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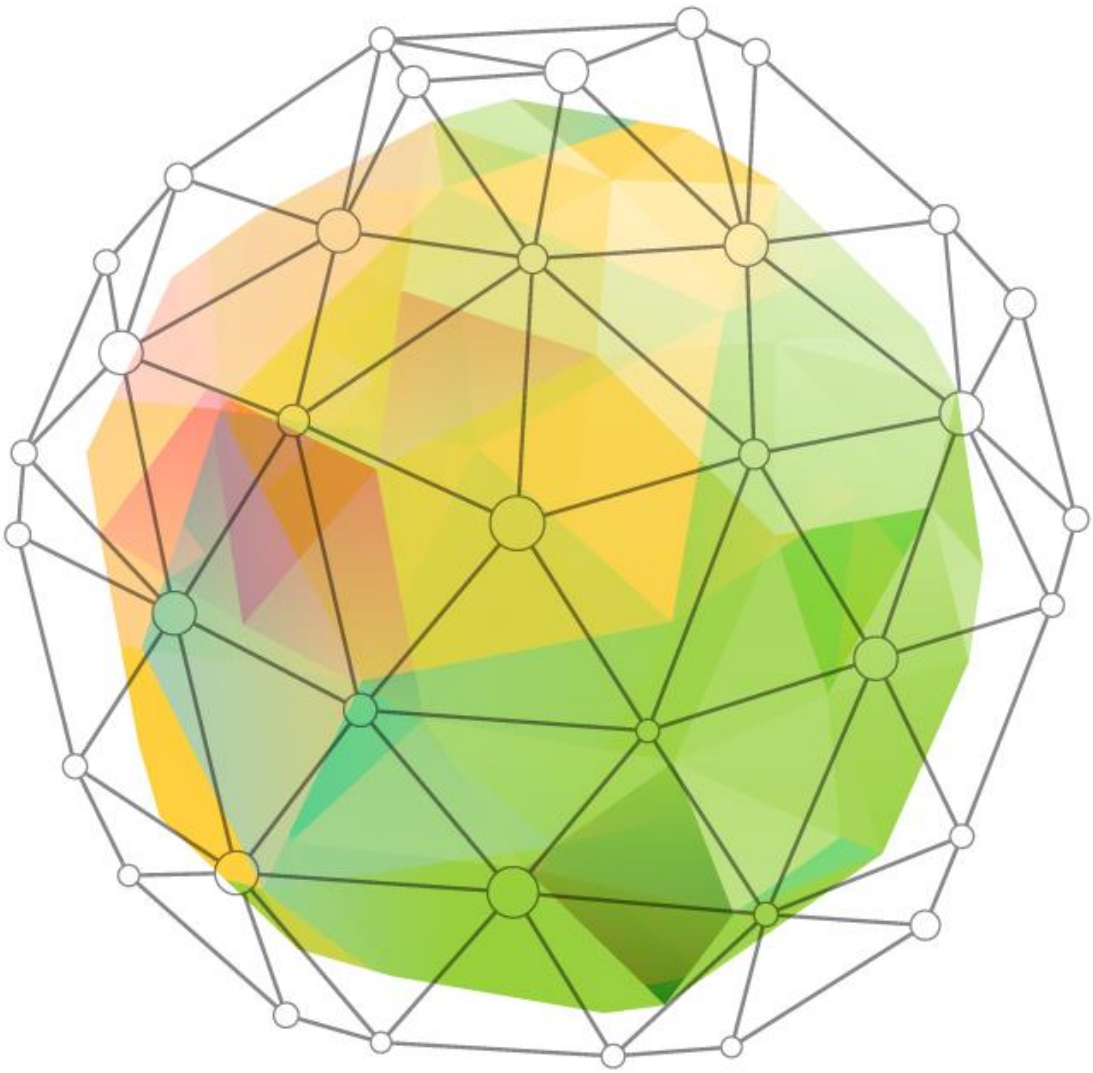


Deposit-Refund System (DRS)

FACTS & MYTHS

April 2019

Introduction

While the European Commission establishes ever stricter requirements on collecting and recycling empty containers, there are discussions underway in many countries regarding the correctness and the form of potential deposit-refund systems.

The situation in packaging waste management is dynamic enough to make us pose questions different than we used to ask one and half years ago. The experience of countries that have implemented the deposit-refund system shows that they can offer a wide range of advantages including an increase in the level of recycled packaging waste, raw material improvement or promote a pro-environmental social awareness. At the same time, this idea raises serious doubts and there are no countries finding it easy to decide whether to introduce it.

The implementation of an effective deposit-refund system is a complex process.
There are lots of questions related to the introduction of the system, regarding its shape, costs, rules of functioning, and the impact on the existing system.

The questions apply to almost any of the system "stakeholders" – from companies introducing packaged products onto the market, through wholesalers/retailers, consumers, to businesses dealing with transport and packaging recycling as well as intermediate system participants – communes and recovery organisations.

Presenting a full shape of an effective deposit-refund system in Poland requires solutions supported by legal, economic, and market analyses. The resulting concept should make a base for further consultations with a wider "bunch of stakeholders" to obtain a final shape that takes into account the interests of all market players.

Considering the complex subject matter of introducing the deposit-refund system (DRS), we would like to refer to a few key related facts and fictions. The brochure continues the presence of Deloitte in the field of packaging waste management, both in Poland and abroad.

Refund or deposit system?

In Poland there are two names to define an additional fee depending on the type of packaging/container, i.e. a packaging deposit fee:

- Polish "kaucja" (a deposit) – for reusable packaging;
- Polish "depozyt" (a deposit) – for single-use packaging.

The English language does not distinguish between the two and both types are referred to as "a deposit"

For consistency reasons both terms (a deposit for reusable and disposable packaging, refund or deposit system) are used interchangeably in our analysis so as not to make an artificial distinction and not to refer to selected packaging types

Subjects discussed

FACTS

01
More and more countries are considering to introduce the deposit-refund system

02
The deposit-refund system will affect the rate of packaging waste recycling

03
The efficiency of deposit-refund system depends on its shape

04
The introduction of the deposit-refund system can result in changing the packaging market structure

05
A well-designed deposit-refund system is country-specific, its introduction takes time and requires an extensive information campaign

06
The deposit-refund system will always entail spending for one of the market players, while tax relief can encourage producers to join the non-mandatory deposit-refund system

MYTHS:

01
The deposit-refund system operates efficiently in most European countries

02
The deposit-refund system will solve the problem of municipal waste collection and management

03
Automatic collection machines should be introduced only in larger cities and supermarkets

04
Introducing the mandatory deposit-refund system will provide equal treatment for all entities providing the market with packaging

05
By using the experience gained by other countries, the deposit-refund system can be introduced literally overnight

06
The deposit-refund system is self-financing

Deposit-refund systems are commonly used

MYTH 1

The myth is that deposit-refund systems operate efficiently in most European countries

FACT 1

The fact is that more and more countries consider introducing the deposit-refund system

A legally regulated deposit-refund system currently operates in 10 European countries covering 26% of Europe's population. Because of strict legal requirements regarding packaging waste recycling, other countries also consider introducing a deposit-refund system.

