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Sorting out Waste Sorting

Analysis of the operation of separate waste collection and extended producer responsibility for packaging and non-packaging products

March 2020

Economic analysis **8**

Authors

Ján Dráb jan.drab@enviro.gov.sk
Marek Engeľ marek.engel@enviro.gov.sk
Tomáš Krištofóry tomas.kristofory@enviro.gov.sk

Reviewers

Eva Barteková (OECD)
Jozef Kubala (Institute for Financial Policy)
Ivana Maleš (Institute for Circular Economy)

Acknowledgements

We would like to thank the following people who helped prepare this study:
Miloš Ballay (Nitrianske komunálne služby - Nitra Municipal Services), Michal Bakyta (Ponitrianske združenie obcí - Nitra Association of Municipalities), Marianna Bodáczová (IEP), Elena Bodíková (SLOVMAS), Roeland Bracke (OVAM), Zuzana Čachová (the Town of Trenčín), Kristína Čechová (the Town of Modra), Vladimír Černák (SAO), Ľubomír Ďuračka (Ministry of Environment of the Slovak Republic), Jarmila Ďurďovičová (SEI), Martin Gális (IEP), Lukáš Grolmus (EKO-KOM), Denisa Hadrbolcová (Environmental Fund), Martin Haluš (IEP), Paul Christaens (Afvalfonds Verpakkingen), Miroslav Jurkovič (ASEKOL), Ján Kmecík (Združenie obcí (Association of Municipalities) Rajecká dolina), Peter Krasnec (AVE SK), Katarína Kretter (ENVIPAK), Amanda Fuso Nerini (CONAI), Andreas Pertl (Verpackungskoordinierungsstelle), Eva Rosenberger (Bundesministerium für Landwirtschaft, Regionen und Tourismus), Michal Sebíň (NATUR-PACK), Stella Slučiaková (IEP), Roman Šterbák (Slovak Association for Branded Products), Michal Štúber (the Town of Banská Bystrica), Milan Toth (Technické služby mesta Prešov - Technical Services of the Town of Prešov), Ladislav Trylč (Ministry of Environment of the Czech Republic).

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List of abbreviations

ARA	Austrian PRO, Altstoff Recycling Austria AG
CC	Coordination Centre
CITEO	French PRO
CEI	Czech Environmental Inspectorate
DRS	deposit-refund system
EPR	extended producer responsibility
HDPE	high-density polyethylene
IVC	Belgian interregional commission, Interregionale Verpakkingscommissie
LDPE	low-density polyethylene
LUCID	a registration system of producers in Germany, within which the central authority collects and checks data from producers
MCM	multilayer combined materials
OECD	Organisation for Economic Co-operation and Development
PE	polyethylene
PET	polyethylene terephthalate
PMD	bags or containers for plastic, metal and drink cartons
PP	polypropylene
PRO	producer responsibility organisation
PS	polystyrene
PVC	polyvinyl chloride
SAO	Supreme Audit Office of the Slovak Republic
SEI	Slovak Environmental Inspectorate
Triman	compulsory uniform marking of recyclable materials in France
VKS	Austrian packaging coordination centre, Verpackungskoordinierungsstelle GmbH
WMC	waste management company

Executive Summary

Recyclability of each product is depends on its material composition, which can be affected by the consumers only to a limited extent. **The producer determines the technical and material requirements, thus affecting what will happen with the product at the end of its life cycle**. This is the basis of the extended producer responsibility concept (EPR), which started to be put into practice at the end of the 1980s. EPR shifts costs after the end of the life cycle of the product to the producer and today, this applies to electrical equipment, batteries and accumulators, vehicles, tyres and packaging.

Producers of packaging and non-packaging products are responsible for the operation and funding of separate collection. According to the data of the Statistical Office of the Slovak Republic and available analyses, packaging and non-packaging products (which, similarly to packaging, become waste immediately after having been consumed) represent almost one third of municipal waste. Their separate collection enables a higher rate of recycling because cleaner material is collected, as well as more efficient identification of costs on the part of producers of these products.

However, separate collection is provided in the environment of contradictory interests of three main entities. Municipalities want for their citizens as comfortable conditions for sorting as possible. Producers represented by producer responsibility organisations (PRO) are to fully finance separate collection and are objectively interested in as low costs as possible. Waste management companies provide these services and create a profit from it.

In the current form, the EPR system for packaging and non-packaging products has been operated since 2016, and despite frequent legal changes it shows system deficiencies leading to a considerable rate of instability. Therefore, our study focuses on this segment of EPR, and the phrase “extended producer responsibility” shall mean EPR for packaging and non-packaging products. The introduction of the deposit-refund system in 2022 will lead to a significant intervention into separate collection, which will mean a good opportunity for an extensive reform of its operation.

The following is necessary to ensure that fees for producers are fair and lead to waste prevention:

- **To penalise materials more difficult to recycle by levying higher fees.** The fees paid by producers for the above packaging and non-packaging products do not differ essentially depending on material and do not correspond to costs of processing. Thus, today, more environmentally friendly materials are subsidising more harmful ones. It could be solved by differentiating the rates so that they would reflect the costs of life-cycle ending and penalise non-recyclable materials.
- **To strictly request responsibility for the waste produced.** PROs should provide for separate collection of everything falling under EPR. They are already obliged to do so today by operation of law, however, several PROs, local governments and waste management companies encourage people to throw the part of products which cannot be recycled into municipal waste. Municipal waste is financed by citizens through fees for waste, thus, the producers evade responsibility and costs for the most expensive materials.
- **To extend producer responsibility so as to include costs of litter removal**. Despite long-term efforts, littering is still an important environmental problem. As a considerable part of it is represented by packaging and non-packaging products such as cigarette butts, the European Commission has introduced the sharing of litter removal costs by producers. Therefore, Slovakia should ascertain the scope, structure and costs of littering and subsequently fully integrate it in the EPR system.

The following is necessary to ensure sufficient conditions for sorting with the lowest possible costs:

- **To associate local governments into larger units.** Today, most municipalities, including the smallest ones, provide for waste management individually. Thus, the weak negotiating position vis-à-vis PROs and waste management companies leads to the inadequate quality of services. Joint procurement of services is naturally more cost-effective, which is proved by the regional operation of waste management companies and by positive examples of cooperation of local governments abroad and in Slovakia.
- **To ensure system stability and predictability of contractual relationships.** Today, PROs achieve balance between the contracted municipalities and producers by municipality fluctuation, and in 2019 alone, 400 municipalities changed their PRO. The system as adjusted today cannot ensure the stability of separate collection for municipalities. It can be resolved by applying the Austrian model of cost sharing by PROs, where regions are allocated to individual PROs by drawing lots and costs are reported to the coordination centre, which balances them among PROs based on the current shares of contracted producers. Contracts among local governments, waste management companies and PROs should be concluded for a longer period and the conditions of termination must be unambiguous. A minimum market share specified by law will prevent speculative establishment of PROs which have a problem financing separate collection.
- **To procure separate collection services for municipalities in tenders.** Competition among waste management companies is a key aspect for cost-effective separate collection because over 85% of system costs are normally at their level. The method of selecting them nowadays is often neither effective nor transparent. Therefore, in foreign countries, waste management companies are selected through tenders which precisely define the description of individual partial acts, division of costs, mechanisms to check their justness, and in an ideal case require compulsory electronic record-keeping of waste collection.
- **To ensure a compulsory minimum standard of service and adequate sorting infrastructure**. Today, collection of sorted waste is not fully provided for the entire territory of Slovakia, and municipalities partially substitute the task of waste management companies and PROs. This is also caused by the absence of a minimum standard of service, of which Slovakia was also advised by the European Commission. Therefore, Slovakia should define it and obligatorily request collection of sorted waste at a distance of maximum 150 metres from the place of residence of waste producers. At the same time, it is necessary to provide inhabitants with adequate infrastructure for sorting, which is insufficient in some areas. This concerns in particular neighbourhoods, suburban satellites, isolated settlements in mountain regions and also dying villages. The condition may be improved by further specification of the existing regulations, such as the standard of collection or collection objectives. Today, two-thirds of municipalities subsidise waste management, which considerably reduces the motivation of inhabitants to sort waste; moreover, it is in conflict with the valid legal regulation. Therefore, municipalities together with PROs should be responsible for the fulfilment of collection objectives.

A fair system adequately punishing any evasion of rules will require the following:

- **To perform an external audit of producers**. The EPR system is susceptible to evasion of fulfilment of duties or underestimation of provided quantities. PROs are obliged to check the contracted producers; but as producers represent the source of their income, they are in a conflict of interests and the effectiveness of such an audit is disputable. Therefore, in several countries the audit of producers is carried out by independent third-party external entities. The avoidance of duties can also be limited by becoming familiarised with duties and requesting involvement in EPR within the business licence applying procedure.

- **To improve control mechanism and collection of data**. Insufficient capacities of the Slovak Environmental Inspectorate hinder control performance. Therefore, control is not detailed and the purpose of use of PRO's resources is not checked. Better data collection can partially automate controls and reduce the administrative load of PROs.
- **To apply clear and motivating penalties**. Although the Act on Wastes provides room for imposing high penalties, in practice, big margins lead to penalties close to the lower limit. PROs' misdemeanours have been solved almost always in authorisation cancellation proceedings, resulting either in the withdrawal of authorisation or in corrective measures without any penalty. Audit authorities should use penalties to a greater extent; their amount should be defined exactly, ideally bound to the degree of violation of the provision. Moreover, it is necessary to ensure that the producer holds final responsibility for unfulfilled duties passed on to the PRO.

1 Introduction

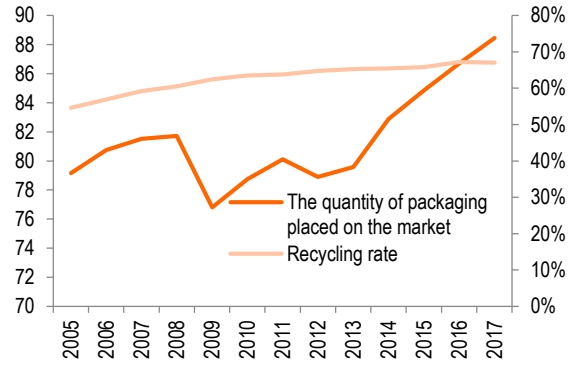
At the end of the 1980s, local governments in developed western economies encountered the problem of how to solve the growing volume and complexity of waste. Since then, the highly-developed economies have adopted several measures with the objective to stimulate recycling and restrict the landfilling of waste. Besides higher fees or even bans on landfilling, the concept of extended producer responsibility (EPR) has been developed. The idea of EPR consists of the fact that the costs of the negative impacts of products placed on the market must be borne not only by the consumer but also directly by the producer. The producer can directly affect the quantity of waste from their products as they are responsible for their design. Term "producer" means the person placing packaging or non-packaging on the market; thus, it need not be only the producer of the product but also the distributor, importer or even vendor.

Public attention is mostly drawn to packaging or "non-packaging",[1] such as plastic bottles or plastic bags; the producers of these products also finance separate collection. This is also the reason why this study focuses on this branch, and the phrase "extended producer responsibility" uses in the meaning of the scheme for packaging and non-packaging products. Today, extended producer responsibility includes, inter alia, electrical equipment, batteries and accumulators, vehicles, tyres or, in some countries, oils, textiles, medical material or agricultural foil (Deloitte, 2014). Some products, such as electrical appliances, are included in the scheme because of the complexity of their composition; other products, such as packaging and non-packaging products, because immediately after having been used, they become waste.

Despite the fact that the rate of waste recycling of packaging and non-packaging has increased, the quantities of packaging and non-packaging placed on the market are increasing, too. The slow increase in the rate of recycling cannot eliminate the accumulating problem, as the materials which these products are made of are often not biodegradable or recyclable. Thus, in addition to requirements for an increase in the fees for landfilling (more in the study How to reduce landfilling) or introduction of the deposit-refund system for beverage packaging (more in the study Real Price of Deposit), the question of how to encourage producers to stop using non-recyclable materials and to increase collection of waste coming from other products arises.

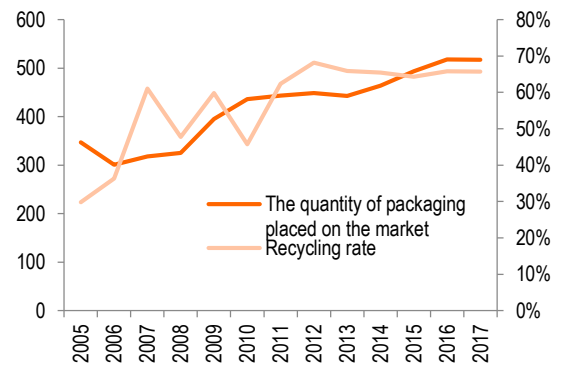
The objective of this study is to outline key problems of EPR for packaging and non-packaging products in Slovakia, as well as potential solutions. For many measures it will not be possible to be implemented immediately; the essential reform should ideally be concentrated on the period of introduction of the deposit-refund system (DRS) for single-use beverage packaging, which will considerably affect separate collection.

