100 thousand tonnes. In addition, the quantity of waste aluminum is difficult to estimate due to a lack of data.

A large proportion of these waste commodities go to landfills, consequently packaging waste constitutes a growing and already substantial share of municipal solid waste. With increasing quantities of plastic items produced in Georgia and imported into Georgia, and with similarly increasing production quantities of glass items and paper and cardboard, this share is likely to increase in the near future. For example, between 2012 and 2015, the production of plastic containers and PET bottles in Georgia grew by an average of 12% annually (cf. WMTR (2016), p. 7).

A more detailed analysis of the quantity of drinks packages can be derived from excise stamps issued. In 2016, a total of 79,737,147 containers with non-alcoholic drinks were produced, among them 23,994,197 half litre containers and 21,907,708 one litre containers.

Packaging Type	Size of Container							
	0.2	0.25	0.33	0.5	1	Total of Selection	Total	
Elopak				15,531		15,531	15,531	
Can		1,458,934	1,762,339	204,971		3,426,244	4,057,764	
PET	28,059	364,744	454,954	15,649,169	15,859,742	32,356,668	39,397,103	
Tetrapak	3,997,471	1,445,769	4,600	1,890,154	2,598,117	9,936,111	12,159,280	
Paper packaging	449,062	23,638			169,517	642,217	1,250,307	
Barrel	5,538	4,240,212	3,128,562	142,495		7,516,807	8,269,794	
Glass bottles	17,513	157,925	908,140	4,272,247	66,409	5,422,234	5,511,842	
Total	4,497,643	7,691,222	6,258,595	22,174,567	18,693,785	59,315,812	70,661,621	

Table 1: Containers for non-alcoholic drinks in Georgia in 2016 (according to excise stamps issued)

Table 1 shows that about 84% of all non-alcoholic drinks were packaged in the standard-sizes containers listed above. Moreover, PET bottles lead the list by far, with a share of almost 56%.

	Packaging Type	Size of Container						
		0.2	0.25	0.5	0.7	1	Total of Selection	Total
Locally	Ceramics		140				140	278
2016	PET		400	100		5	505	520
	Glass bottles	261,599	40,673	12,814	98,264	18,881	432,231	460,686
Total		261,599	41,213	12,914	98,264	18,886	432,876	461,484
Imported	Box			3,343	582		3,925	3,925
2016	PET						0	161
	Glass bottles	325,414	240,490	1,137,045	79,496	721,647	2,504,092	2,556,662
Total		325,414	240,490	1,140,388	80,078	721,647	2,508,017	2,560,748

Table 2 shows that glass containers are most important for alcoholic drinks. Plastic bottles play only a minor role in this context.

Table 2: Containers for locally produced and imported alcoholic drinks in Georgia in 2016 (according to excise stamps issued)

According to information from drinks producers, most of these bottles are single-use bottles. There is no infrastructure to take back refillable bottles, moreover, right now, there is no incentive system for consumers to return empty bottles, and there is no separation of waste at the source. In cities, bottles are usually deposited in waste containers and, therefore, landfilled. Outside of major cities, however, bottles may also end up in the environment.

4.2. General Thoughts on Recycling Waste Containers

Given the fact that most drinks packages currently end up in landfills, there seems to be a great potential to develop a recycling industry in Georgia. After all, energy prices are low, wages are low, and regulations are friendly towards establishing new enterprises, which provide new and interesting jobs. The expectations are that recycling is profitable, such that further outside support, like subsidies from the government, will not be necessary.

Of course, the economic success of recycling activities depends to a large extent on the market prices for recycled material. Prices for these basic commodities are, however, determined on geographically larger markets, and therefore affected by many kinds of international developments.

a) **[Glass Recycling]** Crushed recovered glass (cullet) can replace a substantial share of the materials used for producing virgin glass. Producing glass from recycled material saves energy and, thus, reduces greenhouse gas emissions.

However, it is important to consider the costs arising from collecting and sorting waste glass containers. Glass recycling is based on cullet of the same color, and transportation costs are high in comparison to the market prices for glass waste (cf. Figure 1).

The following figure shows the monthly prices for cullet and other waste glass in the form of powder, granules, or flakes, and their monthly trade volume in the EU-28. The increase in trade volume at the end of 2013 is associated with a sharp decrease in the price, which has since recovered.



Figure 1: Price indicator and trade volume of glass waste in EU-28.4

Figure 1 shows the long-run relationship between supply (trading volume) of waste glass and the specific price, in addition to the short-run fluctuations. A larger supply of cullet in the future due to increasing collection and sorting activities in many countries might, thus, have a negative effect on the price indicator. This will happen, for example, if collecting and sorting is subsidized, reducing the costs for recycling glass.

Due to its weight, which results in high transportation costs, recycling of glass in Georgia should be established, with the recycled glass used for the local market. Rough estimates show that for every 1,000 tonnes of glass recycled, almost 8 new jobs are created to collect and color-sort the waste glass⁵. But, the concrete effects clearly depend on the local situation.

The price indicators mentioned above refer to the EU-28, and need not be of relevance for Georgia, in particular, because of the transportation costs for glass cullet.