MYTH 1

The myth is that deposit-refund system operates efficiently in most European countries

So far a legally regulated deposit-refund system operates in 10 European countries: Croatia, Denmark, Estonia, Finland, Germany, the Netherlands, Norway, Sweden, Iceland and Lithuania. It was Sweden that took the first steps to introduce the system in 1982, while the latest participant, Lithuania, implemented the system in 2016. The system is used by 133.1 million people, which corresponds to 26% of Europe's population[1].

Despite the fact that solutions vary from country to country, inter alia, in terms of mandatory nature of the system, types of packaging/containers included or deposit costs, their performance is similar.

The average level of waste collection included in the system in the above-listed countries is approximately 91%[1,2].

10

This is the number of European (EU28 + EFTA) countries that currently operate the deposit-refund system

133.1 mln

Inhabitants are covered by the system – they make up 26% of Europe's population

91%

This is the average rate of empty container return in the implemented deposit-refund systems

- Countries that already operate the deposit-refund system
- Countries that consider introducing the deposit-refund system
- Countries that have decided to introduce the system in the near future

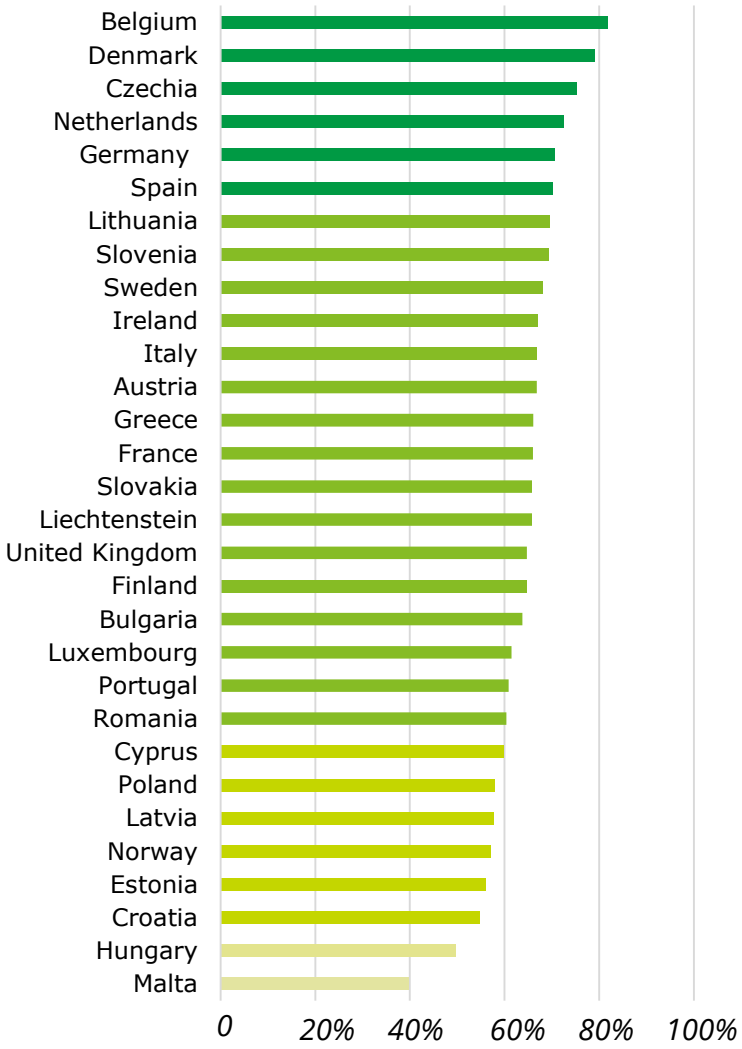
1. CM Consulting, Reloop, Deposit system for one-way beverage containers: global overview, 2016
2. Deloitte, Analiza możliwości wprowadzenia systemu kaucyjnego dla opakowań w Polsce, 2017

Please note that the general levels for the recycling of all empty packaging (including the ones excluded from the deposit-refund system) achieved by individual countries (Chart 1).

Analysing the levels shows, in principle, that the deposit-refund system contributes to raising the general rates for empty container recycling. This trend is most conspicuous in the case of Denmark, the Netherlands and Germany[3]. High performance can result from higher social awareness, adequate legal regulations or the structure of containers supplied onto the market.

At the same time, such countries as Belgium, the Czech Republic or Spain obtain similar results without an officially operating deposit-refund system. In this case, it is important that the countries have in place an excellent mechanism of extended producer responsibility, where manufacturers supplying packaging onto the market, in whole or partially, cover the costs of selectively collected empty packaging / container management, including the costs of administration, reporting and monitoring. In a new Directive on waste, the European Commission assumes reinforcing the extended producer responsibility (EPR) as an effective tool to meet the raw material recycling requirements in many EU countries (for more details on the extended producer responsibility (EPR) system please refer to the part discussing Myth No. 2).

Chart 1 The rate of recycling for empty containers generated on domestic market in 2016[4]



The deposit-refund system can stimulate the increase in general packaging waste recycling rates, but there is a number of other determinants (supporting or restricting) the performance of the empty packaging management system.

3. In Lithuania the deposit-refund system was introduced in 2016. The values presented in the chart can partly result from other actions taken before introducing the deposit-refund system.

4.Eurostat, Recovery and recycling rate for all packaging waste, 2016

FACT 1

The fact is that more and more countries are considering to introduce the deposit-refund system

The year 2018 brought considerable changes in the field of regulations covering waste management and the utilisation of raw materials. In January 2018 a strategy for plastics[5] was published, while on 4 July that year a long-time consulted directive package on circular (close-loop) economy was implemented[6]. Both documents set ambitious targets intended to improve the packaging waste collection and recycling efficiency.