Chart 1: Quantity of packaging placed on the market in the EU (mil. ton) and rate of recycling of packaging (%)



Source: Eurostat

Chart 2: Quantity of packaging placed on the market in the SR (thous. ton) and rate of recycling of packaging (%)



Source: Eurostat

[1] These are products with great potential, similarly to packaging, to end in municipal waste; they include, for example, plate glass (window panes) and all types of household glass, newspapers, magazines, catalogues, leaflets or plastic products such as buckets, vessels, garden furniture or plastic toys.

2 Why producers are to be responsible for products even after the end of their life cycle

Extended producer responsibility in the area of packaging and non-packaging products in Slovakia has been in full operation only since mid-2016. Producers in Slovakia are to settle the total costs of separate collection and fulfil their duties mostly through producer responsibility organisations. Depending on the market share of contracted producers, the organisations have contracts with select municipalities where they provide for separate collection. In some EU countries, the producers' duties are fulfilled by one common producer responsibility organisation, whereas Slovakia is among the twelve countries with a competitive model.

2.1 Extended producer responsibility concept

The concept of "extended producer responsibility" passes the burden of processing products after the end of their life cycle on to the producers. The objective is to encourage them to think about whether products and their packaging can be recycled or have to be disposed of in other ways already during their production (OECD, 2016). The product producer, not the consumer, is the one creating demand for packaging and determining requirements for its composition. Thus, if the customer takes the trouble and sorts the packaging, the subsequent waste-related costs shall be passed on to the producer. Therefore, in EPR, producers are responsible for sorted packaging waste, not the producers of the packaging itself, but the producers of products because they are responsible for design and demand for packaging.

The transfer of costs for separate collection from citizens to producers also creates financial motivation for the improvement of sorting. Although the principles supporting extended producer responsibility create room for an increase in the rate of sorting of municipal waste, EPR cannot be considered a direct tool for its increase. It is only a means for shifting the costs of separate collection and recycling from local governments and taxpayers directly to producers, which stimulates waste prevention on the part of producers and, on the other hand, creates room for citizens to manage waste more responsibly.

EPR can be implemented using various instruments; the most frequent solution is to request compulsory take-back, and for certain products such as beverage packaging, a DRS is also applied. Other possible instruments include material taxes, compulsory fees at sale (which include the costs of subsequent collection and processing), taxation of less environmentally friendly products, and alternatively, subsidising eco-friendly products, regulations and standards, as well as instruments based on environmental education (OECD, 2016).

The model of take-back is stabilised for EPR for packaging, and the principles of its practical implementation are almost identical all around the world. Producers finance the system through fees depending on the quantity of packaging placed on the market. At the same time, they jointly manage an organisation which supports the separate collection and recycling of waste using the collected money. Producers are not obliged to collect and recycle their own packaging, only the equivalent of the quantity placed on the market by them. Despite the common idea, the individual schemes differ regarding producer organisation, the rate of their involvement, level of competition or scope of settlement of the costs.

Although producers may also fulfil their duties individually, mostly they are organised and fulfilled collectively through producer responsibility organisations (PRO). Normally, PROs are non-profit organisations established for the purpose of collective fulfilment of objectives and duties specified for members by law. Thus, there are countries with a competitive model of PROs, as well as EPR with monopoly of one PRO (more in Box 1). Moreover, there are also producers fulfilling their duties individually. The scope also differs depending on the extent to which producers settle the costs of separate collection of local governments. In Slovakia or South Korea, 100 % of costs connected with disposal and recycling of sorted packaging wastes are refunded, in France it is 75 % and in the United Kingdom almost 10 %[2] (OECD, 2016).

[2] Although the United Kingdom has represented a large extreme in this context for a long time, and in some cases, nothing was refunded to municipalities, today, the country is going to join the countries with full refund of costs (DEFRA, 2019).

It is difficult to quantify the benefit of EPR for waste management. Between 1995 and 2017 in OECD countries alone, material recovery has increased from 19 % to 36 % (OECD, 2019) and the weight of wastes from selected packaging has also dropped considerably (OECD, 2016). However, in the above period, several instruments have been adopted, including a considerable increase in the fees or even bans on landfilling, thus, it is rather difficult to isolate the influence of EPR itself. For example, even in the United Kingdom, where the financial involvement of producers in sorting and recycling was minimum, packaging waste recycling has increased from 25 % to 64.7 % between 1996 and 2016 (DEFRA, 2019). This is also suggested by the analysis of waste management in the Nordic countries, within which the introduction of various measures was tested and the influence of extended producer responsibility was not significant (Papineschi, et al., 2019).

The system has not been implemented perfectly and there is great room for improvement. The costs of recycling are often higher than the costs of landfilling or energy recovery. Producers' costs are passed on to consumers, what reduces producer motivation to invest in eco-design. Moreover, collective responsibility "shares" not only responsibility but also costs and revenues (Deloitte, 2014). The fees paid by producers, whose amount often does not differ according to recyclability of materials, are a good example. This is also the reason for the existence of several initiatives, both at the EU or OECD level, on how to make the operation of extended producer responsibility more effective.

Box 1: Competition versus monopoly of PRO

The EPR system normally operates within one PRO or in a situation when several competitive PROs operate on the market. There is no consensus today for which of the systems is better (OECD, 2016). The reason why the competitive model in EPR is not preferred unambiguously, in contrast to most common structures in economy, is in the division of costs.

As the administrative costs of EPR usually represent about 5 % of the costs of the whole system, the room for savings is in particular in the system of waste collection, sorting and processing. The disadvantages of the competitive model include higher transaction and administrative costs, additional bureaucracy, higher costs of audit or non-productive costs due to absence of profit (Rais, et al., 2016). On the contrary, with the monopoly system, market position may be abused and there is also the risk of non-productive costs that are not pushed down by competition. In the event of dissatisfaction with services or prices, neither municipalities nor producers may change the PRO.

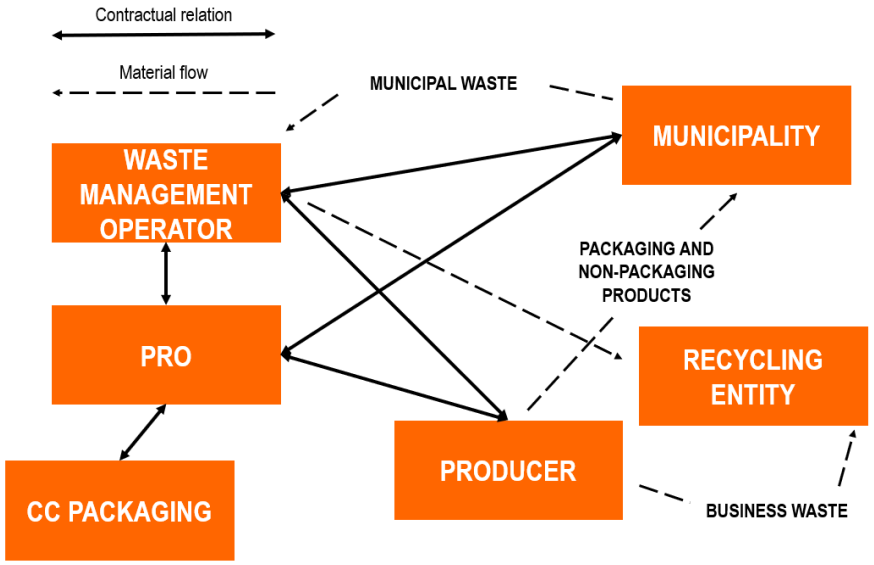
Suitably adjusted competition of waste management companies and other entities involved in sorting and recycling is the best way to cheapen the system. This is also shown by the example from the Czech Republic, where high costs used to be present in particular in the areas with a regional monopoly, oligopoly or even cartel (e.g. in Southern Moravia) of waste management companies. Contract durations also negatively affect the amount of costs (e.g. Kolín has a contract that has been concluded for 25 years) (Rais, et al., 2016).

Within the EU, there are 16 countries with a monopoly (e.g. including the Czech Republic, which formally admits competition, however, only one PRO managed to obtain a licence) and 12 countries with competition (mostly in the former Eastern Bloc, but also in Germany, the United Kingdom and Austria). It has to be noted that not all systems with several PROs are really competitive systems. Individual PROs can be territorially or otherwise specialised (e.g. according to the waste type), thus they do not compete with each other. This is also the case in Belgium, where two PROs operate, however, municipal waste falls under the competence of one of them, and business waste falls under the other one.

2.2 Separate collection in theory

The separate collection of packaging and non-packaging products financed by producers within EPR operates in Slovakia as follows: A citizen throws packaging away into separate collection. The waste management company (WMC) which the municipality has a contract with collects the waste using collection vehicles and transports it to a plant for additional sorting. It subsequently hands it over or sells it to customers of individual materials that then recycle it. The municipality has also a contract with one PRO. The PRO collects fees from producers and uses them to refund the municipality's costs for separate collection carried out by the WMC.

Fig. 1: Diagram of operation of extended producer responsibility in Slovakia



Source: Prepared by IEP

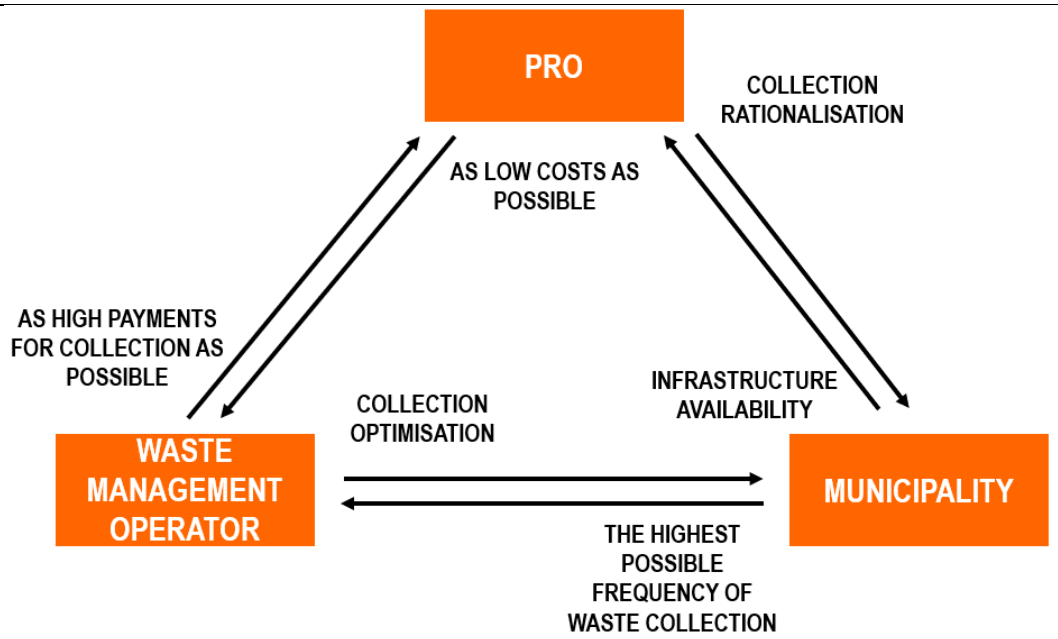
Producers may provide the fulfilment of the statutory duties individually or collectively. The first option is rather rare, in the second case these acts are provided by the so-called **producer responsibility organisation (PRO)**, which is owned by producers, represents them and does not achieve profit. All PROs are associated in the Coordination Centre (CC), ensuring that municipalities without contracts are allocated by drawing lots. The PRO is the mediator in the system: it finances, i.e. indirectly ensures separate collection, recycling, promotional and educational activities, and may propose changes in separate collection to the municipality. To be able to cover these activities financially, it collects fees from producers. The particular fee depends on the material from which the packaging or non-packaging product is made and on the quantity placed on the market by the producer annually.

Although extended producer responsibility primarily finances the separate collection of municipal wastes, industrial wastes, i.e. those produced by enterprises and not collected within waste management of the municipality also enter the scheme. These packaging and non-packaging wastes also create a significant part of wastes which are recycled, thus, they help fulfil the set objectives of recycling to a large extent. Unlike municipal waste, their stream does not flow exclusively through the waste management company and several enterprises sell them directly to recycling entities. Thus, the enterprise has a direct profit if its waste is recyclable, which is also among the reasons of a higher rate of recycling for business wastes.

Individual entities in the EPR system have naturally contradictory interests. The municipalities are interested in a service as comfortable as possible, which, however, costs money. This service is provided by waste management companies, whose objective is to receive as high income as possible and occur as low costs as possible. The PRO pays waste management companies for the services provided; however, the PRO wants

to pay as little as possible because it must compete with the other PROs, and it defends the interests of producers who want to pay as low fees as possible. The State enters the system and its task is to adjust the relations between the individual entities so that the system fulfils its tasks with optimum costs.