 ⁴ <u>http://ec.europa.eu/eurostat/statistics-explained/index.php/Recycling – secondary material price indicator#Glass.</u>
5 <u>http://spendmatters.com/2015/04/20/recycled-glass-price-increases-40-in-3-years/</u>.

b) **[Plastics Recycling]** The situation regarding recycling of plastics is more complicated. First of all, as plastics are made from petrochemicals, the market price of plastic products is substantially dependent on the market price of these petrochemicals.

This carries over to the price of recycled plastics, which is, thus, also dependent on the price of crude oil. Due to its low specific weight resulting in lower transport costs in comparison to the value of recycled plastics, global effects play a higher role for the market price of recycled plastics.

Analogously to glass, waste plastics must be sorted in order to yield high quality secondary plastics in the course of material recycling. Alternatively, there is the possibility of resource recycling, which turns plastic waste into certain basic chemicals.

The following figure shows the monthly specific prices for plastic waste and the monthly trade volume in the EU-28. The price declined sharply in 2009 and has since recovered, although the recently falling price of crude oil has left its mark on the plastics recycling industry.



Figure 2: Price indicator and trade volume of plastics waste in EU-28.⁶

Figure 2 outlines the long-run relationship between supply (trading volume) of plastic waste and price indicator. Again, besides the potential effects of a fluctuating price of crude oil, an increasing supply of plastic waste might adversely affect the price indicator. For example, prohibiting landfilling of plastic waste in a variety of countries might lead to such a situation.

⁶ <u>http://ec.europa.eu/eurostat/statistics-explained/index.php/Recycling – secondary material price indicator#Plastics</u>

Moreover, there is a downgrading regarding material recycling of plastic waste. At some point plastic waste has to be resource recycled or thermally recycled.

The prices mentioned above refer to the EU-28. Due to comparatively low specific transportation costs for plastic waste, they may be of relevance for Georgia too.

c) **[Paper Recycling]** According to WMTR (2016), p. 9, manufacturing of different types of paper and cardboard is well-developed in Georgia, with local companies using mainly imported material (paper pulp or recycled waste paper). However, there are some attempts to collect waste paper from households. WMTR's partner companies recycle more than 9,000 tonnes of waste paper per year (WMTR (2016), p. 11).

For these reasons, it is recommendable to extend existing recycling activities for paper and cardboard in Georgia. Paper associated with drinks packaging could provide a good starting point.

As with glass and plastics, waste paper should be sorted for high quality recycled paper. The price for high quality paper waste may be twice as high as the price for low quality paper waste. Figure 3 shows the development of the price indicator and the trade volume of paper and cardboard waste in the EU-28.



Figure 3: Price indicator and trade volume of paper and board waste in EU-28.⁷

The figures outline the relationship between trade volume and specific price. Again, the financial crisis in 2009 led to a sharp decline in the price, with stable prices over the last few years. The high specific prices allow transportation over larger distances. The prices might thus be of relevance for Georgia too.

⁷ <u>http://ec.europa.eu/eurostat/statistics-explained/index.php/Recycling – secondary material price indicator - Paper</u>

d) **[Environmental Aspects]** The general environmental aspects of glass recycling refer mainly to saving energy and reducing greenhouse gases. Landfilling glass containers uses a lot of landfilling space, but seems to be, beyond that, environmentally harmless.

Similarly, recycling of paper and cardboard helps to save natural resources and energy, thereby reducing greenhouse gas emissions. Paper and cardboard are bio-degradable, landfilling will therefore not do much environmental harm.

The environmental effects of recycling plastic waste cannot be completely assessed at this point. There are positive effects with respect to collecting the plastic waste in the environment and preventing its further pollution with discarded PET bottles, for example.

However, many plastic items, including plastic bottles, may contain certain chemicals such as Bisphenol A or phthalates. The health risks from using these plastic items are not yet known, although the concentration of these chemicals in the soil will increase by continuously landfilling plastic waste, which will not degrade for a long period of time and may pose additional health risks for future generations (cf. EC (2011a), EC (2011b)). Moreover, more plastic items will also mean more leakage of plastics in the environment, in particular the oceans.

Material recycling of plastic waste may increase the concentration of these chemicals in secondary products. Moreover, thermal recycling requires special and efficient filter technologies to prevent toxic exhaust gases.

In summary, material or resource recycling of plastic waste is necessary to handle the huge amounts of plastic waste produced, with which many countries will be confronted with many years into the future. However, in view of the leakage rate of not-collected plastic waste and the many unknowns still associated with the toxicity of chemicals in plastics, it is advisable to try to reduce the consumption of plastic in general — in accordance with the waste hierarchy and the precautionary principle.

4.3. Recycling Activities in Georgia

Recycling of packaging waste is not yet well developed in Georgia. There are some activities regarding waste paper, resulting in the collection and recycling of around 12% of waste paper, if the scarcely available data is correct (cf. the numbers and comments in WMTR (2016), p. 11).

There is currently no systematic and rigorous glass recycling; only cullet from glass production is recycled. Moreover, some drinks producers recover and recycle containers which break during production. Concrete details are, however, not available.

There are a few companies which recycle plastic waste (PET and PP). Their capacity is up to 6,000 tonnes a year, and employment for up to 50 workers. Currently, however, their capacity is not met because they do not receive sufficient plastic waste.