According to the Directive[7] , the packaging waste recycling rate per fraction should be:

Percentage of packaging waste subject to recycling versus total amount of packaging supplied onto the market:

	By 2025	By 2030
Packaging in total	**65%**	**70%**
Plastic	50%	55%
Wood	25%	30%
Steel	70%	80%
Aluminium	50%	60%
Glass	70%	75%
Paper and cardboard	75%	85%

In addition, a proposal for Directive on Single Use Plastic[8], expected to be adopted in 2019 assumes that **the PET bottle collection rate should reach 77% by 2025 and 90% by 2029.**

To meet the strict requirements, especially in the case of PET bottles, an increasing number of countries are considering introducing the deposit-refund system. Talks on this are underway, inter alia, in Austria, Belgium, France, the UK, Romania, Slovakia, Spain and Latvia. Malta and Portugal have already decided to implement the system.

5. European strategy for plastics in a circular economy, COM(2018)
6. EC, Circular economy package
7. EC, Directive No. 2018/852 of 30 May 2018 amending the Directive 94/62/EC on packaging and packaging waste
8. EC, Proposal, Directive on the reduction of the impact of certain plastic products on the environment

Deposit-refund system vs. recycling

MYTH 2

The myth is that deposit-refund system will solve the problem of municipal waste collection and management

FACT 2

The fact is that deposit-refund system will affect the rate of packaging waste recycling

An average collection and recycling rate for packaging waste covered by the deposit-refund system in European countries is about 91%. Referring this result to the situation in Poland, the packaging collected in the system would correspond only to about 6% of the total municipal waste.

MYTH 2

The myth is that deposit-refund system will solve the problem of municipal waste collection and management

Chart 2 presents a detailed division of packaging by fractions and origin (households, industry and trade). This division has already been mentioned in Fact No. 2.

Chart 2. Packaging volume launched in Poland in 2017[9]

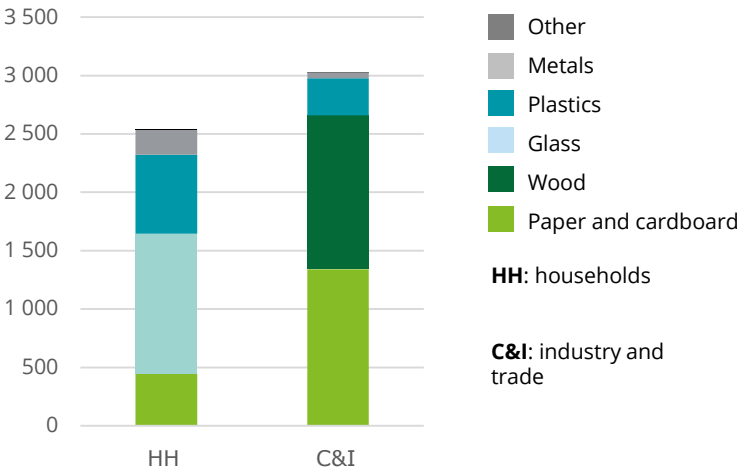
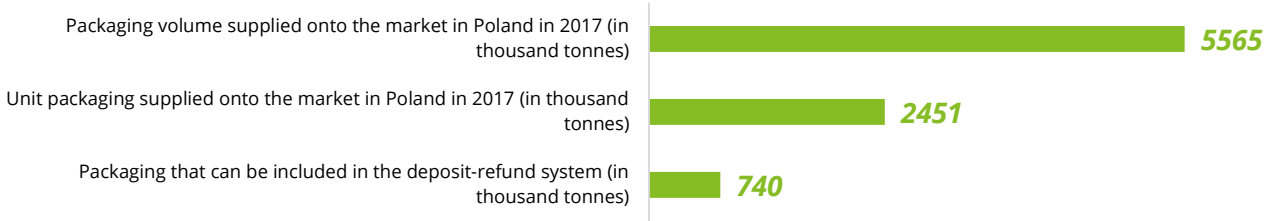


Chart 3. Packaging launched in Poland in 2017 and packaging volume that can be covered by the deposit-refund system



About 55% of the packaging supplied onto the market is handled within the B2B system (industry and trade), 45%, i.e. about 2.5 million tonnes is supplied to households, This number in reference to the total amount of municipal waste makes up only about 20%.

In addition, the deposit-refund system mandatory for PET bottles, glass bottles, aluminium cans and multi-material packaging for liquid food will cover about 30% of packaging supplied to households. When assuming the collection rate of about 91%, this waste corresponds to approximately 6% of the total amount of collected municipal waste.

Consequently, the system will cover only a small fraction of the waste market and is not a comprehensive solution. Furthermore, the system will include relatively easy-to-recycle packaging. The problem of waste management such as multi-material packaging, trays, wrapping, yoghurt cups or films will remain unsolved.

9. Reports from Marshall's Offices, data valid for 2017

A solution that can provide benefits in terms of collection and recycling rate for all packaging waste that should make the basis for those actions is strengthening the extended producer responsibility (EPR) system. The extended producer responsibility (EPR) system is a tool widely used in EU countries that brings measurable benefits.

EPR adopts various operation models. In spite of many different EPR models, they share some common components that boost performance and they should be taken into account when improving the EPR system in Poland. They are also described in section 8A of the directive on waste[10] published as part of the circular economy package. In accordance with assumptions, an effective system should include the following components:

A clear division of responsibilities

The scope of rights and obligations for individual system participants should be selected by the EU and domestic legislators depending on set targets and defined in a way minimising the plurality of interpretations. The suppliers of packaging should have separate obligations regarding packaging waste management coming from HH and C&I, both for fraction and general rates.

Providing an adequate financial contribution

The financial contribution provided by suppliers should cover the total costs of packaging waste management (collection, sorting and preparation for recycling deducted by the income obtained from raw material sales).

Fair competition between waste recovery organisations

To streamline and improve the performance of individual units, strengthen and systematise the cooperation between them, provide adequate responsibility allocation among system participants, and to eliminate system problems, it is suggested to appoint or identify from among existing institutions an entity to play the role of a central body to coordinate and establish proper supervision measures.

Reporting and audits

The basis of a proper assessment system for extended producer responsibility (EPR) should make a precise and reliable reporting system using properly selected indexes that will allow for performing comparable analyses and providing transparent information on meeting the targets.

The extended producer responsibility (EPR) may take various forms, including cooperation with a packaging recovery organisation or concluding agreements with public administration bodies.