Fig. 2: Diagram of interests of municipalities, PROs and waste management companies

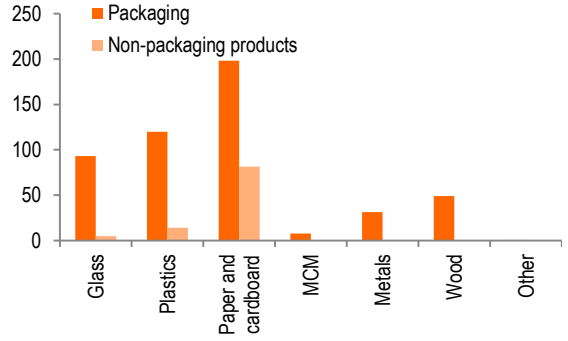


Source: Prepared by IEP

2.3 Extended producer responsibility in Slovakia

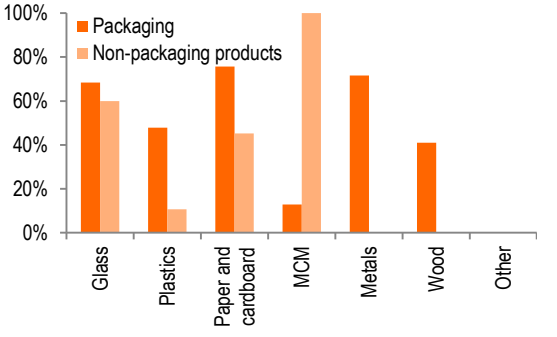
In 2018, 499 thousand tons of packaging and 100 thousand tons of non-packaging products falling under extended responsibility of producers organised within PROs were placed on the market in Slovakia. Besides that, about 46 thousand tons of packaging are placed on the market annually through individual performance. As much as 83 % of all the above packaging and non-packaging products were made of glass, plastics or paper and cardboard, where paper and cardboard represent approximately two-fifths of all the above quantities[3]. The rate of recycling of plastic packaging is almost 50 %, however, for non-packaging products, it is only 11 %. The difference is caused by higher contamination and material composition of non-packaging products. The scheme currently includes over 16 thousand packaging producers and three thousand producers of non-packaging products, the majority of which fulfil their duties collectively through PROs.

Chart 3: Packaging and non-packaging products placed on the market within PROs in 2018 (in thousand ton)



Source: IEP according to PRO reports

Chart 4: Rate of recycling of packaging and non-packaging products in 2018 (%)



Source: IEP according to PRO reports

[3] It is the comparison of weight, packaging made of paper may be several times heavier than plastic packaging, which, unlike paper, is not biodegradable.

The objective of waste management in the area of packaging waste management is to reach the rate of recycling of at least 65 % by the end of 2025, and 70 % of the total weight of packaging waste by the end of 2030. The law also defines minimum rates of recycling for selected packaging materials. Moreover, PROs must ensure a minimum level of sorting of municipal waste of the total potential of waste production from packaging and non-packaging products.

Table 1: Objectives for the rate of recycling for individual packaging materials (%)

Packaging waste	By 31/12/2025	By 31/12/2030
Paper and cardboard	75	85
Glass	70	75
Plastics	50	55
Ferrous metals	70	80
Aluminium	50	55
Wood	25	30

Source: Act No. 79/2015 Coll. on wastes

The minimum level of municipal waste sorting (objectives of collection) is set as the percentage of the potential of sorting of packaging and non-packaging products which can be collected from municipal waste. The objectives of collection entered into force in July 2019, and they will be gradually increased up to 60 % of the potential in mid-2021. Today, almost all collected glass comes from separate collection from households, for plastics it is almost 60 %, and for paper and cardboard only a bit more than one third of collected quantities. The rest comes from buy-back facilities and in particular from industrial waste.

Table 2: Objectives of collection of packaging and non-packaging wastes that are part of municipal wastes

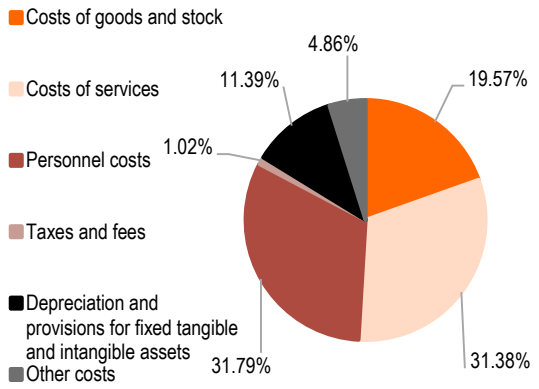
Period	1 July 2019 - 30 June 2020	1 July 2020 - 30 June 2021	1 July 2021 - 30 June 2022
Objective	40 %	50 %	60 %

Source: Act No. 79/2015 Coll. on wastes

In 2018, PROs spent in total EUR 44 million, which can be identified as the costs of the whole separate collection system, including administration and supporting activities. In 2020, 10 PROs in Slovakia were authorised for packaging and non-packaging products, of which two – ENVI-PAK and NATUR-PACK – cover almost 90 % of the market. PROs are the coordinators of the whole system and directly carry out only a few active activities. The structure of their costs, which is fundamentally different from waste management companies, corresponds to it. The waste management company owns collection vehicles, its own premises and for the purposes of separate collection, also the infrastructure in the municipalities, which is investment-demanding and can also be seen in property depreciations. On the contrary, the PRO operates economically as a fund which receives income from the fees of represented producers used to finance the operation of separate collection. The costs of services represent the biggest item[4] (almost 87 % of all costs in 2018), short-term receivables and liquid resources on accounts ensuring fluent financing of the system represent a significant part of assets.

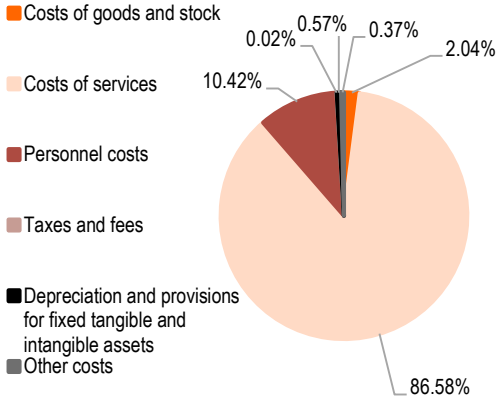
[4] This accounting group also includes items such as lease of premises, legal or advisory services or promotional activities on a contract basis whose execution is obligatory for the PROs. In 2018, depending on the organisation, the costs of promotional activities reached a share of about 0.5 % to 4 % of all costs.

Chart 5: Structure of costs of 12 large waste management operators, 2018



Source: IEP based on the data of the Register of Financial Statements

Chart 6: Structure of costs of all PROs, 2018



Source: IEP based on the data of the Register of Financial Statements

Box 2: Not everything which can be recycled is really recycled

Although common people often understand sorting and recycling as the same thing, not everything that people throw into separate collection can be recycled. Throughout the world, only 14 % of plastics placed on the market are really recycled (World Economic Forum, 2016). Materials such as PET (beverage packaging) or HDPE (cleaning agents) are relatively routinely recycled, other materials, such as PS (yoghurt crucibles), or PP (packaging of sweets) or PVC (toys), end up in landfills or incineration plants.

Although there is technology for recycling them (Grigore, 2017), the resulting material often has limited sales, or the process itself is too expensive and increases the price of the recycled material in comparison with primary substitutes. Not all recycled materials can be used for the same purpose as the original product. For example, polymers lose their properties after each recycling process, which limits their further utilisation (Hahladakis & Iacovidou, 2018). For hygienic reasons, it is also difficult to produce a new bottle purely from recycled PET material (Welle, 2011), the primary material is also necessary. However, recycled PET is commonly used in the textile industry.

Ideal materials are those which can be recycled for the same purpose. Glass (in particular packaging glass), similarly to metals, is basically fully recyclable without quality impairment. However, the process of glass recycling is extraordinarily energy-intensive (although less energy-intensive than production of new glass), about 1,150 kWh of energy is used to produce a ton of recycled glass (ICF, 2019). For glass, the price is affected by colour, for metals, the particular material plays a role, as aluminium (most cans) is a much more expensive material than steel (tins). Almost every paper packaging is recyclable, only 3 % are recyclable with problems (e.g. paper cups for beverages, beverage cartons) (Confederation of Paper Industries, 2019). An average paper yarn can be recycled 5 to 7 times (ADEME, Bio by Deloitte, 2017) and the gradual recycling impairs its properties, which limits its utilisation; for example, the paper packaging for eggs is not recyclable anymore (it can still be used for zero waste shopping).

Although paper cannot be recycled forever for the same purpose (Fostplus, 2020), it is easily biodegradable, thus, it can be naturally degraded in nature. Common plastics are not degradable, however, already today, research into biodegradable plastics is available (e.g. the Slovak patent NONOILEN). However, these materials are mostly biodegradable only in industrial conditions. They also have to be collected separately because if they get among other materials, they could deteriorate recycling (e.g. the whole sample of PET). Biodegradable plastics are not the same thing as “bioplastics”, this

category also includes materials which, despite being produced from renewable sources (e.g. corn), are not capable of biodegradation. These plastics behave like common plastics in nature.

Already today, technologies for recycling most materials including various types of plastics are available in Slovakia. We cannot say, however, whether they are sufficient, as several materials are processed on one line. The market itself is the main barrier, as with the current prices, there is no demand for certain recycled plastics or combined materials. Thus, recycling does not bring profit, which leads to the fact that the landfilling of material is cheaper. Instead of investments in new capacities, it is necessary to set regulations so that the materials which are not recycled to the required extent today are significantly penalised, which can start natural market processes and innovations towards profitable recycling.

3 Three areas where separate collection can be improved in Slovakia

Despite the progress that has been achieved by Slovakia in the previous years, operation of EPR and separate collection still does not bring optimum results. In Slovak competitive model of PROs it is relatively difficult to achieve balance between the contracted municipalities and producers. Moreover, this model leads to price competition, which deletes the differences in the prices of materials with various environmental impacts. A part of the reason also stems from the conditions under which the system was introduced in our country. For example, in Germany, separate collection was built on the principles of EPR from the very beginning, in Slovakia, this concept was introduced into the separate collection which had been in operation before, including contractual relations, many of which are still in force. This is also the reason why a possible reform of system operation cannot be carried out immediately; it will require a series of gradual steps, with **the objective to achieve the following**:

- **To transmit EPR to eco-design, i.e. waste prevention** it is necessary to penalise materials with difficult recycling using significantly higher fees. Producers of recyclable materials in Slovakia do not feel advantages, on the contrary, they cross-subsidise the system. It is necessary to request that producers fully bear the costs connected with their packaging and non-packaging products at the end of their life cycle. Today, a part of this waste avoids financial responsibility for producers through false instructions for inhabitants on how to sort, and through pollution in nature.
- **Sufficient conditions for sorting with the lowest possible costs** can be provided by the simultaneous introduction of tenders for services of separate collection and a compulsory minimum standard of service. The definition of the standard will prevent possible negative impacts of tenders in the form of underestimated infrastructure. It is still insufficient in several places despite the indisputable development. At the same time, the system in Slovakia is also characterised by relatively significant instability, which leads to the fact that annually hundreds of municipalities replace their PRO. It is also caused by the low negotiating power of local governments, when separate collection is also individually provided by municipalities with tens of inhabitants, as well as the complicated achievement of balance between producers and municipalities. Stability can be achieved by introducing the Austrian model of cost sharing among PROs according to their current market shares, as well as by using contracts for a longer period.
- **A fair system adequately punishing the evasion of rules** will require an increase in the capacities of audit authorities, improvement of effectiveness of their work by suitable data collection, and a greater emphasis on the application of penalties. Today, the misdemeanours of PROs are solved by two extreme approaches: corrective measures without a penalty or proceedings on the withdrawal of a PRO's authorisation. Even if other entities were penalised, the sanctions were usually at the lower limit, which is often more than one hundred times lower than the highest limit. Imposition of penalties is nevertheless more effective, in particular if their size is exactly defined. Moreover, control activities of PROs vis-à-vis contracted producers needs to be passed on to external auditors because PROs are in conflict of interests in relation to the audited entities. It is also necessary to start controlling the purpose of resource utilisation by PROs and to set rules for the creation of reserves.

3.1 Fair fees for producers

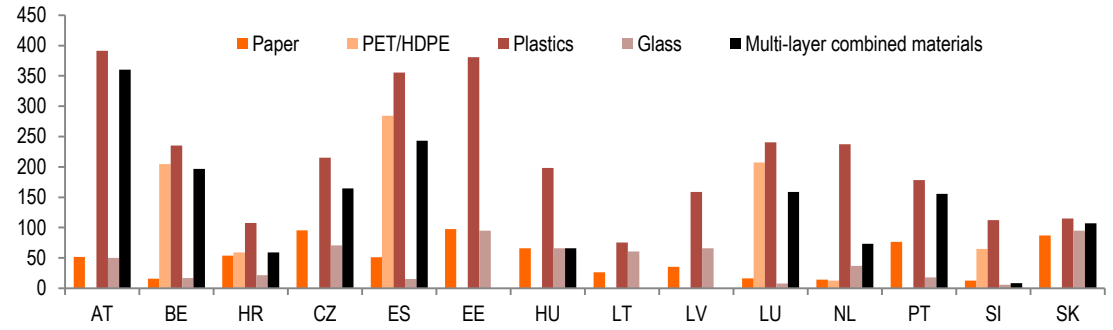
Today, the amount of fees within EPR does not reflect the environmental impacts of materials used. The producers putting recyclable materials on the market are not advantaged, the fees do not essentially differ within material streams and do not reflect the environmental burden of material. Thus, there is cross subsidising between recyclable and non-recyclable products. Moreover, a part of selected products bypasses the separate collection system and ends up in mixed municipal waste. Some PROs, waste management companies or towns incorrectly instruct their citizens not to sort certain types of wastes, thus, the costs of this waste are paid by citizens instead of producers.