5. Resume

The above considerations give some helpful direction for what Georgia needs to do to preserve the environment, independent from any legal obligations regarding the Association Agreement with the EU.

a) Georgia should follow the waste hierarchy and first of all try to reduce packaging waste.

Continued landfilling of packaging waste will require more and more space, moreover landfilling plastic waste may increasingly pose environmental and health risks for future generations.

Recycling plastic waste without efforts at reduction will increasingly pollute the environment due to leakage effects. In Germany, close to 98% of single-usesingle-use plastic bottles were recovered and materially or thermally recycled in 2015, the figure for the EU was only 59%. Moreover, the markets for secondary products can be volatile and external influences can render recycling activities unprofitable.

 b) Georgia should establish recycling facilities or try to attract such facilities in order to sort and handle packaging waste that cannot be avoided or reused.
Beyond reduction, this is the only way to deal with this part of packaging waste. A welldesigned EPR policy should provide the solution for this without compromising reduction efforts.

The following sections of the report are now devoted to developing an EPR policy for drinks containers in Georgia, which motivates DfE and a reduction of plastic waste.

6. Basic Constituents of an EPR Policy for Drinks Containers

6.1 Goals of the Policy

The goals of the policy must be based on the legal regulations provided by the Code, the NWMS, and the AP. According to details given in the NWMS and the AP, the national minimum targets for waste to be recycled are listed in Table 3 below.

	2020	2025	2030
Paper	30%	50 %	80%
Glass	20%	50%	80%
Metal	70%	80%	90%
Plastic	30%	50%	80%

Table 3: National minimum targets for waste to be recycled. Source: NWMS, p. 20.

In view of the 90%, resp. 100%, of municipal waste to be collected from 2020, resp. from 2025 (cf. NWMS, p. 19), these targets need to be reconsidered and correctly interpreted. Regarding drinks packages, they imply that 90% of all waste containers must be collected from 2020, and

100% from 2025. The national minimum targets for waste to be recycled have then to be applied to the 90%, resp. 100% of beverage containers collected. The collected but not recycled containers will probably have to be landfilled, till the recycling quota increases to 80% or 90% in 2030.

As already indicated in Section 3.4a), the feasibility of these goals should be investigated in view of local conditions.

At the beginning of 2017, there are some pilot activities regarding waste separation, but there is no systematic collection of beverage containers in Georgia.

In order to document the progress of these environmental activities, a data management system has to be established in order to collect and process data regarding all aspects of waste management. This should be done together with setting up a collection system for waste drinks containers.

Another goal, addressed in the legal documents (Code, AP), is the issue of cleaning up the environment and preventing littering (cf. Code, Article 8 and Chapter X; AP, Action A 1.3.1). As empty glass and plastic bottles constitute a substantial share of discarded items, this issue is related to the organization of the collection system for empty beverage containers. It will therefore be discussed again with the details of the EPR policy in Section 7.1.

In summary, the goals set by the Georgian government are ambitious, especially the goals for 2020. They can only be achieved if the necessary first steps are taken soon.

6.2 Relevant Stakeholders

As discussed in Section 3.2 above, the polluter-pays principle should be interpreted carefully in the context of waste beverage containers. Drinks producers generate this waste jointly with their beverages. Drinks have to be packaged in containers and it is not the intention of the drinks producers to pollute the environment. Nevertheless, according to the polluter-pays principle, they have to contribute towards collecting and treating this waste. On the other hand, these companies are substantially dependent on the demand for their products. Thus, it is in there legitimate business interests that they will oppose any measures, they deem unfair or they consider detrimental to their business interests (consider the Russian "plastic-bottles-case" mention in Section 3.2). Consequently, consumers have to be adequately integrated into the EPR policy to support the achievement of these goals, and to motivate drinks and packaging producers to DfE. If empty single-use drinks containers have to be returned, their cooperation is necessary.

Moreover, it is the first task of drinks producers to focus on their business. That is understandable and should not be misunderstood as a lack of environmental awareness. The consequences for designing the EPR policy, however, is that the corresponding environmental issues should become part of the business goals of the drinks producers, implying that the general goal of maximizing profits requires them to pursue environmental goals at the same time. This is one of the challenges of designing an EPR policy in this context.

6.3 Appropriate Tools

In order to set up a rather complex environmental policy, different tools are in general required to address the various features of the policy. Different tools are necessary to address the large number of consumers and a comparatively small number of drinks producers, for example.

In addition to that, the various stakeholders, drinks producers, and consumers in the case considered here, have their own knowledge, their private information, on environmentally relevant issues. They will typically make use of this information only, if it is of advantage for their business interests, or if they are "motivated" to do so by certain features of the environmental policy. This requires again specific instruments.

An example for such a case is the question of whether refillable containers for soft drinks or beer constitute a feasible alternative for drinks producers. In order to find out the position of drinks producers regarding this issue, it is necessary to establish framework conditions, which encourage them to seriously take into account this alternative.

In summary, among the tools of relevance for an EPR policy regarding beverage containers are first of all command-and-control policies in the form of by-laws, ordinances and other legal instruments as outlined in the Code, for example. They constitute the general framework conditions, which have to be monitored and controlled by the public authorities. In addition to that, tools are required to address the larger numbers of consumers, for example. It is difficult, if not impossible, to rely upon command-and-control policies alone to affect the behavior of consumers. Due to the "Tragedy of the Commons"⁸ they will not always comply with the regulations, and it will not be financially or politically feasible to control the environmental behavior of everybody.