10. Directive of the European Parliament and council amending Directive 2008/98/EC on waste

Strengthening the extended producer responsibility (EPR) system does not exclude the deposit-refund system. Quite the contrary – the deposit-refund system can be a perfect complement of the extended producer responsibility (EPR). Currently, there are well developed parallel systems operating in the Netherlands and Germany ranked in the first five of top recycling rate countries. The process of creating an effective packaging management system should cover 3 steps, at which we should ask ourselves the following key questions:

3 steps to create an effective waste packaging management system:

Analysis of existing packaging waste management system

Introduction of the well-performing extended producer responsibility (EPR) system

Introduction of the deposit-refund system (DRS)

Do the tools and measures used meet the actual needs?

Are they sufficient to achieve current and future recycling targets?

Does the existing system help improve the current situation in packaging waste management?

FACT 2

The fact is that deposit-refund system will affect the rate of packaging waste recycling

The term of packaging, being understandable to all of us, is actually very complex. The term packaging covers all products made of any material, designed to store, protect, carry, deliver and display any products, from raw materials to highly processed products, from a manufacturer to a user or a consumer[11].

The packaging system consists of three levels:

The first level includes **unit packaging** that makes a direct product packaging, e.g. bottles, plastic containers or wraps.

The second level includes **collective packaging** comprising multiple unit packaging used to considerably facilitate its transport, e.g. cartons, bottle shrink-wrap multi-packs and boxes.

The third and last level includes **transport packaging** used to provide large-scale transport and storage, e.g. pallets and wrapping film.

Households usually use unit packaging and a small fraction of collective packaging. The unit packaging makes up about 45% of all packaging supplied onto the market. The remaining two groups are used in industry and trade and represent 55%[12].

The deposit-refund system for packaging would cover only the unit packaging. However, it should be noted that it would not comprise all unit packaging. **The packaging usually covered by the deposit-refund system includes PET bottles, glass bottles (beer, juice, soft drinks and strong alcoholic beverages) as well as aluminium or steel drink cans.** Some countries have also decided to include multi-material drink packaging (selected U.S. states and provinces in Canada).

The weight of all the above-mentioned packaging in Poland is about 740 thousand tonnes, which corresponds to **13% all packaging supplied onto the market**[13]. The collection rate of such packaging would be at a high level – in countries where deposit-refund systems operate, their collection rate is about 91%. The results could result in improving general recycling rates, however the growth would depend on fraction type.

	PACKAGING INCLUDED IN THE SYSTEM[14]			
COUNTRY	Plastics (mainly PET, in Norway also HDPE bottles)	Metals (mainly aluminium cans, in Croatia, Sweden and Norway – also tinplate; steel packaging in Estonia)	Glass (depends on the country, i.a. beer, wine, soft drink, juice)	Average system efficiency
CROATIA	●	●	●	90%
DENMARK	●	●	●	89%
ESTONIA	●	●	●	82%
FINLAND	●	●	●	93%
GERMANY	●	●	●	97%
ICELAND	●	●	●	89%
LITHUANIA	●	●	●	90%
NETHERLANDS	●		●	95%
NORWAY	●	●		96%
SWEDEN	●	●		88%

11. Art. 3 par. 1 of Directive on waste
12. In-house Deloitte paper based on Rekopol data, the "PakFlow 2017" report, Valpak and other data from Marshal's Office on the quantity of packaging supplied onto the market in 2017
13. Deloitte in-house calculations based on: Deloitte, Analiza możliwości wprowadzenia systemu kaucyjnego dla opakowań w Polsce, 2017 and consultation with i.a. representatives of: Organizacja Odzysku Opakowań Rekopol SA (Packaging Recovery Organisation Rekopol SA) and Recal Foundation
14. CM Consulting, Reloop, Deposit system for one-way beverage containers: global overview, 2016; Deloitte, Analysis of the opportunity to introduce a deposit-refund system for packaging in Poland, 2017

Why are the milk containers excluded from deposit-refund systems?

None of the European deposit-refund systems covers milk containers – however, in many countries, these containers are partly aligned with the types of materials collected as part of the system, including PET or glass bottles.

The main reason for excluding milk are sanitary issues. The additional grounds for keeping milk containers outside the system include:

1) Milk is considered to be basic food in many countries, therefore increasing milk prices by imposing a deposit fee violates ethical principles (including the second goal of sustainable development – Goal 2: End hunger and provide food security and better nutrition as well as promote sustainable agriculture).
2) Milk usually is not a drink intended for consumption outdoors or "on the way", therefore empty milk containers do not present a problem in terms of littering public places.
3) Majority of milk in global scale is launched in pouches[15], and only a small part of the product is sold in glass and PET bottles. Imposing an obligation only on selected producers would mean unequal treatment of a specific consumer group, and consequently, could result in changing the packaging structure.