It is necessary to introduce rules which will significantly differentiate fees between and within individual waste streams. The fee amount should take into account the recyclability, recycled material content and costs of material collection and processing. The producers of products made of materials that cannot be recycled to the required degree should pay a separate fee. The suitable moment for the commencement of these changes is the introduction of a deposit-refund system for single-use beverage packaging[5], which will exclude valuable material from the system and will lead to changes in fees amounts. At the same time, Slovakia should integrate responsibility for littering into the EPR system. Producers can significantly affect the rate of littering by the design or composition of products, however, today they are not encouraged to make such modifications because these costs are not allocated to particular producers.

3.1.1 To penalise the materials with more difficult recycling by higher fees

The fees for packaging do not correspond to the costs of its processing and they do not differ essentially depending on material. For example, the fees for plastic packaging producers are subsidised by fees from producers of the other materials. In Slovakia, the fees for individual waste streams are approximately at the same level, whereas in other countries they are significantly differentiated. In general, the highest fees are for plastics, multilayer combined materials follow (beverage cartons). On the contrary, the fees for glass and paper in other countries are on average 7 to 10 times lower than in Slovakia. Based on the available data on the costs and fees of Slovak PROs, we assume that the fees for paper and glass should be lower by more than one half and for plastics higher by about 13 % (see more in Box 3).

Chart 7: Fees for producers for individual types of materials (EUR/ton)



Source: IEP according to information from various PROs in EU countries

Paradoxically, recyclable plastics today subsidise non-recyclable materials. In Slovakia, there is only a basic differentiation of fees according to streams, the materials are not differentiated within the streams. In Belgium, the fee for plastics other than PET or HDPE is 1.5 times higher, whereas in Slovakia the same rate applies to polypropylene, polystyrene or polyethylene, although the real life-cycle costs are various (Zero Waste Europe, 2015). The costs of individual materials depend on their buy-back prices, which are determined by their recyclability or the degree to which they can be recovered. One rate for all plastics allows cross-subsidising of materials recyclable with difficulties, which weakens the pressure on more real costs and the resulting ecological design.

[5] The introduction of the deposit-refund system for single-use beverage packaging from plastic and metals which will be put into practice on 1 January 2022 will mean additional costs for separate collection. As PET bottles and aluminium cans are among the few materials with a positive market value, they subsidise the system. Although the costs of the system will decrease because there will be less raw material for collection and sorting, the loss of a valuable raw material from bins along with lost fees will lead to a loss of the system amounting to EUR 4 mil. annually. The loss will have to be settled by producers of the other packaging and non-packaging goods paying 1.3 times and 1.7 times more than today for a ton of the above plastic or aluminium packaging, respectively. Moreover, the approved objectives of collection will need adjusting so that they will take into account the exclusion of selected beverage packaging from separate collection. The experience from abroad does not suggest that the rate of recycling decreases in countries with a deposit-refund system or that the deposit-refund system has a negative impact on the sorting of the other waste components (Dráb & Slučiaková, 2018).

Individual rates of fees should be differentiated with respect to environmental criteria. Such determination of fees is called eco-modulation and materials are differentiated, for example, according to the content of the recycled material, biodegradability, availability and demanding character of processing capacities or information on recyclability directly on the packaging (Watkins, et al., 2017). Moreover, problematic packaging or single-use products may be penalised by additional taxation or a ban on landfilling and incineration of certain types of materials (Zero Waste Europe, 2015).

Competition among PROs prevents the natural differentiation of fees, thus, the initiative should be taken over by the State. Foreign PROs have implemented eco-modulation in tariffs based on a suggestion from the State. Slovakia will also have to apply eco-modulation due to the EU legislation; the exact method will be specified by a decree or act based on recommendations prepared by the EU. For the free market of products, an ideal solution would be a uniform pan-European solution based on the strict requirement for the transfer of costs into the price (in connection with the penalisation of negative externalities affecting the environment). However, in practice it is possible that this way will not be fully applicable due to demands for control and the will of the Member States. However, the fees for packaging and non-packaging products should respect the following principles:

- **The fees for individual materials should be differentiated and reflect the recyclability and real costs of collection and processing of the material.** Individual criteria of recyclability may be set on the basis of experience from abroad. The Italian PRO CONAI takes into account the degree to which materials can be sorted and recycled (CONAI, 2018). In Belgium, the rates of plastics are set according to demand for processing, the lowest one applies to PET, a higher one to HDPE, and the highest one to the other plastics. The Spanish PRO Ecoembes applies a rate lower by one-fifth to hard reusable plastics (PET, HDPE) than to other plastics (soft HDPE, LDPE) (PRO Europe, 2019). In the Netherlands, materials with easier processing are supported by a lower rate, and a special rate applies to biodegradable plastics[6] (Afvalfonds Verpakkingen, 2019).
- **Packaging and non-packaging products with a certain content of recycled material can be provided with special advantages**, which will support the market with secondary material. It is also possible to support reusable packaging and products. Clear glass can be recycled over and over again, whereas for several materials each recycling deteriorates the quality of the material. The amount of the fee should also take this factor into account. In Germany, fees are graded according to ecological criteria and also depend on the content of the recycled component (European Sustainable Business Federation, 2019). However, this criterion should not be the only and main one, only supplementary to the requirement for recyclability.
- **If the material does not reach the requested rate of material recycling, it should be burdened by a special fee for less environmentally-friendly materials**. Thus, they will be penalised and producers will be encouraged to take eco-design into account when creating products. Already today, for example in France, the producer is penalised by an increased fee if there is no recycling channel for the material or if it contains undesirable additives or if its shape complicates subsequent processing (Zero Waste Europe, 2015). Guides for ecological designs, issued by the University of Applied Sciences in Vienna, for example, can be used to evaluate environmental friendliness. Although packaging can be produced from recyclable materials, their combination or design can disable material recovery (FH Campus Wien, 2019). However, in determining the fee amount it is also necessary to take into account whether an extreme rate will not finally lead to a higher environmental burden. The degree of product protection against damage is an important feature of packaging; it extends their durability and reduces waste production risk, in particular as regards foodstuffs (Wikström, et al., 2014).

[6] The separate collection of these plastics will have to be ensured in parallel with their extended usage. Today, such plastics are often thrown away with other plastics or are put into garden composting bins, where, however, the necessary biological and physical processes do not take place.

- **A higher rate should apply to packaging with dangerous content in order to support ecological product design.** There are individual requirements for packaging composition in terms of safety, however, the product inside can be risky or potentially dangerous (e.g. packaging of engine oils can contaminate water sources in nature, solvents such as toluene excite the mucous membranes of living organisms). In such case, packaging is considered hazardous waste within the reserved waste stream. An increased fee rate should also apply to packaging from potentially hazardous products. Fost Plus in Belgium sets rates for contaminated packaging in the amount of approximately EUR 620 or 780 per ton. Slovenian SLOPAK collects a basic fee for plastics amounting to EUR 195, however, a rate of EUR 570 applies to hazardous wastes (PRO Europe, 2019).
- **Packaging and non-packaging products that do not provide information on the recyclability of the material should be penalised by a higher fee.** For separate collection, it is essential to cultivate regular habits for inhabitants; consumers also expect the provision of information on recyclability directly on packaging (Cole, 2019). In France, a special logo is used to identify such products and the consumer is advised of the fact that the product will be properly recycled. The criteria for labelling should not be based only on the technological possibility of recycling; they should also reflect the real results of recycling of these materials placed on the Slovak market.

The separation of municipal and industrial waste in the EPR system (including separate objectives) can be considered in the future. In several EU countries, including neighbouring Austria or the Czech Republic, the standard is that the duties resulting from business waste are separated from the duty to finance separate waste collection. This leads to the fact that producers pay less for packaging which does not flow to municipal waste because of lower related costs. Today, industrial and municipal wastes are not distinguished in Slovakia, and those who place industrial waste on the market are also obliged to finance separate collection. PROs can also fulfil the objectives through business waste, which they do by purchasing slips about waste recovery from waste management companies. However, the price list for producers is the same. A change would require the introduction of special objectives and strict control because for producers it is financially convenient to report municipal packaging as industrial, in particular if it is within one PRO. Therefore, in some countries such as Belgium, there is a separate PRO for industrial waste and a separate PRO for municipal waste, which raises the question whether to perform an analysis of the effectiveness of operation of the current PRO model if these wastes are strictly separated.

Box 3: How fees can be differentiated in practice

Today, the fees paid by producers do not correspond to the real costs connected with the material. For example, paper producers pay about twice as much as they should for one ton, whereas producers placing plastics on the market pay less.

This results from the data on costs provided to the IEP by one Slovak PRO, based on which we have estimated the expected income of PROs from individual materials, based on the provided quantity of packaging according to materials and rates[7].

We have compared the amount of net costs for the collection of individual materials from households and their recovery with the expected income for individual materials. The results, as well as a comparison of price lists of individual PROs (see more in Annex 2) suggest that prices do not differ essentially among individual streams, and they do not differ within the streams at all.

[7] The fees for producers should be based on the costs of collection of the material and its recovery. The amount of costs depends on the rate of sorting or quantity of collected waste, as well as the buy-back prices of raw materials. A high rate of sorting means more waste for which the PRO must provide collection and recovery, which results in a higher unit cost. On the contrary, a higher buy-back price of material means that net costs are lower for the PRO. Thus, we can generally calculate the optimum fee amount for producers as the product of net costs of collection within the infrastructure and the rate of sorting of wastes from households because the PRO must provide services of separate collection only for this part of material.

Table 3: Fees of producers as they should be today (EUR/t)

Material	Net costs	Collection from households	Average rates	Optimum fees as they should be
Paper	174	23 %	99	41
Plastics	313	41 %	114	129
Glass	67	76 %	104	51
MCM	389	18 %	111	70

Source: IEP, Slovak PROs

A guide on how to implement eco-modulation is also currently being prepared by the European Commission in cooperation with the consultancy consortium Eunomia. One of the possible ways of eco-modulation implementation in Slovakia is that the State will set minimum prices by streams, as well as a system of maluses (penalisations) or bonuses (price reduction). Minimum prices will ensure that prices will not drop below a certain level. At the same time, the system of maluses and bonuses will pass the majority of costs on to those who place non-recyclable materials on the market.

The definition of non-recyclability is a key parameter. It cannot be considered the technical possibility of recycling; it should be based on whether, in the respective period, the PRO managed to recycle a prescribed share of the material placed on the market. For several types of plastics, the technical possibility of recycling can already be documented today, however, it is often so expensive that it is not executed in practice (d'Ambrières, 2019). Only materials which are really recycled should be advantaged.

In accordance with the recommendations in Chapter 3.1, their application means that the following will be specified by legislation:

- **Minimum amounts of fees** for individual waste streams: e.g. at the level of "optimum fees" in Table 3;
- **Recyclability** will be defined, and a malus will be determined for **non-recyclable materials**: e.g. for a material (not waste stream) which in the past year did not reach a rate of recycling of at least 20 %, the producer will pay a multiple of the basic fee for the reserved waste stream;
- A special rate will also be set for **hazardous materials**; a malus to the basic rate of material may be set, e.g. in the amount of EUR 300 per ton of plastics contaminated by thinning agents;
- For packaging and non-packaging products which do not contain **information on recyclability,** a special malus will be set: e.g. 5 % of the basic fee for the reserved waste stream applied by the PRO;
- For **products without the content of recycled material,** a malus will be set: e.g. up to an amount of 20 % of the basic fee for the reserved waste stream applied by the PRO.

In practice it would mean that a producer placing on the market recycled paper and paying EUR 99/t today could now pay EUR 41/t; on the contrary, a producer of non-recyclable yoghurt crucibles paying EUR 114/t today would pay EUR 258/t. If the packaging does not contain information on recyclability, the producer will even pay EUR 6.45/t more. If the material does not contain recycled material, the producer will pay an additional EUR 25.8/t more.

3.1.2 To strictly request responsibility for the waste produced

Today, citizens in several towns pay for the waste which should be managed by PROs, thus, PROs save their costs. According to the Act on Wastes, PROs are obliged to ensure take-back of the whole quantity of the separately collected component of municipal waste belonging to the reserved waste stream. However, in practice waste without positive economic value is often redirected to mixed waste based on incorrect sorting

instructions for citizens. This means that the least recyclable waste, which should be top-burdened, avoids the system and its costs are borne by citizens instead of producers.