An example for this case is provided by littering. In Article 7 of "The Law of Georgia on Environmental Protection" citizens are obliged to "take care of natural surroundings...", and in Article 34 the disposal of household waste is permitted "only in especially prescribed sites". This law entered into force in 1996, but littering, in particular with plastic waste, continued. Moreover, it is doubtful whether the fines for littering detailed in Article 31 of the Code will have a substantial effect. To be clear: the fines for littering are needed. However, these command-and-control regulations should be supplemented by incentives to motivate citizens to comply with these regulations.

6.4 Linked Signals and Vested Interests

The issues of linked signals and vested interests are of utmost importance for a functioning EPR policy. It is through missing or misdirected signals, or through incompletely linked signals that incentives detrimental to the environmental goals enter an EPR policy. Similarly, vested interests can lead to conflicts with these incentives.

For these reasons, such issues will be considered in all relevant details in the following section.

⁸ The "Tragedy of the Commons" describes a situation, in which a small pollution of the environment – with a discarded plastic bottle, for example – is individually rational: why should I carry this empty bottle back home? However, an environmental issue arises with other individuals thinking and acting like this. The "Tragedy of the Commons" is obviously relevant for many environmental problems.

7. EPR Policies for Waste Beverage Containers in Georgia

As the title of this section indicates, there is no unique EPR policy for the problem of drinks containers. Rather, there are different alternatives, which have to be considered in view of the relevant framework conditions, and whose feasibility given the goals of the policy have to be analyzed. Nevertheless, at the end of this report there will be and should be a clear recommendation for one policy option.

7.1 Collection Systems

Treatment and recycling of drinks packages require the collection of waste containers. An appropriate collection system is, thus, of importance for achieving the policy goals. There are two basic systems, which are partially compatible. This means it is possible to start with the first "separate collection system" and enrich it later with aspects of the "take back system". Such a combined system can then gradually be extended to cover larger and larger areas of Georgia.

a) **[Separate Collection System]** A separate collection system is comparatively easy to implement. It requires separate waste bins for discarded drinks packages, which are then collected separately and delivered to a sorting plant, and consigned and prepared for recycling. There are, however, some issues which have to be taken into account.

First of all, there is the question of what extent such a system will be accepted by consumers. It is likely that littering will continue, as there are only small incentives to bring back empty bottles from excursions to the mountains etc., a consequence of the "Tragedy of the Commons" mentioned above, and a probably still low environmental awareness. Thus, this system will likely not sufficiently address target T 1.3 and action A 1.3.1 of the AP.

In addition to that, experience – from Germany, for example – shows that a nonnegligible amount of packaging waste will end up in the bins for household waste, or vice versa, residual waste will end up in the bins for packaging waste (up to 2% in terms of weight).

In Austria, approximately 74% to 80% of single-use plastic bottles are currently returned to the separate collection system, whereas the share in Germany with a take back system to be introduced below is close to 98%.

The becomes even more complicated when taking into account that glass and plastic drinks containers should be sorted – optimally at the source – in order to facilitate recycling. Thus, waste bins need to be provided for white, green, and brown glass bottles, and for plastic bottles, providing further possibilities to discard waste drinks containers into the wrong waste bin. Alternatively, it is possible to have just one bin for drinks packages, and then to sort the waste mechanically or by hand in a sorting plant. Given the low cost of labour in Georgia, this might be an option to be considered.

Despite these more negative features of this simple separate collection system, there is a positive aspect which should not be neglected. It is probably relatively simple to

extend the current waste collection system in Tbilisi and other major cities to include separate collection of drinks packages. The current waste bins for household waste should include a clearly distinguishable additional bin for drinks containers. This waste should then be collected separately and transported to the sorting plant and thereafter consigned to recycling.

The financial consequences of such a system must not be forgotten, of course. The question of who will pay will be addressed later.

b) [Take Back System] The second system, a take back system, focusses much more on individual incentives to return empty bottles. The crucial difference to a separate collection system is a mandatory deposit on each drinks container sold. Thus, there is a deposit fee of a few tetri (the fee should be acceptable for most consumers), which is returned upon return of the empty bottle. The fee could depend on the size of the bottle. With such a deposit fee, Germany succeeds in collecting close to 98% of singleuse PET bottles.

Such a take back system needs different infrastructure. In particular, each store selling drinks has to charge the deposit fee and return it once the empty bottle is handed in. Complications arise when the bottle is returned at a different location. For these not unusual cases, a clearing house has to be established. This clearing house could also take care of the collection of the returned bottles and have them delivered to the sorting plant.

The advantages of such a system are clear: by establishing "individual consumer responsibility" for the empty bottles, consumers have an incentive to return them to receive the deposit. Such a system also helps to clean up the environment and prevent or at least reduce further littering. Thus, this take back system integrates the aspect of collecting waste drinks packages with the aspect of preventing littering. Even if some consumers for some reasons will not return the empty bottles to collect the fee, other individuals will search waste bins for misplaced bottles or pick up discarded bottles in order to collect the deposit fee. This is based on the experience of Germany.