Similar arguments apply to **thick fruit and vegetable juices.**

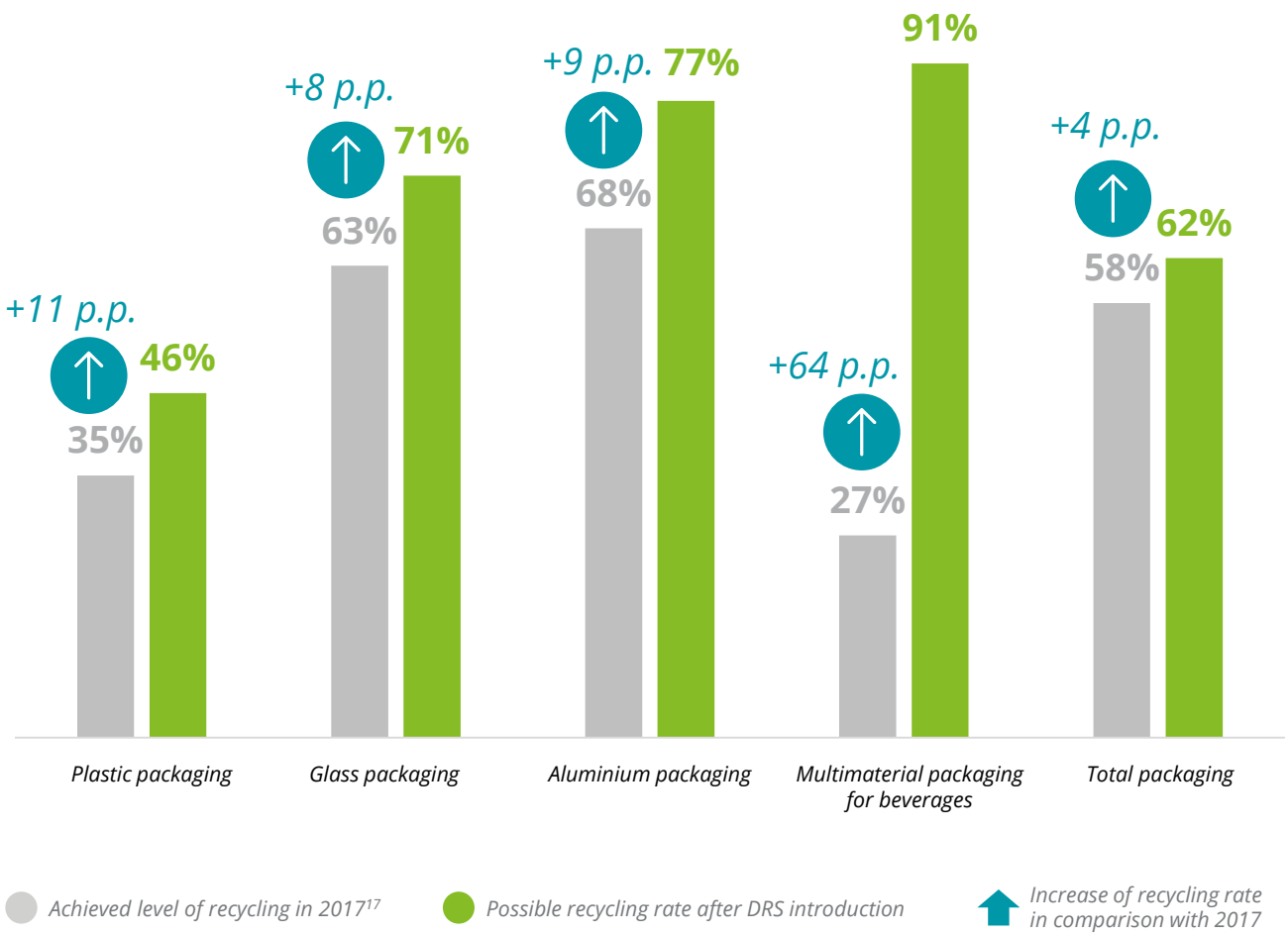
In spite of the above-mentioned difficulties, in Iceland work is ongoing to include both milk and juice containers in the system. This solution can be a key step to collecting 90% of PET bottles by 2029.

15. Milk Packaging Market by Packaging Type and Material - Global Opportunity Analysis and Industry Forecast, 2017-2023

Simulation of packaging waste recycling rate after introducing the deposit-refund system

We have carried out a simulation of the opportunity to increase the packaging waste recycling rate in Poland after introducing the deposit-refund system for PET bottles, glass bottles, aluminium cans and multi-material packaging for liquid food. The results of the analysis show that **introducing the system could allow us to collect additional 272 thousand tonnes of packaging, which would contribute to increasing the general recycling rate up to 62% (from current 58%[16]).** The level of this increase would depend on currently achieved rates for individual fractions.

The highest growth, as much as by 63% would be for multi-material packaging (the current rate is 27%), the lowest – 8-percent for glass packaging.



16. Statistics Poland, Environmental Protection 2017
17. Statistics Poland, Environmental Protection 2017, interviews with industry representatives

Arrangement of the deposit-refund system

MYTH 3

The myth is that automatic collection machines should be introduced only in larger cities and supermarkets

FACT 3

The fact is that the efficiency of the deposit-refund system depends on its shape

The arrangement, cost and functionality of the system are directly interconnected and affect its performance. An effective, functional and convenient deposit-refund system may entail high investment outlays.

MYTH 3

The myth is that automatic collection machines should be introduced only in larger cities and supermarkets

In the ongoing discussions on the deposit-refund system, there are arguments brought up that the collection of empty packaging/containers is not necessary in the whole country and it can be provided only in large cities. There are also arguments saying that large retail establishments can be provided with automatic collection machines, while remaining ones can implement a manual collection. Both issues apply to equal treatment of all market players. In a communication on juice packaging, the deposit-refund system and the free movement of goods[18], the European Commission has shown particular features a specific deposit-refund system should be provided with. One of the features is non-discrimination property of the system – i.e. free access to system on equal terms for all entities operating in a specific industry without favouring any groups. Let's analyse the potential solutions.

Automatic collection provided in large retail establishments, the opportunity to choose a type of collection by small shops

In this case, the key determinate is who finances the purchase of the authomatic collection machines.

If producers were responsible to purchase the automatic collection machines, small shop operators would have to find space to install the machine. It is possible that all small shops will decide to use the automatic collection so as not to engage shop employees (or to reduce the time spent by them to handle the collection process). This in turn will result in increasing the investment costs of the whole system.

However, if this is trade that will be responsible for buying the automatic collection machines, the majority of small shops, due to high costs, will not be able to afford it. Considering the matter or the so-called convenience of individual collection methods for customers (see Fact 3) installing the automatic collection machines only in large shops can make that they will be preferred by customers – both in terms of returning waste and shopping. This in turn can result in reducing the profits of smaller players, and consequently, exclude some entities from the market.

Packaging collection is available only in large cities

Restricting the packaging collection area in the deposit-refund system to large cities will make logistics much more difficult to organise.

Packaging distributed within the cities will have to be differently labelled. It will be also necessary to differentiate the prices of products depending on the place of sale. Such an approach can induce a social objection or changes in places of shopping chosen by consumers – the ones wanting to avoid higher fees will choose shopping places outside the city while the consumers with a pro-environmental approach will move to cities. This approach contests the aspect of non-discrimination both in the case of retailers and consumers.

18. EC, Communication – Juice packaging, deposit-refund systems and free movement of goods (2009/C 107/01)

FACT 3

The fact is that the efficiency of the deposit-refund system depends on its shape

One of the most important factors affecting the level of costs of introducing and running the deposit-refund system, at the same time its functionality and convenience for consumers, is whether it is automatic or manual.

The difference between manual collection (diagram 1) and automatic collection (diagram 2) first of all refers to the number of steps needed to collect and sort empty packaging. The steps include:

- checking whether a given packaging type is covered by the deposit-refund system;
- counting the pieces of packaging;
- issuing a receipt after accepting packaging and refunding the deposit;
- further packaging handling, i.e. transfer and sorting according to pre-defined rules.

In the manual system, the steps are carried out by a shop employee, as a result, the process takes more time as compared to the same process performed by a machine. Modern automatic collection machines can accept even 60 pieces of packaging per minute. In addition, process automation eliminates the need to re-check, re-count, and sort packaging/containers. It means that packaging waste can be shipped directly to a recycler.