Separate collection in Slovakia should be unified, checked on a regular basis and its violation should be strictly penalised. Unified collection of all reserved waste streams within the separate collection is already required by law today, however, it is not carried out in many places. This concerns, for example, the sorting of polystyrene[8], Bratislava (mesto Bratislava, 2017) does not collect the packaging of oil and liquid washing agents, Žilina crucibles and single-use plastic bags (mesto Žilina, 2019) and Galanta represents an extreme example, only collecting pure PET within plastics (mesto Galanta, 2019). The entity (municipality, PRO or waste management company) which incites to such activity should be sanctioned, where the penalty for responsibility avoidance should depend on the annual quantities evading collection due to such a measure.

Alternatively, the participation of PROs in the costs of mixed municipal waste corresponding to materials which are not collected within separate collection can be introduced. In several countries, such as Belgium and Austria, only recoverable waste is collected separately. If some Austrian regions do not collect waste with a zero economic value, PROs contribute to municipal waste financing (Busuttil, et al., 2016). The problem is that in the event of progress in the area of recycling, it is necessary to change the sorting habits.

PROs should compulsorily monitor and report costs by individual waste streams and materials (including gross costs) and bear full responsibility for the sorted waste. Today, the costs of non-recoverable waste are often borne by the WMC, which may but need not be reflected in the net price paid by the PRO to the waste management company for services. In such situation, costs of individual materials cannot be ascertained because it is not clear from the contracts between the waste management company and PRO what the costs of collection are and what costs or income result from the subsequent waste recovery. This data should be available to auditors and general government authorities. It is also possible to consider the transfer of waste ownership to PROs, which will better allocate the responsibility for the waste produced. Such regulation is in force in several countries, such as Austria, Belgium, Bulgaria, Estonia or Greece.

3.1.3 To extend producer responsibility so as to include costs of litter removal

According to the data of the Statistical Office of the Slovak Republic, almost 30 thousand tons of waste is collected annually just within the cleaning of streets in Slovakia, which represents more than five kilograms per inhabitant. Besides earth, leaves or spreading material, litter also represents a significant part of this waste, in particular from packaging and non-packaging products. Almost all waste from litter is landfilled or energy-recovered in incineration plants. Thus, together with litter in nature and near the roads, it opens the discussion to what extent producers are responsible for this situation. Responsibility at the level of cost sharing with local governments is considered legitimate because producers are able to considerably affect the rate of littering, for example, by the design of the product (OECD, 2016).

The sharing of costs of litter removal by producers is introduced by the European Commission within its Directive on the reduction of the impact of certain plastic products on the environment. No later than from the beginning of 2023, producers of select plastic products will be obliged to settle the costs of cleaning the environment polluted by these products and the subsequent transportation and processing of such pollution (see more in Box 4). Special attention is paid to cigarette butts as it is estimated that three of every four end up as litter. For Slovakia, with the same rate of littering, it would mean more than 5 billion pieces with a weight of 1 to 1.7 thousand tons on streets, in channels and in nature[9]. Therefore, producers of filter-tip cigarettes will

[8] Incorrect sorting instructions are provided by certain local governments, waste management companies, as well as PROs, for example, the waste management companies KOSIT (Kosit, 2019) and OLO (OLO, 2019), which refer to the general binding regulation of the City of Bratislava (City of Bratislava, 2017), or the Town of Žilina (City of Žilina, 2019) or the PROs Nowas (Nowas, 2019) and Natur-Pack (Natur-Pack, 2019).

[9] According to (Araújo & Costa, 2019) 75 % of cigarette butts become part of litter. The total annual estimated quantity of consumed cigarettes ranges from 5.5 (Smith & Novotny, 2010) to 6 trillion pieces (Araújo & Costa, 2019). The quantity of butts reaches 4.3 (Enotiko, 2019) to 4.5 trillion (Slaughter, et al., 2011). About 7 billion cigarettes are legally placed on the market in Slovakia (Ministry of Finance of the Slovak Republic, 2019) and it is estimated

have to fulfil even stricter rules and co-finance the costs of the establishment of a specific infrastructure for the collection of waste from these products (European Parliament, 2019).

Slovakia should analyze the scope, structure and costs of littering and subsequently fully integrate it in the EPR system. Within the reform of EPR, the UK also plans to allocate these costs to producers (DEFRA, 2019). Based on ad-hoc agreements with producers, Flanders (Belgium) has disposed of almost EUR 10 mil. since 2016; this amount is used to finance measures against littering. It will also prepare a study of litter composition which will represent the basis for subsequent legislation EPR by litter removal. Slovakia should also adopt a similar approach. The litter analysis should help better aim the particular responsibility and lead to the penalisation of those products which are part of litter, in particular those which are not degradable or contain substances that are dangerous in nature. Today, these costs are fully borne by local governments[10] and other entities (administration of water courses, forests or roads, or district offices). For successful implementation it will also be necessary to define what is considered littering and what is an illegal landfill. However, the transfer of part of the responsibility for litter to producers does not mean that the responsibility of the citizens throwing away the waste ceases to exist, they should be properly penalised for such act.

Box 4: Directive on the reduction of the impact of certain plastic products on the environment

The objective of Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment is to increase participation of producers of selected products in waste management costs and cleaning of polluted territories. The Directive prohibits the placing on the market of those single-use plastic products for which sustainable and affordable alternatives exist. It also provides market participants with sufficient time to adapt. For products with a low availability of direct alternatives, measures reducing consumption will be implemented. The other products are without direct alternatives, therefore, in compliance with the "polluter pays" principle, the scope of EPR will be increased for them with the objective to contribute to the costs of waste prevention and management including waste cleaning. For hygienic products, in particular wet wipes and sanitary towels, less strict regulations will be applied.

For products without available alternatives, measures will be implemented that will encourage consumers and producers to reduce consumption. A minimum requirement for separate collection in the amount of 90 % of production volume will be introduced for beverage packaging (PET but also other plastic packaging). The requirement for caps attached to bottles is to considerably reduce the leakage of caps and lids into the environment. Product marking requirements have to inform consumers that the products should not be flushed into the sewage system. The requirement for marking with information on more appropriate disposal after use applies to sanitary towels, wet wipes and balloons. For all products, an increase in the awareness of negative environmental impacts will be required. For products for which alternatives are not readily available, objectives of consumption reduction will be introduced, and Member States will choose their own instruments to achieve them. They may, for example, prohibit free provision of these products at the point of sale to final consumers or introduce an increased tax on these products.

It is estimated that thanks to the Directive, the quantity of greenhouse gases will drop by 2.6 mil. tons, the quantity of plastic waste on beaches by 56 % and its weight by 33 %. As the Directive requires essential reforms of EPR, it has provided Member States with an extended period for the implementation. To help governments apply them, Eunomia has prepared a draft procedure of reforms (Eunomia, 2018).

that an additional 360 million get on the market illegally (SITA, 2018). The World Health Organisation estimates the weight of the filter itself to be 170 mg (World Health Organization, 2017), according to various sources the butt (together with a part of the unfinished cigarette) weighs almost 188 mg (Smith & Novotny, 2010), 234 mg (Enotiko, 2019), or 310 mg (Slaughter, et al., 2011). The resulting weight of waste from cigarette butts does not mean only the weight of filters as it is also affected by consumer behaviour or weather.

[10] These costs generally amount to EUR 5/inhabitant in Košice and 8 in Bratislava. It is the so-called summer maintenance, which includes: machine sweeping, flushing, accidents, manual sweeping, emptying of litter bins and cleaning of the town.

3.2 Lean and stable separate collection

Competition among waste management companies can reduce system costs more effectively than competition among PROs (Rais, et al., 2016), which was also proved in Germany (Bundeskartellamt, 2012). **Tendering of waste management companies** is a frequent instrument to minimise these costs. If tendering is introduced today, it could lead to inadequate savings on the part of provided services. Therefore, it is necessary to define a **minimum standard of service** provided to citizens and to provide them with **adequate infrastructure**. **Digitalisation and the use of data and technology** is increasingly important in optimising the extended producer responsibility system. The introduction of electronic record-keeping for waste collection will allow monitoring of the waste level in every bin, which may facilitate control and allow more effective pick-up rounds if pick-up vehicles are equipped with GPS.

Today, it is very difficult to reach efficient balance between producers and municipalities, which leads to the situation every year where hundreds of municipalities have no contract with PROs. The solution is to introduce the Austrian model of **cost sharing by PROs**, when PROs will keep providing separate collection services in municipalities, but the municipalities will be allocated by drawing lots and the costs will be reported to the coordination centre, which will balance the system based on current market shares. The current poor negotiating position of (in particular small) local governments vis-à-vis PROs and waste management companies may be mitigated by **association in larger units**, which will subsequently order the services together. The limitation of conditions under which the contract may be terminated, as well as contracts for a longer period, will create conditions for investments in infrastructure and better stability of the system.

3.2.1 To associate local governments into larger units

The current system of one PRO in one municipality complicates the achievement of stability. Such exclusive operation in local governments within the competitive system is a rarity characterising the EPR system in Slovakia. The method of achieving balance in the system is a source of uncertainty and outages in service provision. Through the market share, PROs must contract such a number of municipalities and inhabitants which correspond to the quantities of packaging placed on the market by the represented producers. The market shares reached by the PRO in individual streams are not taken into account.

In the current conditions, municipalities are a weak contracting partner without greater bargaining power. Each of the almost 3 thousand local governments is obliged to organise waste management today, which leads to unequal position vis-à-vis waste management companies and PROs. Often for objective reasons, municipalities are not sufficiently interested in this issue because they cannot afford to employ an expert. Many do not even know about all the duties they are to fulfil and are not well aware of the municipality's results in waste management. Some municipalities invest in separate collection themselves and do not even know that it is the duty of PROs, which was the case of the municipality of Červený Kameň, which purchased collection bins by itself.

If a PRO or waste management company pushes on cost reduction, the municipality may be forced to accept a reduced quality of service (European Commission, 2017)**.** Costs can be saved by reducing the frequency of collection and lower investments in infrastructure, and if contractual conditions are negotiated with the definition of such circumstances, municipalities with low profitability may be forced to accept inconvenient conditions. The effort to optimise costs and collection disadvantages smaller and remote municipalities, which is manifested by frequent replacement of contracting partners and selection of municipalities by PROs according to their costs (Deloitte, 2014). For their geographic and demographic conditions, some municipalities are considered inappropriately expensive and remote municipalities with a low population often do not have any other possibility but to provide a part of the services themselves (this concerns, for example, isolated settlements in mountain regions in the vicinity of Detva, Myjava or Kysuce, or small villages in North-Eastern Slovakia).

Smaller local governments should procure the services of collection together, which will strengthen their position and improve the economy of the process (Soukopová & Klimovský, 2016). The problem of municipalities' inconvenient position vis-à-vis contracting partners consists in their large number, spreading over a large area and low population density. Cost savings can be achieved by coordinated use of capacities and vehicles (Poldnurk, 2015). Tallinn is a good example; there, the cooperation of local governments in the process of procurement led to the optimisation of routes and cost savings, as well as collection fees (Poldnurk, 2014). This is because larger areas for collection allow better planning of routes, and larger quantities of waste reduce unit costs. Waste management also has regional effects and the economy of a municipality also affects the neighbouring local governments (Slučiaková, 2019).

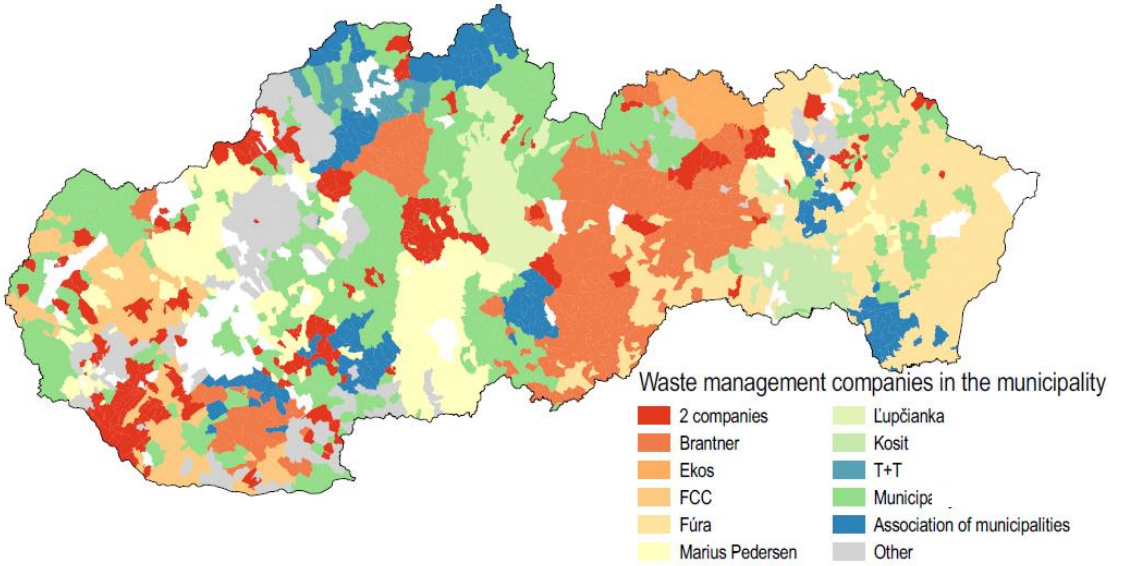
Larger units of local governments become more attractive for waste management companies during procurement, which improves competition (Poldnurk, 2015). In Belgium, local governments create joint associations, thanks to which they are able to negotiate better contractual conditions and coverage of the population by the service. In this way, roughly 600 local governments were reduced to about 40 entities (Busuttil, et al., 2016), which act as a contracting partner in relation to waste management companies. In particular, smaller local governments improved their bargaining power in the process of tender organisation.