Analogously to the case of the separate collection system, the financial consequences of the take back system must not be forgotten. The question of who will pay for such a system will be addressed later.

c) **[Recommendation for Georgia]** There is a clear indication, also from the practical experiences of Austria and Germany, that a take back system will better serve the environment regarding waste drinks packages. The aspect of individual consumer responsibility mentioned above is of particular importance for a country with (probably) a still low level of environmental awareness. However, a take back system requires infrastructure, which might be difficult to set up within the short period of time that is left to introduce a collection system for beverage containers in Georgia.

Thus, the following combination of the two systems should be considered. As discussed earlier, waste paper, waste glass containers, and waste plastic containers are of different environmental quality. Waste paper and waste glass or cullet, can be

landfilled, taking away space, without, however, posing future environmental problems. This is not true of plastic waste, as indicated above.

Therefore, Georgia could start with a simple separate collection system in some major cities which already have established waste collection systems, with separate bins for glass and plastic bottles. Moreover, there should be separate bins for waste paper at various locations. After a few years, when the separate collection system for paper, and glass and plastic bottles, including sorting plants, is fully functional, a take back system for single-use plastic bottles should complement the separate collection system, which will then remain responsible for collecting the returned plastic bottles from the stores and consigning them for recycling.

Thus, with this mixed system, most waste paper, and glass and aluminum containers will be collected and recycled. But individual consumer responsibility will provide incentives to return most of the plastic bottles for recycling, thereby reducing landfilling and littering.

The following subsection focuses on another central part of the EPR policy. There are again alternatives, which should be analyzed carefully.

7.2 Individual or Collective Implementation of the EPR Policy

One of the crucial questions regarding an EPR policy for drinks containers in Georgia is the organization of collection systems, including sorting plants and recycling activities. Moreover, the financial issues regarding financing the collection system, the sorting plant and, perhaps, some recycling activities, have to be addressed and solved. It is thereby very important to investigate the specific incentives associated with the alternatives for the various groups of stakeholders.

What are the responsibilities and the obligations of such a "system" (individual or collective systems)? As already mentioned, the system first of all guarantees the regular and free-of-cost collection of used drinks packaging from or in the vicinity of the final consumer. The system then consigns the packaging waste to material-recycling (or resource, or thermal recycling). In this context, the public waste management authorities may demand the takeover or joint use of facilities required for collecting and sorting packaging materials.

Moreover, the system has to meet the recovery and recycling requirements specified in the AP (cf. Table 3). This implies that there has to be sufficient recovery (and recycling) capacity for the packages entering the system. All these activities have to be verifiably documented, and an independent expert should certify compliance with the collection and recovery requirements.

In Article 9, the Code allows the implementation of the tasks of a "system" both individually or collectively. The following considerations point to specific characteristics of three different "systems", three different implementations of the EPR policy.

a) **[Individual System]** An individual system transfers the above obligations to an individual drinks producer. Thus, in this case this producer has to take care of these obligations at the expense of the company.

From an economic point of view, such a system might make sense in the following situations: the drinks producer offers drinks in a geographically limited area mostly in refillable containers, which have to be separately collected anyway. Alternatively, chain stores, such as Aldi, Lidl, Penny, Edeka, and Spar with shops all over the country, may consider to set up their own system. An individual system might be preferred to a collective system in this context, because these chain stores already have their own logistics system, which can also be used for transporting the returned drinks packages to recycling plants. This is the example from Germany and other countries.

There is, however, one aspect of such an individual system, which must not be forgotten. There are no direct incentives for reducing packaging waste. In particular, if recycling plastic bottles, for example, is profitable, then there is no reason to change anything regarding the share of plastic bottles. Perhaps the share will be increased, if this is in line with demand. In case recycling is not profitable, there might be some incentive to reduce the quantity of plastics for bottles, but major changes will only be motivated by changes in demand.

Moreover, typically not all bottles will be returned. In Germany, this refers to more than 2% of the single-use plastic bottles. Consequently, if there is a mandatory deposit fee, then this share of the fee remains in the individual system of the chain store, for example. This gives these chain stores incentives to extend their share of drinks in single-use plastic bottles. That is exactly, what is happening in Germany, occasionally supported by high prices for plastic waste or recycled plastic⁹.

Thus, as probably none of the above conditions applies to any one of the drinks producers or importers of drinks in Georgia today, an individual system would simply be too costly to constitute a reasonable alternative to a collective system.

b) [Collective System – Association] The idea to form an association among drinks producers to implement collectively the obligations of the EPR policy seems a natural thing to do. Drinks producers must be made responsible for their waste, and therefore integrating them directly into such as system with all the obligations seems to be an optimal way to realize the polluter-pays principle.

Moreover, to set up such a system is more or less straightforward at first glance.

However, a closer analysis shows that the participating drinks producers have to solve a couple of difficult questions. What looks easy and simple at the first glance can become more complicated.

There is, first of all, the fact that none of these drinks producers have any substantial experience regarding collecting waste bottles or consigning them to recycling. Thus,

⁹ https://www.umweltbundesamt.de/en/press/pressinformation/grocery-discounters-should-offer-more-deposit

the association will have to establish these operations, which is not a problem in itself. The problem arises with sharing the costs of the system within such an association. The natural procedure would be to share the costs according to the quantity of drinks packages recovered from a certain producer. But then questions might arise over why a small local producer should subsidize the higher specific costs of a producer selling drinks in all parts of the country.