Another key aspect is settling the payments. In the automatic system, the operator is informed on a regular basis about the number of accepted pieces of packaging, paid amounts, etc.
This, in turn, significantly facilitates and accelerates the process of accounting between the shop and the operator.

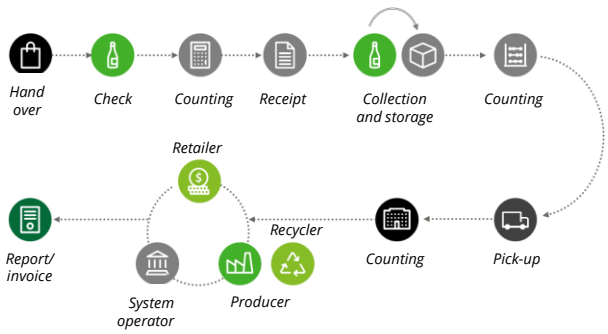


Diagram 1

Manual collection in the deposit-refund system

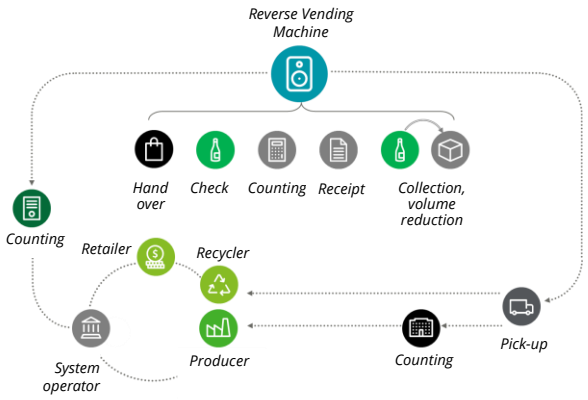


Diagram 2

Automatic collection in the deposit-refund system

Source: Deloitte, Analiza możliwości wprowadzenia systemu kaucyjnego dla opakowań w Polsce, 2017

Unfortunately, system automation that considers the aspect of equal treatment of all waste collecting entities (see Myth No. 3) is a very costly option. The cost of one automatic collection machine, depending on its size and function, ranges from PLN 65,000 to PLN 184,000[19]. The number of shops in Poland, assuming that all of them are covered by the mandatory collection system, amounts to nearly 120,000 points[20]. On the assumption that one automatic collection machine is installed in one shop, the total gives billions of PLN (option 1).

However, installing automatic collection machines in small shops is unjustified. Despite installing one automatic collection machine in supermarkets and discount shops with a surface areas exceeding 200 sq metres and hypermarkets, the amount necessary to pay the purchase or leasing costs would be in excess of PLN 1 billion.

At the same time, it is worth noting that renting the machines will not reduce the cost, but will spread it out over a longer period of time and will force to take into account the additional capital/financing costs.

The investment costs related to introducing the deposit-refund system will have considerable impact on the functionality and convenience of individual participants. This in turn will be a decisive factor affecting its efficiency.

Type of shop	***Number of shops***	***Type of RVM***	***Cost of RVM***	*Number of RVM (Options 1)*	*Number of RVM (Options 2)*
Small shops (>50 sq metres) and convenience shops (>200 sq metres)	109 552	Small	75 000	1	0
Supermarkets (>550 sq metres) i discount shops (>650 sq metres)	7 926	Average	141 000	1	1
Hypermarkets (>5 500m^2)	465	Large	184 000	1	1
Cost of RVM				**PLN 9,41 billion**	**PLN 1,21 billion**

19. TOMRA; costs of RVM have been specified as: small automatic collection machine: EUR 15–20 thousand; medium machine: EUR 30–36 thousand; large machine: EUR 40–46 thousand; data valid for 2019; the values have been used to calculate the average and converted to the Polish currency (PLN). PRICES PROVIDED ARE APPROXIMATED AND SHALL NOT CONSTITUTE A COMMERCIAL OFFER OF TOMRA SYSTEMS GmbH

20. Based on PMR (2015), Grocery retail market in Poland 2014

Deposit-refund system and the packaging market structure

MYTH 4

The myth is that introducing the mandatory deposit-refund system will provide equal treatment for all entities providing the market with packaging

FACT 4

The fact is that introduction of the deposit-refund system can result in changing the packaging market structure

The deposit-refund system should guarantee an equal treatment for all its participants, including trade entities and the ones launching products in packaging. Otherwise, it may lead to negative changes, e.g. in packaging structure.

MYTH 4

The myth is that introducing the mandatory deposit-refund system will provide equal treatment for all entities providing the market with packaging

Key decisions to be made for the deposit-refund system to be introduced are the issues of compulsory nature and the types of packaging included in the system.

A voluntary deposit-refund system, where entities operating on a free market decide at their own discretion whether to participate in the system and collect the deposit fee for packaging supplied onto the market operates e.g. in Finland. This system option keeps it open and non-discriminative as reflected by offering the opportunity to access the system on equal conditions for all entities operating in a specific industry. However, it should be noted that even if the system were voluntary, certain product groups, e.g. milk, for sanitary reasons, could not be included in the system (see Fact No. 2).

Therefore, also selecting individual packaging to be included in the system may lead to discrimination of certain producer groups. Including a product in the system can discourage customers from buying it because of its higher price and necessity to return the packaging or, conversely, they will choose products with a deposit to protect the environment.

In the case of Poland, it is also important to consider the situation of entities currently operating within the existing non-mandatory deposit-refund systems. The system currently operating in brewing industry is an excellent example of a voluntary deposit-refund system.
Per 36 million litres of beer supplied annually onto the market about 50% comes in returnable glass bottles. Non-returnable bottles make up about 6% of the volume. The remaining volume is supplied in aluminium cans and reusable kegs. The system is very efficient and its recycling rate ranges from 91% to 94%, which means that only 6–9 bottles out of 100 put on the market do not return to the system. If there is a decision to introduce a mandatory deposit-refund system, we will have to ask ourselves a question what effects it will bring for brewing industry[21].

NON-DISCRIMINATION SYSTEM SHOULD BE CONSIDERED BY TAKING INTO ACCOUNT A FEW ASPECTS:

Entities obliged to take part in it.