In Slovakia, it would be possible to execute associating at the level of micro regions or districts, which create relatively compact units connected by the network of transport infrastructure. Joint procurement of municipalities has also been recommended by the European Commission for a long time (European Commission, 2012)**.** In associating, it must be kept in mind that the larger and more heterogeneous a unit is, the more demanding the achievement of consensus can be (in particular in the case of an association of rural and urban local governments). By associating, the bargaining power of municipalities and effectiveness of selection of waste management companies would be improved, which was pointed out by the European Commission within its recommendations for Slovakia (European Commission, 2018).

There are already examples of associating today. Municipalities associate within regional municipal waste management companies. These are for example: Ponitrianske združenie obcí (Nitra Association of Municipalities), Združenie obcí Rajecká dolina (Rajec Valley Association of Municipalities), the Zemplín Association, the Hont-Poiplie Association of Municipalities for Separate Collection, and the Tatiar Association in the surroundings of Levice and Banská Štiavnica.

Some municipalities already jointly procure waste management companies today, however, mostly for mixed waste. Examples include municipalities in the surroundings of Cejkov or municipalities and towns in the region of middle Spiš (Krompachy, Spišské Vlachy, Spišské Podhradie, Žehra and others). Waste management companies already act regionally today. For logistical reasons, waste collection requires a special infrastructure around which a catchment area is naturally created (OECD, 2016). Within the area, it is convenient to offer collection services to nearby municipalities. The effort to optimise costs encourages waste management companies to operate based on the area or regional principle.

Fig. 3: Contracting municipalities of selected waste management companies



Source: IEP based on the data of Slovak PROs

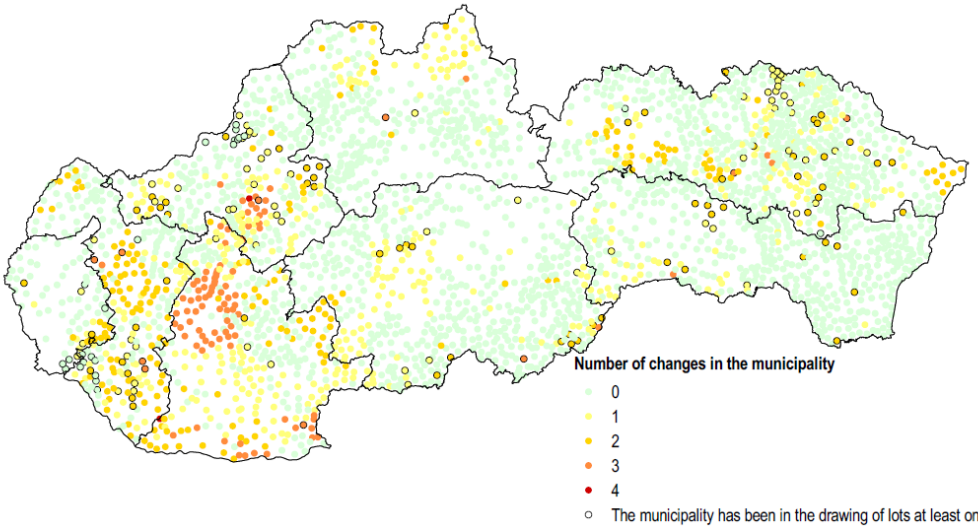
3.2.2 To ensure system stability and predictability of contractual relationships

The competitive EPR system is especially sensitive to balance achievement. It is necessary to ensure that the share of service municipalities contracted by a PRO is equal to the share of contracted producers. Otherwise, some PROs would have higher income than costs and vice versa. Moreover, a change of PRO is often accompanied by regulation of relationships with the waste management company if the new PRO insists on service rationalisation. If there is a high risk of change, local governments have no certainty regarding availability and coverage of service or infrastructure development.

In Slovakia, the EPR system is characterised by a significant rate of instability at the expense of municipalities. PROs must reach balance between market share on the part of contractual producers and municipalities. This results in the re-grouping of municipalities on an annual basis and prevalence of short-term contractual relations. This is because, taking into account the high number of small municipalities and their weak bargaining position, it is simpler to balance inequality by local governments than producers. However the change of PRO brings fewer problems to the producer than to the municipality to which the PRO proposes a collection system. A new PRO may mean fewer bins or lower frequencies of pick-up rounds, which happened, for example, in the municipalities of Hriňová, Senec or Hubice. Since 2016, as many as 99 municipalities have changed PRO three times, and four municipalities four times. **In 2019 alone, 400 municipalities changed PRO, i.e. every eighth one.**

The data for the calculation of market shares are not available in time. PRO have data for market share calculation no later than as at 31 March but the system must be balanced from January. Thus, they utilise their own estimates of market development and, to prevent the situation when one PRO pays for another, they terminate contracts with some municipalities, usually with the most expensive ones, in order to balance their share. This situation is solved by the coordination centre, which organises drawing of lots for municipalities without contracts. These municipalities settle the costs of separate collection until they are allocated a PRO; but this is in conflict with the law. In January 2020 alone, this concerned almost 200 local governments with about 270 thousand inhabitants who were not provided with services of separate collection (Združenie miest a obcí Slovenska, 2020).

Fig. 4: Number of PRO changes in municipalities, and municipalities in the drawing of lots for PROs (2016-19)



Source: IEP according to reports of PROs on activity

The Austrian EPR system imposes duties upon PROs objectively, based on their market shares within individual streams. In drawing lots, the Coordination Centre VKS (Verpackungskoordinierungsstelle) allocates responsibility for individual regions to the PROs that have to organise separate collection there. All the PROs take part in the financing of the system. PROs' market shares are electronically evaluated separately for each stream on a monthly basis. This data is officially publicised in the information system of the federal ministry. If a PRO has a 5.2 % share within plastics and, for example, 4.8 % within paper, it participates in the total costs of the stream in each region in the amount of its respective percentages. Thanks to sharing, the costs and their financing are more predictable and the system is more stable.

Slovakia should apply the Austrian system of shared costs for PROs, which will ensure better stability of the system. Despite several modifications, the Slovak system still does not achieve market stability. Therefore, we recommend the application of the system of shared costs which is applied in Austria. Individual associated local governments would be allocated to PROs based on the drawing of lots for a period of approximately 4 to 5 years. The PROs would report the costs of separate collection to the coordination centre (CC). Based on the actual market shares of contracted producers, the coordination centre would determine the share of costs of each PRO. Market shares would be determined on a regular basis for all PROs and streams separately. The service itself would be provided by the the waste management company winning the tender.

Such a solution will provide a PRO for municipalities for a longer period. The PRO will still be able to propose a system of separate collection in cooperation with the municipality. The producers will still be able to change the PRO on an annual basis according to the price offer. The balance between the fees collected from producers and the costs of municipalities will be determined in the CC based on the latest data on market shares. The change of system adjustment will probably also require a change of collection infrastructure (bins) ownership, which is mostly owned by waste management companies today. During the transitional period, the CC could lease it from them or purchase it for depreciated values. After natural wear and tear and the investment cycle, collection bins would be gradually transferred to the ownership of the coordination centre and PROs would finance their replacement.

As the costs of processing one ton of paper are different from the costs of processing plastics, in connection with the introduction of cost sharing, it will also be necessary to ensure the monitoring of market shares for materials. Thus, the CC will also have to counterbalance the shares regarding this, otherwise a situation might

occur where some PROs would have higher costs than income. A deeper differentiation of fees could lead to the same result. It is suitable to set minimum fees at the level of unit costs of collection of the respective waste stream and carry out the subsequent differentiation only through maluses and not bonuses so that the price can never drop below the minimum value. Alternatively, market shares can also be monitored within a deeper differentiation of materials.

A minimum market share specified by law will prevent the speculative establishment of PROs which have a problem financing separate collection. A considerable number of PROs with a market share of about 2 % operate on the Slovak market. As they depend on a small number of producers, they reach balance with difficulties and also report problems with financing separate collection. Even after the withdrawal of authorisation, the same PRO may be established again, which may encourage speculative establishment. This can be avoided by granting authorisation to a PRO only on condition of proving a minimum market share, e.g. at a level of 5 %. The fluent launching of the system will be provided for by a transitional period specified once for a period of three years. Such a solution will not prevent new PROs from entering; however, proof will be required that their founders dispose of an adequate market share. A lower number of financially more stable PROs will allow better coordination of the system and facilitate the achievement of balance. In the Czech Republic, separate collection may only be provided by a PRO which has obtained at least a 10 % market share in one year. In Austria, PROs must prove a market share of 5 % over three years.

Contracts between local governments, the waste management companies and PROs must have a minimum period of duration and the circumstances under which they can be terminated must be unambiguous. Today, these contracts can be terminated very easily, which may cause waste management companies to prefer lower investments in bins and collection points. The most expensive municipalities face the risk of unjustified unilateral contract termination by PROs, which leads to the absence of conceptual building of separate collection system. Therefore, it is necessary to adjust a minimum length of contract duration and unambiguous termination clauses with specified legitimate reasons for contract termination. The notice period must guarantee that the local government can find a new PRO, and possibly also a waste management company, in time. It is also necessary to provide for executability because when terminating contracts today, PROs refer to commercial law, although the contracts are subject to the Act on Wastes.

Service predictability and continuous availability can be provided for by contracts concluded for 4 to 5 years. Short-term contracts do not support systematic development of municipal infrastructure. Long-term contracts guarantee service availability for municipalities and stable income and business for waste management companies. Moreover, they enable the creation of a plan for municipal infrastructure development in compliance with the objectives of waste management and the needs of local governments. Based on experience from abroad and in the interest of strengthening competition among waste management companies, we propose a period of 4 to 5 years as an optimum standard length of duration, which approximately reflects the sunk costs of infrastructure (European Commission, 2017). The contracts should not exceed this period so that the system is not extremely expensive and is sufficiently flexible[11].

Box 5: Audit of separate collection by the Supreme Audit Office

In 2018, the Supreme Audit Office (SAO) carried out a cross-sectional audit of municipal waste sorting and fulfilment of objectives undertaken by Slovakia. The reason was the threat that Slovakia would not fulfil the objective of recycling 50 % of municipal waste in 2020. Fifty-eight municipalities representing one third of municipal waste were audited. Although PROs are to settle all the costs of separate collection in municipalities, in five municipalities it was found that they paid for separate collection by themselves.

[11] In Germany, there was a practice of contracts for very long periods, as many as 20 years. A gradual increase in costs of separate collection was a negative consequence of such long periods. Since 2003, when ten-year contracts were released, the total costs of the system have continually decreased (OECD, 2016). In Kolín, Czech Republic, a contract has been concluded for as many as 25 years as a consequence of limited competition among waste management companies (Rais, et al., 2016).

Moreover, 80 % of municipalities settled the costs of waste management from their own budget. Thus, citizens pay lower fees for waste than real costs and are not financially motivated to sort (Najvyšší kontrolný úrad SR, 2019).

The audit revealed significant problems in reporting. In more than one half of municipalities, separate waste collection not included in the record-keeping was identified. Thus, in fact, more waste is sorted than reported but not all municipalities sort all components. As many as 40 % of municipalities did not monitor the sorting of all components (mostly MCM); nine municipalities even did not sort all components. As regards collection standards, as many as 27 municipalities did not fulfil them (mostly MCM and plastics), and 16 did not monitor them. Therefore, the SAO proposes an annual check on the fulfilment of objectives at the municipality level (Najvyšší kontrolný úrad SR, 2019).

3.2.3 To procure separate collection services for municipalities in tenders

The current method for the selection of waste management companies does not always ensure effectiveness and transparency. Waste management companies are often contracted directly based on a call for price offer or there is not a sufficient number of tenderers. In Kráľovský Chlmec, several bids were expected in a selection procedure, however, only one company registered. In some cases, municipalities are addressed by a potential supplier, e.g. municipalities in the surroundings of Šarišské Čierne, which were addressed directly by a waste management company after the discharge of a municipal enterprise.