Even if this issue can be overcome, there remains the issue of negotiating contracts with the recycling industry. It is a general economic principle that such a constellation will prevent both new entrants into the market, and it might form a monopoly selling waste drinks containers to recycling companies.

The fact that this association constitutes some kind of monopoly will likely reduce the quality of services offered by the association. Why should it care about the quality of the services? The public authorities monitoring the system will only have incomplete and limited possibilities to influence the operations of the association. There will always be good reasons for why different challenges cannot be solved *"we will try harder in the future"*, will be the likely responses from the association.

The perfect example is the "Duales System Deutschland" (DSD), which was founded in 1990 and had a monopoly as a "system". Soon it turned out that the system could not – for a variety of reasons – fulfil its obligations. Moreover, some waste collectors and some recyclers were excluded by the DSD, perhaps due to corruption, and some innovative recycling technologies were not considered by the DSD. These are reasons enough to allow competition among these systems.

The idea to constrain a monopoly by reducing it to a not-for-profit institution instead of introducing competition is not very helpful either. First of all, without the chance to gain a profit, the motivation for quality services declines further. Moreover, competition also functions as a disseminator of information. Thus, companies can and do learn learn from each other, even when they are in competition. A monopoly clearly disables this function.

Other aspects refer to the possibility to extend such an association to other areas of waste management, for example to packaging waste in general, or to waste electronic and electrical equipment (WEEE). In such a case, it is likely that another association would have to be established, further complicating the situation regarding waste management in Georgia.

Regarding reduction of packaging waste, the conclusions for the case of an individual system apply in this case too: there are no direct incentives for reducing packaging waste. To the contrary, where there are profitable prices for recycled plastic there are incentives to increase the share of plastic bottles, thus violating the waste hierarchy.

This collective system is characterized by vested interests: the drinks producers have their legitimate business interests, of course. They do, however, also have some possibilities to influence environmental issues. Thus, pursuing their business interests they may interfere with environmental issues, but not necessarily to the benefit of the environment.

There are various examples to this case of vested interests. One is the end-of-life vehicle legislation in the EU. In this case, car manufacturers have to take back scrap vehicles and consign them to recycling. In practice, car manufacturers in Germany, for example, form an association in charge of these activities. Car manufacturers pay a uniform fee for each of their cars to be recycled. Of course, there is an incentive to export used cars to countries outside the EU, for example to Georgia, in order to save on recycling costs, which reduce the profits of the manufacturers. Similarly, handling WEEE is based on an association of manufacturers in the sense that they have to take back and recycle WEEE. However, exporting still reusable equipment to developing countries, for example, helps again reducing costs.

In summary, the at the first glance great idea of forcing (or allowing) drinks producers to establish an association to take care of waste containers loses its initial attractiveness very soon.

c) **[Collective System – Compliance Schemes]** There is one crucial difference between an association and a compliance scheme: a compliance scheme is a system with the obligations mentioned above, it is, however, independent from the drinks producers in the sense that it is a private company certified and accredited by the public authorities. This small variance entails some significant differences. There is first of all the question of financing such a system. This is achieved through a system of license fees for handling the waste drinks packages. Thus, for each glass or plastic bottle, or for each can, a certain fee has to be paid to the system. This implies that each drinks producer or importer has to join such a system for licensing the packaging. The system uses the revenue from these fees to finance collection and recovery of the packaging waste.

The licensing fees for the various packaging materials result from competition among the compliance schemes. Each drinks producer has to join one of these systems, but is otherwise free to join the one offering the best conditions. Competition thus helps to keep these fees at a reasonable level, despite the profit motive guiding the decisions of the compliance schemes.

At a later stage, the fees can be adjusted to support further ecological goals. For example, if drinks producers continue to increase the share of drinks in single-use plastic bottles, public authorities might wish to raise the licensing fee for plastics. That such a situation might arise can be observed in Germany. As already mentioned earlier, more and more drinks in plastic single-use bottles are currently entering the market in Germany. The tacit justification is that there is a reasonably functioning take back and recycling system, and consumers prefer single-use bottles.

Thus, in order to restore the waste hierarchy, the government could intervene by "ecologically" adjusting the licensing fees. But, once again, this should only happen, if at all, when both the drinks producers and the government are familiar with the "system".

What are the consequences of such a system? There is a clear incentive for a DfE regarding drinks packages. The reason is that lighter bottles or refillable bottles immediately reduce the licensing fees to be paid – independent from the situation on recycling markets. In addition to that, if drinks producers know that most of their drinks packages are collected, this might increase recycling costs, thus providing even more incentives for a DfE. This is one of the consequences of the integration of consumers, mentioned already in Subsection 6.2.

Moreover, there is complete transparency for drinks producers: they know the fees they have to pay for their packaging; beyond that they can care for their business interests and do not have to worry about collection systems and volatile recycling markets.

Clearly, new drinks producers or importers of drinks can easily join such a compliance scheme, and other areas of waste management, packing waste in general, or WEEE, for example, can be added to such a system without much difficulty.