Packaging included in the system

Amount of deposit fees for individual packaging types

Entities currently operating within the non-mandatory deposit-refund system

Entities currently achieving high waste recycling rates

21. Based on data sourced from breweries: Kompania Piwowarska, Grupa Żywiec, 2017

FACT 4

The fact is that introduction of the deposit-refund system can result in the changing of the packaging market structure

The inclusion of selected packaging in the deposit-refund system will result in increasing product prices supplied in this packaging as well as increase in the level of waste handling process complexity for the consumer.

This in turn can result in increasing the demand for products supplied in packaging not included in the system.

A change in packaging market structure has been noticed in Germany. The main reason for this was including both single-use and reusable packaging in the system by simultaneously imposing the obligation on shops to collect only the single-use containers. Reusable packaging is collected on a voluntary basis, so it is more difficult to return it than in the case of single-use packaging. In addition, the value of deposit fee for individual packaging varies, which encourages customers to buy drinks in containers with the lowest deposit fee possible.

The tendency of packaging market in years 2000–2015 is shown in the chart on the next page.

A serious challenge is to establish an adequate deposit fee for packaging. The following aspects should be taken into account:

The value of deposit must be high enough to encourage consumers to return empty packaging.

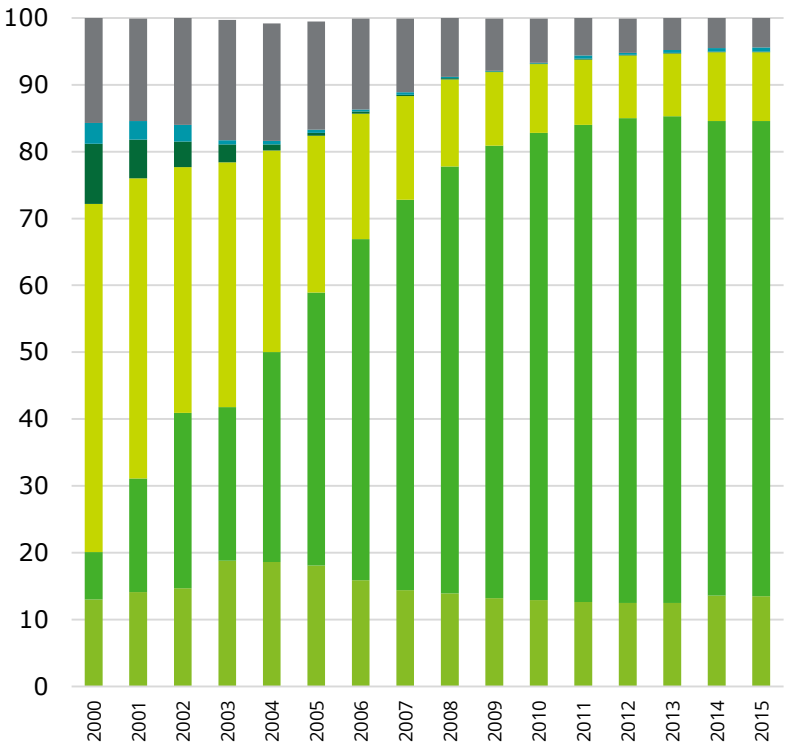
The higher the deposit fee, the higher return rate.

However, the deposit value that exceeds the packaging production cost can encourage committing malpractices.

The proportion of deposit fee value to product price should be considered in two dimensions: high deposit value as compared to the low product value can discourage from its purchase or, conversely, too low deposit fee as compared to the high product price can discourage from returning the packaging.

The deposit fee value should be established at the level not to be perceived as artificial increase in product price, as it can result in more serious economic consequences.

Chart 4 Change in packaging market structure in Germany in 2000-2015[22]



The example of Germany *perfectly shows the aspect of consumer convenience on the potential change in packaging structure.*
In just 3 years since the introduction of the system (2003) a single-use glass bottle has almost completely vanished from the market. A considerable drop has also been noticed for aluminium cans and the reusable glass bottle. At the same time the share of single-use PET bottles has increased by almost 50 percentage points.

22. https://www.statista.com/statistics/560209/non-alcoholic-beverages-packaging-structure-by-type-germany/

What do we need to introduce the deposit-refund system?

MYTH 5

The myth is that by using the experience gained by other countries, the deposit-refund system can be introduced literally overnight

FACT 5

The fact is that a well-designed deposit-refund system is country-specific, its introduction takes time and requires an extensive information campaign

Because of its complexity, proposing a full shape of an effective deposit-refund system is an intricate and long-term process. Creating adequate consumer' attitudes will accelerate the implementation and stimulate the increase in system efficiency.

MYTH 5

The myth is that deposit-refund system can be introduced overnight

In spite of many EU documents on packaging and waste, no document presents strict guidelines for the recommended shape of the deposit-refund system. The analysis of systems operating in European countries show that there is no single solution ready for implementation in Polish conditions. The existing EU regulation documents are different from one another in many aspects – including its mandatory nature, packaging types included or supervisory bodies.

What is more, deposit-refund systems are highly complicated. Before introducing such a solution it is necessary to perform preparations, including:

- ***consumers*** – notify them about the change made, the deposit fee to be paid and the ways of getting refund;
- ***producers*** – inform them how to label packaging, plan additional costs of participating in the system;
- ***retailers*** – inform them about the rules of system operation, how to re-arrange sales spaces, adjust financing systems and employee trainings;
- ***local authorities (communes)*** – inform about the aspects of raw material ownership and settling the collection and recycling rates.

Preparing a basis to implement the system in Poland we should take into account internal requirements for packaging and packaging waste management, municipal waste management as well as trade and environmental protection. Experience gained by other countries can provide important tips for the process of shaping and implementing the system, but they will not give a simple answer. The period of introducing the system must allow for specially adjusted transition periods, which can considerably extend the implementation, thereby delaying the assumed benefits.

FACT 5

The fact is that a well-designed deposit-refund system is country-specific, its introduction takes time and requires an extensive information campaign

There is no doubt that the introduction of the deposit-refund system supported by an extended information-educational campaign may have a positive impact on promoting pro-environmental awareness. The deposit-refund system shows directly consumers the value of raw material and encourages them to pay attention how important is to further handle the packaging after emptying it. It will make it possible to promote pro-environmental behaviours in the society.

However, there is a fear that it can cover only the part of waste to be included in the system. Therefore, before implementing the potential deposit-refund system it is necessary to take extended educational actions on selective waste collection, especially the one that can be difficult to sort properly.

Financing the system

MYTH 6

The myth is that deposit-refund system is self-financing

FACT 6

The fact is that the deposit-refund system will always entail spending for one of the market players, while tax relief can encourage producers to join the non-mandatory deposit-refund system

Higher costs for industry can result in higher food and beverage prices. However, this is an unavoidable cost as producers have to bear responsibility for packaging launched.