The service of separate collection is often provided by waste management companies only because they collect municipal waste in the municipality (e.g. Sečovská Polianka was directly addressed by the company providing collection of mixed waste, or the municipality of Malá Čalomija, where both contracts were concluded at the same time). Thus, in several cases, the revenues from payments for municipal waste provide waste management companies with compensation for separate collection. There are even municipalities (e.g. Hrašné, Hrachovište or Jablonka) which do not have any contract with a waste management company; they have a contract directly with a recycling company and finance the collection themselves.[12]

Slovakia should introduce compulsory selection of waste management companies based on tender. Competition among waste management companies motivates them to find optimum cost solutions because they bear the majority of the costs of separate collection. Organisation of open tenders in regular intervals, adapting the contract duration to the economic life cycle of fixed assets and joint contracts for several local governments with the possibility to change the service supplier stimulate competition (Pavel & Slavík, 2018). In 2003, a tender was organised in Germany, and where only one tenderer registered, the contract prices were on average 70 % higher than the cheapest offer of competitors. In the next round, conditions were loosened so that smaller enterprises were involved and by 2005, the average costs dropped by as much as 20 to 30 % (OECD, 2016). Within the European Union, several approaches are applied to tenders for waste management companies:

- **Scandinavian countries have a waste system based on strong local governments** with great autonomy in decision-making. Their task is to organise separate collection; therefore, they utilise the services of private companies within supply relationships. Municipalities select waste management companies in tenders in compliance with the European rules of public procurement (Nordic Competition Authorities, 2016).
- **In Austria, there is a competitive model of several PROs** which participate in separate collection in every region according to their market share. According to law, contracts of service provision are

[12] These services are often carried out by municipal enterprises. They have a strong social aspect as they also employ disadvantaged people, (Deloitte, 2014), on the other hand, their use may be more expensive for the municipality than when it selects a waste management company through a tender. In contrast to a private enterprise, a municipal enterprise has a lower motivation to be effective, through coverage from the budget of the municipality, it may often have better access to finances (OECD, 2016).

concluded based on a tender for 3 to 5 years (Rais, et al., 2016). For greater flexibility, a digital platform is used for communication between PROs and waste management companies. Besides selection procedure, data flows between relevant entities also support the quality of service performance.

- **Belgium provides PROs with greater autonomy**; thus, the selection procedures are performed by the Fost Plus organisation in cooperation with local governments. This model is a kind of compromise between a system with stronger municipalities and a system preferring PROs. The tenders for waste management companies are organised by local governments, whereas the recycling facilities enter into contracts with PROs based also on tender result. See more about tenders in Belgium in Annex 4.

In the competitive system, an independent authority is necessary to provide for the organisation of tenders and the resolution of disputes. In Austria, VKS was established for the purposes of market organisation; it organises tenders for individual regions. The Coordination Centre could fulfil this task in Slovakia. On the other hand, the CC in its current form is not an adequate authority at the level of VKS. It is because VKS is financed by individual PROs, however, the Austrian Ministry of Environment is also represented in it and managers are selected through open transparent tenders. On the principles of VKS, we propose establishing a new central authority for separate collection which will organise tenders and coordinate the whole system. In Austria, every contract between the region and a PRO specifies an independent arbitrator. In Slovak conditions, a situation when mediation fails could be resolved by the region or, in the last resort, the Ministry.

Waste management companies need a guarantee that they will also be paid for any additional collection and municipalities need a guarantee of adequate service. This should be ensured by a suitably prepared tender. Today, contracts between municipalities and waste management companies contain in particular a description of the provided service or frequency of collection. The municipality of Cernina represents an example; it is not obvious from the contract to whom invoices for extraordinary collection exceeding the schedule should be sent. The tender documentation must be specified in detail so that the contract is explicit and indisputable. Moreover, the provision of separate collection services must be strictly separated from the collection of municipal waste, and both services must be provided separately so that there is no room for the application of a cross subsidy. **Well-prepared tender documentation and individual bids should specify in particular the following requirements:**

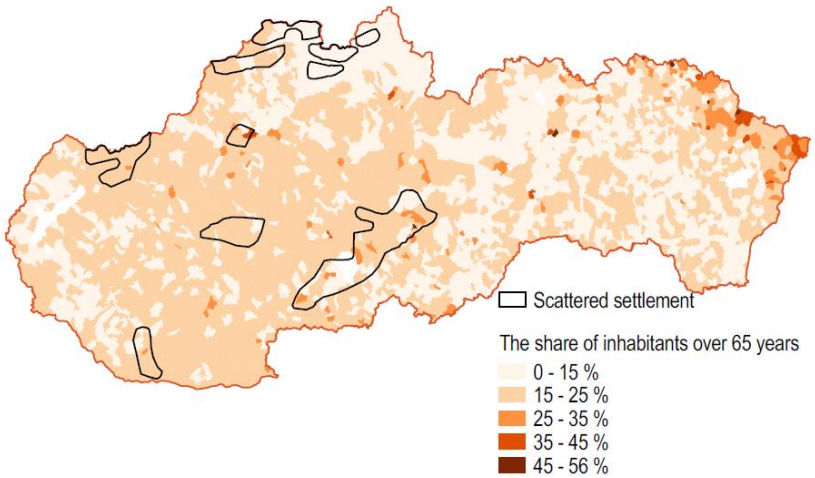
- **A special description of individual partial acts** specifying in detail the schedule and form of collection. Requirements must be described in detail for collection, handling, transport, sorting and preparation for further processing of the material. In order to prevent undersized servicing of some local governments, the requirements will also include the expected frequency of pick-up rounds, which must be adequate to needs.
- As a follow-up, it will be necessary to **divide the cost chain** in the same way. In the current practice, waste management companies provide a price within the scope of net costs (revenues from the sale of material are deducted from gross costs of collection). For the sake of comparability and transparency of the cost chain, it is necessary to separately calculate the costs of collection, handling, transport, sorting and preparation for further processing. The revenue from secondary raw material trading would subsequently be PRO‘s income, similarly to other European countries. For successful implementation, it will be necessary at the beginning to introduce special information duties for waste management companies vis-à-vis PROs and general government authorities.
- The tender specifies the requirements for **mechanisms of audit of cost eligibility**. All eligible costs, for example in the event of necessary extraordinary pick-up rounds, must be settled. Provability of waste management companies’ costs shall be documented by invoices, declarations about waste collection and recovery, weight certificates or by checking the movement of vehicles by means of GPS.

- The tender should require **compulsory electronic record-keeping of waste collection.** In such case, waste management company transports only marked bins, which provides PROs and municipalities with an overview of the real number of bins removed and can check the eligibility of financial costs of collection. At the same time, anonymity is eliminated and an overview of waste production is provided. In Senec, the introduction of electronic record-keeping for waste collection led to the reporting of "stowaways" who used unregistered bins for free. In Košec, this reduced the quantity of landfilled waste without any change in fees for waste (Slučiaková, 2019).
- Wwaste management companies will be required to provide a **minimum standard of post-sorting**. PRO would have the duty to pay for the whole post-sorting with a prescribed standard, which is usually defined by a maximum rate of pollution (mostly below 5 %) and foreign material. Technical standards for the result of post-sorting within individual streams exist in several countries, such as the Netherlands, Italy, Spain, Israel or the Czech Republic (Extended Producer Responsibility Alliance, 2018).

3.2.4 To ensure a compulsory minimum standard of service and adequate sorting infrastructure

Today, collection of sorted waste is not fully provided for in some municipalities, thus, the municipalities partially substitute the task of waste management and PROs. PROs often refuse to carry out collection if it is too expensive. This problem concerns in particular dying areas and areas with scattered settlement (i.e. isolated settlements in mountain areas and isolated houses, see Fig. 5), but also towns such as Banská Štiavnica, Modra or Čadca have had a problem with the unavailability of services. In such case, these local governments bear inappropriate responsibility for the system of separate collection as in many cases they must execute these services at their own costs. Waste is transported by the municipality or directly by the citizens to a collection point where the waste management company is willing to pick it up.

Fig. 5: Scattered and dying municipalities in Slovakia



Source: IEP according to the Country Atlas of the Slovak Republic and the Statistical Office of the Slovak Republic

Some municipalities even organise separate collection themselves - in such case EPR does not operate at all. Examples include the scattered municipalities in the surroundings of Myjava (e.g. Jablonica, Hrachovište, Priepasné or Jablonka), which did not have any contract with a waste management company, organising the collection themselves and selling the material directly to the recycling entity. After the bankruptcy of the plastic waste buyer, waste is now gathered at the municipality's collection point. Municipalities in North-Eastern Slovakia (Šarišské Čierne, Udavské, Cernina, Bukovce, Andrejová or Lipová) are relatively expensive, which leads to frequent changes of PROs, system and frequency of collection, in an extreme case to one pick-up of plastic waste per month, which leads to hygienic problems.

Today, producers do not fully finance separate collection (European Commission, 2018). According to the Act on Wastes, producers are fully responsible for the financing of separate collection, however, it this only partially true. If a municipality has higher costs than the region's average, the PRO need not fully finance the collection and it may pass a part of the costs on to the municipality. It is permitted by Decree No. 371/2015 Coll. concerning the Act on Waste, which, however, does not distinguish between actually overpriced municipalities and municipalities which will always be expensive because of their geography and scattered population. In mountainous and scattered Banská Štiavnica, costs will always be higher than in plain and concentrated Veľký Krtíš, although geographically they are close to each other. Thus, a part of costs is transferred to local governments and citizens (as many as 5 municipalities of the 58 municipalities audited by the SAO were concerned; see more in Box 5). For example, in the municipality of Hrašné, the cadastre of which also contains isolated settlements in mountain regions, the supplementary payment has amounted to as much as 26 % of costs of separate collection since 2016. Total costs are not fully reported in many cases because municipalities do not include in them the costs of informal collection from isolated settlements in mountain regions.

Slovakia should introduce a minimum standard of service, which will request collection of sorted waste at a distance of maximum 150 metres from the place of residence of the waste producer. As regards neighbourhoods where large-capacity containers are installed, there could be required that collection is not executed farther than the collection of mixed waste (which is already applied by Nitra today). Research in Spain and in the United Kingdom has shown that in assessing separate collection, infrastructure at a smaller distance was the most important factor (Mattsson, et al., 2003). In the USA, there was a 20 % increase in collection in case of a smaller distance from households in comparison with collection yards (Jenkins, et al., 2003), which is similar to the situation in smaller municipalities. In 2016, a law was adopted in Lithuania prescribing the average distance between a residence and a bin and in 2018 it was reduced from 150 to 100 metres. The European Commission also recommends the introduction of a minimum standard in Slovakia; it says that the standard could also include the type and volume of containers, minimum and maximum frequencies of pick-up rounds and the type of vehicle used, taking into account the availability of housing or climatic differences (European Commission, 2018).

Equipping pick-up vehicles with GPS may facilitate control and allow the PROs to adjust collection more effectively. In Greece, the minimum distance is set to 70 metres, however, the standard is ineffective because nobody enforces it. Several countries already measure the distance between a residence and a bin today. For example, Eko-Kom in the Czech Republic reaches an average distance of 91 metres (EKO-KOM, 2019). The Austrian PRO ARA (with a market share exceeding 75 %) cooperates with contracting partners using the DiGiDO application, which utilises GPS data where the participants exchange transport data on material flows and service routes. The application is used by about one half of ARA partners (ARA, 2019). The availability of collection can be increased by the transfer to a bag system (Slučiaková, 2019), which is efficient in particular in combination with quantitative collection (Seyring, et al., 2016) including the historical centres of towns (Sörme, et al., 2019).

Despite already introduced measures, some local governments do not dispose of sufficient infrastructure for sorting development. Assurance of pick-up rounds to a distance of maximum 150 m from a residence will not ensure comfortable sorting itself because low frequency may lead to overfull bins. Today, adequate infrastructure should be provided by the **"collection standard"**, which represents a minimum annual volume of pick-up for each municipality and each collected component. However, in Slovakia there is a significant number of municipalities where the standard is not fulfilled[13]. In 2018, this also applied to large towns such as Prešov (paper and plastics) or the city of Košice (MCM). Today, municipalities are responsible for fulfilling it, however, they cannot affect it because an additional capacity or frequency must be provided for

[13] For one PRO, there are 16 % of municipalities that did not fulfil collection standards in 2018 for at least one material. As many as 40.2 % of municipalities have at least one bin more than 90 % full, the most serious problem occurs for plastics.

by the waste management company and paid by the PRO. Therefore, it is necessary to transfer the responsibility for the fulfilment of the collection standard directly to PROs and introduce record-keeping of the installed infrastructure and frequency of pick-up rounds, which will allow easy check of the fulfilment of the standard.

The collection standard should be separately monitored in densely populated areas of towns and should take into account the number producers per waste. Although the collection standard may be fulfilled for a municipality as a whole, some parts of it can still have a problem with insufficient collection capacity, which occurred in Martin or Senec[14]. This concerns mainly densely populated areas, such as **neighbourhoods**, where the standard cannot effectively respond to increased sorting because it is only based on the quantity sorted in the previous year. This does not include waste which people would like to sort but have no place to do so. The so-called **satellites** represent another group of municipalities, these are the municipalities where the number of inhabitants, often without permanent residence, dynamically increases. The year-on-year increase in the quantity of waste produced does not correspond to the development of waste infrastructure; this happened, for example, to the municipalities of Rovinka or Kvetoslavov.