Of course, competition is necessary in order to provide high quality services and in order to keep licensing fees and the compensations for the collection and the recycling companies within a reasonable range. As outlined above, competition also helps to provide additional information on market development, etc.

Vested interests are no longer apparent in a system with competitive compliance schemes, and drinks producers can reduce their costs by reducing the environmental impacts of their drinks packaging. This integrates stakeholders in a perfect way: by pursuing their business goals, drinks producers also benefit the environment (cf. Section 6.2).

Observe that beyond the obligation to join one of these compliance schemes, drinks producers are free regarding their business decisions. They can adopt a DfE for their packages, but nobody forces them to. Moreover, they will make use of their private business information, again without anybody forcing them to do so. It is therefore quite a liberal approach to protecting the environment.

How are relevant signals linked in this approach? Producers receive a clear signal from the consumers that a great deal of drinks packages will be collected and consigned to recycling. The costs of collection and possible recycling costs have to be covered by drinks companies through the licensing fees. Thus, drinks companies learn quickly that lighter packages, or at least partially switching to refillable drinks containers, might reduce their costs.

The following diagram illustrates the operations of the "Duales System Deutschland" (DSD), one of the major compliance schemes in Germany.



Figure 3: Operating principle of Duales System Deutschland GmbH¹⁰.

d) [Recommendation for Georgia] The considerations above make clear that Georgia should opt for a collective system based on independent compliance schemes. Only this solution allows a reduction of packaging waste from beverage containers. The licensing fees will assume a competitive level without any interference from the side of the government. However, if need be, the government can adjust the fees in order to pursue certain environmental goals, the further reduction of the quantity of plastics used in drinks packaging, for example.

In this context, it might also be a good idea to follow the initiatives of the Ellen MacArthur Foundation¹¹, which strives for a "New Plastics Economy", using plastic on a more sustainable basis. Interestingly, DSD GmbH and other German compliance schemes also support their customers for a DfE regarding packages made of plastics.¹²

One of the most critical questions relates to the costs of a system based on independent compliance schemes. Some results from Germany provide insight and allow a rough estimation of the corresponding costs in Georgia.

8. Licensing Fees for Drinks Packages – Some Estimates for Georgia

The following calculations and estimates for the licensing fees are based on data from

¹² <u>https://www.gruener-punkt.de/en/communication/news/article/details/konzerne-wollen-anders-mit-plastik-umgehen.html</u>

¹⁰ https://www.gruener-

punkt.de/fileadmin/layout/redaktion/Bilddatenbank/Grafiken/How_Duales_System_Deutschland_GmbH_operates.jpg ¹¹ <u>https://www.ellenmacarthurfoundation.org/</u>

- a) Veolia Umweltservice GmbH http://www.veolia-umweltservice.de/dual/html/default/home.de.html
- b) Interseroh GmbH. https://www.interseroh.de

Both companies are compliance schemes in Germany. Both offer their services all over Germany.

Observe that realistic licensing fees depend on concrete quantities of packaging waste and have to be, at least for very large quantities, negotiated with the compliance schemes. Thus, the following prices refer to small quantities and cannot automatically be scaled up for large quantities of packaging waste. The quantities are licensed for one year.

	Interseroh GmbH ¹³	Veolia-Umweltservice GmbH ¹⁴
50 tons of glass containers	2,900 Euro	4,000 Euro
10 tons of plastic containers	8,530 Euro	7,100 Euro
10 tons of paper/cardboard	1,190 Euro	1,200 Euro

Consider a drinks producer who is selling 1 million bottles of drinks in 0.5 I glass containers, and another million in 0.5 I plastic containers. Single-use 0.5 I glass bottles for beer, for example, weigh approximately 0.3 kg. Refillable 0.5 I beer bottles are approximately 0.35 kg, slightly heavier. 0.5 I single-use PET bottles weigh approximately 0.02 kg.

Thus, this drinks producer has to license 300 tonnes of glass and 20 tonnes of plastic. The licensing fee for the glass containers is then between 17,400 and 24,000 euros, and the licensing fee for plastic containers between 14,200 and 17,060 euros.

This amounts to 1.74–2.40 euro cents per glass bottle, and to 1.42–1.70 euro cents per plastic bottle. In Germany, 19% VAT is added to these values.

The question is now, how to transfer these values to the quite different situations in Georgia, with significantly lower wages especially in the area of waste management. One idea is to look at the differences in GDP per capita in Georgia and in Germany. The values for 2015 show that GDP per capita in Germany is 41,313 USD more than 10 times as high as GDP per capita in Georgia, 3,796 USD.

A substantial share of value creation in collecting, sorting and recycling packaging waste is manual labor. Moreover, as a great deal, some 70% of GDP, is accrued through labor, one could argue that some 70% of the obligations of the system come from labor, and are therefore allocated to wages in Georgia. The remaining 30% refers to modern equipment for separate collection, sorting plants, and recycling activities to be bought on international markets.