MYTH 6

The myth is that the deposit-refund system is self-financing

The costs of the deposit-refund system comprise two main cost groups:

Investment costs, including the cost of buying collection machines, the cost of personnel training, the cost of buying machines or adjusting a process line for labelling the packaging;

Operating costs, including:

- the maintenance cost of automatic collection machines,
- the cost of packaging labelling,
- the cost of transport and counting collected pieces of packaging,
- the cost of system maintenance (administration).

Each of the above groups comprises a number of components. These amounts are assigned to individual system participants – e.g. entities supplying the packaging onto the market or retailers obliged to cover the costs (usually indirectly, but as part of some general fee, e.g. service, transport or recycling fee). These burdens affect the general production and sales costs for individual products, which is reflected in the amount of the deposit fee imposed on the product. Therefore, indirectly, some part of deposit-refund system functioning costs will be paid by customers.

While the income from selling materials is an additional source for financing the system, the non-refunded deposit fees are receipt paid by the customer earlier. The introduction and operating the deposit-refund system will also be a cost for one of the market participants.

ANALYSIS OF COSTS AND BENEFITS

However, the functions and environmental resources are not provided with market prices, but they are actually economic goods and services and their usage usually requires some market transactions.

Hence, it should be noted that the introduction of the deposit-refund system can reduce the economic, environmental and social costs (thereby financial costs) resulting from environmental pollution by waste. e.g. the costs relating to:

loss or damage to biological diversity,

loss of landscape aesthetics,

loss of facilities and attractiveness of tourism destinations,

damage to cultural human assets,

loss of people's health.

Only the analysis of costs and benefits for the deposit-refund system could make a relevant argument for or against in the discussion over its cost-based profitability.

Comparing the costs and receipts between individual countries is unjustified as the volume of packaging supplied, population, economy, beverage market, sales network or municipal waste management structure vary a lot, which can considerably affect the amount of costs for system introduction and operation. For example, in Denmark and Finland, countries with similar population and the volume of packaging included in the system, the turnover values vary more than 60% (approximately by EUR 110 milion[23]).

23. ACR+, Deposit refund system in Europe, 2019

FACT 6

The fact is that the deposit-refund system will always entail spending for one of the market players, while tax relief can encourage producers to join the non-mandatory deposit-refund system

History of the deposit-refund system in Finland dates back to 1950 when it operated as a non-mandatory return system for reusable packaging. Further solutions and system improvements were introduced in the 1990s, however the system is still based on the principle of voluntary participation.

In 1994 to encourage producers to participate in the deposit-refund system a packaging tax was introduced amounting to 0.67 EUR/litre to be paid for any soft drinks and alcoholic beverages supplied onto the market. By 2005 the producers supplying drinks in reusable packaging were exempted from tax, while in the case of single-use packaging the entities were entitled to tax rate reductions even down to 87.5% (by 2005: 0.17 EUR/litre; in 2005–2008: 0.085 EUR/litre). This distinction resulted in changes in packaging market structure, therefore since 2008 also the reusable packaging has been exempted from the tax, if its suppliers/producers have taken part in the deposit-refund system.

The fee modulations brought desired effects.

Currently a considerable number of producers participates in the voluntary deposit-refund system. The amount of tax for companies that have not decided to join the system is **0.51 EUR/litre**[24]. These companies include mainly producers supplying the market with low volume products, and this tax solution is more cost-friendly for them.

The tax tool, but for plastic packaging recycling levels, operates also in Norway, while the UK has decided to modulate tax depending on the level of material utilisation coming from recycling used to produce new packaging.

Tax reliefs can make an effective tool to encourage or to some extent, to force market entities to take some actions. This solution can be especially interesting for countries with well performing non-mandatory deposit-refund systems providing non-discrimination for its participants. At the same time, tax and the voluntary system would solve the problem of goods imported in packaging suppliers of which would not be obliged to label.

24. Based on interviews with PALPA, conducted in March 2019

CONCLUSIONS

The concept of a deposit-refund system raises lots of doubts, and it has supporters and opponents. The above discussed facts and myths have led us to the following conclusions:

A legally regulated deposit-refund system currently operates in 10 European countries covering 26% of Europe's population. Because of strict legal requirements for packaging waste recycling other countries also consider introducing a deposit-refund system. The proposal regarding mandatory goal of collecting 90 percent of launched plastic bottles makes the deposit-refund system most probably the only solution to meet this requirement.

The deposit-refund system should provide equal treatment for all its participants, including trade entities and the ones launching products in packaging. Otherwise, it may lead to negative changes, e.g. in packaging structure. When designing the system, it is necessary to analyse the aspect of its non-discrimination in several respects to eliminate the problem of its negative influence on any entity present on the market.

An average collection and recycling rate for packaging waste covered by the deposit-refund system in European countries is about 91%. Referring this result to the situation in Poland, the packaging collected in the system would correspond to only about 6% of the total municipal waste. Consequently, the system will cover only a small fraction of municipal waste market. Therefore, it is the extended producer responsibility (EPR) system covering all packaging volume that should make the base for actions to increase the packaging waste recycling rate. In addition, it will be an excellent complement to the deposit-refund system.

Because of its complexity, proposing a full shape of an effective deposit-refund system is an intricate and long-term process. Creating adequate consumer attitudes will accelerate the implementation and stimulate the increase in system efficiency. Although the deposit-refund system is a long-known tool, so far no country has developed a perfect solution to be repeated by other countries. The structure of economies, beverage market, sales network or waste management system is so country-specific that creating an effective system should be individually adjusted by each country taking the challenge. However, what is certain is that prior to the introduction of the deposit-refund system it is necessary to organise an extensive information-educational campaign regarding the selective waste collection, especially regarding the type of waste that is difficult to sort in households.

The arrangement, cost and functionality of the system are directly interconnected and affect its performance. An effective, functional and convenient deposit-refund system may entail high investment outlays. The system automation that can increase the operation speed, reduce possible queues, raise system throughout and finally improve consumers' satisfaction and the equality of its participating entities is an extremely capital-consuming process.

Higher costs for industry can result in higher food and beverage prices. However, this is an unavoidable cost as producers have to bear responsibility for packaging launched. Every tool encouraging and enforcing some actions, including the strengthening of the extended producer responsibility (EPR) system, introducing the deposit-refund system or imposing a tax for the entities launching packaging will be a cost one of the market players will be obliged to bear.

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