 ¹³ <u>https://www.verpackungslizenzierung.interseroh.de/onlinehandel/webshop/wizard_angebot_jahresmengen.jspx</u>
¹⁴ https://www.usepac.de

Taking 2 euro cents per bottle as a basis, then 0.14 euro cents correspond to wages in Georgia (70% of 10% of 2 euro cents), and 0.6 euro cents (30% of 2 euro cents) to depreciation of technical equipment. Thus, the license fee for a 0.5 l glass or plastic bottle in Georgia would be 0.74 euro cents, which corresponds to 2.12 tetri per bottle. Of course, the concrete situation on the markets for waste glass or plastics, or for recycled glass or plastics, can affect this number. It should be mentioned once again, that this fee of 2.12 tetri per 0.5 l bottle is only a very rough estimate.

There is another argument: if licensing fees in Germany are considered to result from the market mechanism in a competitive system, then the fees could be taken as a cost-efficient solution. Due to competition, lower fees for each category of packaging material should therefore not be feasible. As total costs for the drinks companies are then minimal, they constitute a lower bound in the sense that any other system, be it individual or collective, based on an association, cannot reduce these costs further. Consequently this system addresses policy objectives in most efficient manner. Of course, in view of the above issues related to an individual or a collective system with an association, the costs arising in these systems should be expected to be much higher. Again, these conclusions depend on a functioning competitive framework, which requires some time to be implemented in Georgia.

If this reasoning is transferred to the situation in Georgia, then it implies that a system modelled as a collective system with independent compliance schemes in a competitive framework would yield the lowest costs regarding the obligations which have to be fulfilled. Thus, any other system will not lead to lower costs, and very likely will lead to higher costs.

Applicants for a compliance scheme have to prove that they are familiar with the basic tasks of such a company. Thus, waste management companies should be approached to establish such a business. These compliance schemes have to be accredited by the government, and their activities have to be monitored on the basis of certified reports. As these compliance schemes exist only because of government regulations, the obligation for supervision of these schemes has to be taken seriously.

Alternatively, it is possible to bring in companies from abroad or to ask for advice from companies abroad. As already mentioned, there is a "Green Dot" network of such systems in Europe.

The following section explains and analyzes international experiences with systems which are modifications of the systems introduced above.

9. International Experiences

This section presents experiences with these systems in Germany, Austria, and Bulgaria. It has to be emphasized that the systems in these countries refer to packaging waste in general and not just to drinks packages. The Packaging Recovery Organisation Europe provides a survey on licensing fees.¹⁵ The "Green Dot" is meanwhile a trademark in more than 25 countries.

a) [Germany] The German system is a collective system currently based on 10 independent compliance schemes. After initial difficulties with a monopolistic system, there is now a high-quality system collecting, sorting and recycling all kinds of packaging waste. In view of new technologies, costs for recycling plastic waste, for example, has decreased by 95% over the period 1997-2015. This is also a consequence of competition among compliance schemes.



Figure 4: Cost index for plastic recycling (1997 = 100)¹⁶.

This system in Germany is working quite well – with two exceptions: one has already been mentioned. The fact that some major companies (chain stores, for example) can set up an individual system, motivates them to raise the share of single-use drinks containers. The second issue refers to the fact that it seems to be difficult right now to further reduce packaging waste (cf. the link in Section 7.2a)). This development could result from the attitude: "Now that we have an efficient collection and recycling system, there is no reason not to use it".

Coca Cola in Germany is in principle using this justification for reducing the share of refillable containers it uses.¹⁷ One way to handle this issue would be to switch to ecological licensing fees.

¹⁵ http://www.pro-e.org/files/Participation-Costs 2016.pdf

¹⁶ <u>https://www.gruener-punkt.de/fileadmin/layout/redaktion/mediathek/gruener-punkt-Nachhaltigkeitsbericht-2013-</u> 2014_en.pdf - page=22

¹⁷ One has to admit, though, that the share of refillable containers used by Coca Cola Germany is still higher than the average of other soft drinks producers.

- b) [Austria] In 2015, Austria opened the market for compliance schemes; consequently, there are currently 7 schemes in a competitive environment. The Austrian system is also functioning quite well regarding packaging waste in general. However, due to the fact that there is no mandatory deposit fee for single-use plastic drinks containers, the collection rate is only 70%-80% (estimated), significantly below the corresponding rate of 98% in Germany.
- c) **[Bulgaria]** As a member state of the EU, Bulgaria has certain obligations regarding waste management. A packaging directive which entered into force in 2004 allows for "systems" for separate collection, recovery and recycling of the packaging waste.¹⁸ However, there are further specifications for the systems (cf. Section III). Both individual and collective systems seem to be allowed.

In 2012 there were 7 operating systems in Bulgaria; a lack of control from public authorities combined with a lack of incentives for citizens and small retailers has rendered the system inefficient. In addition to that, scavenging of precious recyclable waste has worsened the situation with the systems. ECOPACK Bulgaria, one of the "systems", is a non-profit organization associated with the "Green Dot".¹⁹

The major problem in Bulgaria can be found in the organization of the waste management system. The more or less arbitrary operations of individual and collective systems, without proper supervision from the government, have created problems. There is no data on recovery of drinks packages. A few years ago, however, most packaging waste was landfilled.

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¹⁸ http://www.b2bweee.com/files/legislation/bulgariapackaging_en.pdf 19 http://eimpack.ist.utl.pt/docs/1.3%20Todor%20Bourgoudjiev.pdf