The use of current data from the electronic record-keeping of waste collection could adapt the infrastructure in real time. In such case it would be possible to introduce the rule that if a bin is full when picked up during a certain period, the PRO is obliged to ensure an immediate increase in the capacity of collection. Until then, the PRO will have time for correction, for example, education of inhabitants on how to use space in the bins more effectively. This will motivate PROs to provide more education, which is a frequent problem today. Electronic record-keeping of collection may also be used for flexible adjustment of the system for recreational areas, which have a problem with insufficient infrastructure in some months of the year.

The legal regulation should define edifying more exactly and consider the introduction of measurement of its effectiveness. Failure to execute promotional activities is the most frequent deficiency found during audits performed by the SEI. Suitable edification is among the key factors improving the sorting habits of the population. As municipalities encounter various problems, area campaigns need not be successful everywhere. Examples include the municipalities frequently participating in the drawing of lots in North-Eastern Slovakia (Andrejová, Vyšná Polianka, Lipová, Cernina), where the inhabitants are missing education adapted to their particular problems. Therefore, the form of edification should be defined more exactly, ideally bound to measurable indicators. It would be suitable to consider the regular measurement of bin pollution conducted by PRO. In some countries, compulsory minimum PRO expenditures spent on awareness have also been introduced. In Austria, they amount to 0.3 % of income, in Poland even 5 % (Busuttil, et al., 2016).

It is necessary to require the fulfilment of collection objectives at the level of municipalities. Collection objectives represent a specified share of the potential quantity of waste produced from packaging and non-packaging products; they are gradually increased to as much as 60 % of the potential. Their introduction would mean progress as in contrast to the standard, they are not based only on the sorted quantity but also on the total potential of sorting in municipal waste. However, today this objective is only set at the national level, which allows its fulfilment through local governments where already today citizens sort, and on the contrary, the development of sorting in other areas is neglected. To ensure an increase in sorting in the entire territory, it would be suitable to specify collection objectives in detail at the level of individual local governments or in the event of associating, at the level of greater units. For better transparency, it would also be suitable to define

[14] According to the data provided to the IEP by NKS, a double quantity of separated waste is collected in the combined residential construction in comparison with individual housing. This is caused in particular by paper, where the difference is quadrupled. There are several reasons: 1) Containers in the combined residential construction are to a great extent utilised by companies. 2) They are also used by the citizens living in the individual housing (on the way to work, to school with children, to shops or to cultural events). 3) The number of residents in the combined residential construction is much higher than shown by statistics (students, workers). 4) In connection with the fall in the price for paper, there is a strong increase in the volume of carton in 1100 L bins coming from companies.

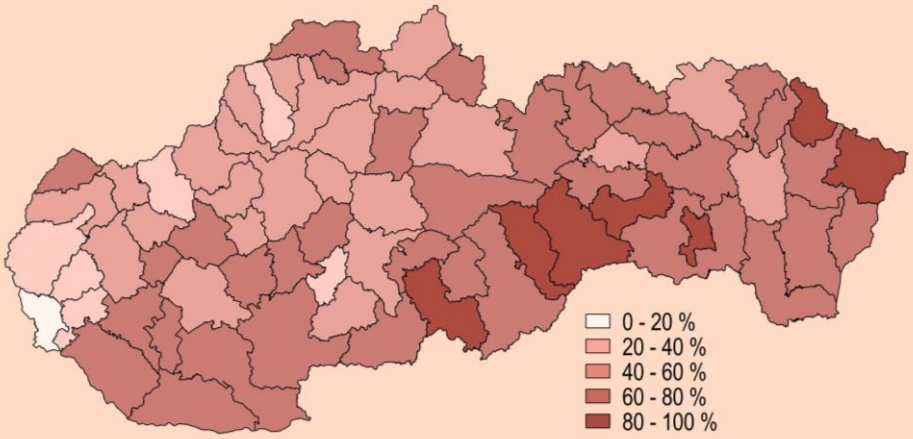
collection objectives for a calendar year and not as it is today, from the beginning of July of one year to the end of June of the next year.

Both PROs and municipalities should be responsible for collection objectives at the municipality level. Today, PROs are fully responsible for collection objectives, however, their achievement (unlike collection standards) also depends to a great extent on the cooperation of the local government. If a municipality has an exceptionally low fee for waste, people may not be sufficiently encouraged to sort despite the maximum effort of PROs. In such case, the municipality should prove that it fully passes the costs on to the citizens. Otherwise the responsibility for the fulfilment of collection objectives may be passed from PROs on to local governments. The introduction of collection objectives at the level of local governments, as well as of more accurate standards of collection, will also require an amendment to Act on Statistics No. 540/2011, which today limits the sharing of data on municipalities.

Box 6: Today, municipalities subsidise waste management, which reduces the motivation of inhabitants to sort

Although producers bear the primary responsibility for the operation of separate collection, cooperation of the local government is needed in order to ensure that people sort properly. The amount of the fee for waste and the method of its calculation significantly affect the decision whether packaging is thrown into separate collection or into mixed municipal waste. For this, exclusive responsibility is borne by the municipality. According to the data of the Statistical Office of the SR, as many as two-thirds of municipalities in Slovakia collect significantly lower amounts of fees for waste[15] than the real costs are, and the arithmetic average of supplementary payments reaches the level of 35 % of the value of costs. The inhabitants of these municipalities do not fully bear the costs connected with waste; thus, the municipalities subsidise waste management. Yet, the Act on Wastes stipulates that municipalities have to set the amount of the local fee on the basis of the real costs. Waste management is subsidised to the greatest extent in the Prešov, Košice and Banská Bystrica regions but the problem is also extensive in the district of Hlohovec. The municipality of Vápeník in the district of Svidník represents an extreme case; it does not impose any fee for waste and fully settles the costs of waste management.

Fig. 6: What is the share of municipalities subsidising waste management in a district? (2017)



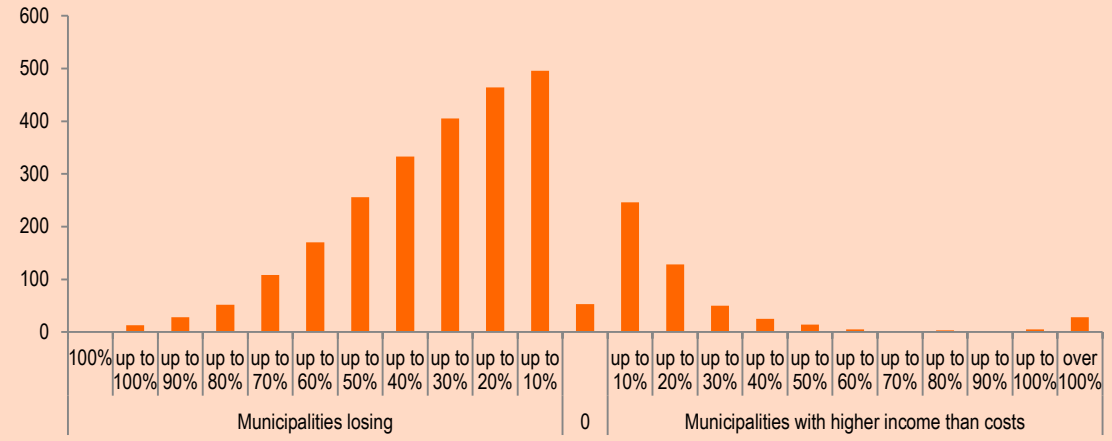
Source: IEP according to the Statistical Office of the Slovak Republic

The municipality can also affect the rate of sorting by the type of collection. The application of pay-as-you-throw, when a citizen directly pays for the waste produced by them, is an ideal scenario. However, today

[15] As a municipality cannot predict exact amounts collected and spent on waste management, we have set the difference between income and expenditures amounting to 10% as the criterion of systematic cross-subsidy.

only 13 % of citizens in the SR pay for waste in such manner. According to the analysis of the IEP Fair Waste, pay-as-you-throw in Slovakia reduces the production of mixed municipal waste per inhabitant on average by 22 % (with the use of token collection, by as much as 31 %) and increases sorting by 15 % for plastics and by 9 % for glass. Most frequently it is a method when savings can be reached by a lower frequency of collection, a token system, when people mark a bin by tokens to be emptied, or a combination of several approaches. Another possibility is to introduce a system of discounts when a lump-sum fee is paid, however, a significant discount can be obtained if a sufficient rate of sorting is proved (e.g. on the basis of data from the electronic record-keeping of waste collection) (Slučiaková, 2019).

Chart 8: Number of municipalities depending on what % of costs amounts to the subsidy of the municipality (2017)



Source: IEP according to the Statistical Office of the Slovak Republic

3.3 Effective regulation

A suitably set regulation, control mechanisms and enforcement of justice are crucial for the general operation of the separate collection system. However, today there is great room for the avoidance of duties. As for objective reasons, PROs have limited possibilities for control of their contracted producers, **control carried out by external auditors** is preferred abroad. **The capacities of audit authorities**, in particular of the SEI, should be strengthened, and some control processes could be automated by suitable **data collection**. As regards PROs, the control activity is to a great extent focused on the process of withdrawal of authorisation and insufficiently utilises **penalties**. A reform is necessary with the objective to specify accurately the amount of penalties. If a PRO fails to fulfil its duties, it is necessary to **enforce producer responsibility in relation to the producers** that passed their duties on to PROs. It is also necessary to control the purpose of utilisation of resources and to set rules for the creation of PRO reserves.

3.3.1 To perform external audit of producers

The collective fulfilment of EPR duties along with exceptions and insufficient control mitigates the emphasis on individual responsibility, innovations, and allows system avoidance (Watkins, et al., 2017). The entities placing less than 100 kg of packaging on the market annually need not fulfil their duties collectively but they must be registered and submit annual reports to the Ministry. The enterprises recovering packaging waste themselves may fulfil their duties individually; if the customer companies provably collect and recycle the rest of 100 % of the material. For example, 52 companies in the automobile industry fulfil their reserved duties in such a way; the share of packaging placed on the market by these entities amounts to approximately 7 % of all packaging in Slovakia. The entities that do not perform business activities are exempted from these duties (including state organisations). See more on the exemptions from the system in Annex 5.

The PRO has neither the tools nor the motivation to perform depth controls of correctness of the declared data. The basic duty of the PRO is to check 5 % of the total number of producers during the year (regardless of the reported quantities). If it finds that a producer has underestimated the quantities of packaging, the producer can pass to another organisation. Today, the producer is not obliged to allow the PRO to inspect the producer's accounting. EPR of packaging is affected most by stowaways because of the large number of entities (Marbek Resource Consultants Ltd., 2007). Their market share is estimated to be from about 2 % in France and the Netherlands, 5 to 7 % in the Czech Republic and Belgium, to 25 % in Germany. (Deloitte, 2014). As regards PET, underestimation in Slovakia is estimated at a level of 30 % (Dráb & Slučiaková, 2018).

In several countries, an external audit of producers is carried out by independent third entities (Deloitte, 2014). Such practice is also recommended by the United Nations Environment Programme in its EPR Manual (UNEP, 2017). In the Czech Republic, it is the contractual duty of producers to tolerate an audit. Deloitte and EY check the accounting and documents about material flows. Thus, as third entities, they are not affected by other interests. In Austria, the services of audit are ordered by the Packaging Coordination Centre (VKS) from contracting auditor companies. Similarly to tendering, an appointed independent authority should carry out audits in Slovakia.

New companies should already be familiarised with the duties of waste management upon establishment and engagement in EPR should be part of their business licence. Many small companies are not aware of the duty to register as packaging producer. If they apply an exemption, they are obliged to submit reports but they do not because they are not informed. Information on these duties could be provided already upon the registration of the business entity. Another step could be to condition business registration with registering in the system of PROs. For example, in Germany there is compulsory electronic registration of packaging producers in the LUCID system. Producers, importers, auditors, as well as online vendors are registered (Nairne, 2018).

3.3.2 To improve control mechanism and collection of data.

The Slovak Environmental Inspectorate (SEI) and district offices are the most important control authorities in the area of extended producer responsibility. They jointly control the physical methods of waste management, recovery and disposal, waste management facilities and separate collection. Moreover, district offices also hold permitting powers. The Inspectorate receives suggestions or acts proactively, and verifies the submitted documents about the holding and management of wastes of particular entities. Within the framework of waste management inspection, it controls PROs, waste producers, holders and processing entities, and municipalities. Based on the control, the state supervision authorities may impose a penalty or the Ministry may withdraw the authorisation. The Ministry also keeps records of reports from PROs, based on which it carries out continuous control of fulfilment of duties.

The insufficient capacities of SEI hinder control performance. Although with respect to the size of the market, the number of SEI employees is comparable with the Czech Republic, in the Czech Republic 90 inspectors deal with waste management, whereas only 26 employees solve these matters in the Slovak Republic. Yet, the Slovak competitive model requires more complicated control than the centralised monopoly system in the Czech Republic. Moreover, the review of environmental expenditures from 2017 assessed that SEI inspectors were remunerated below average and burdened by work which they should not carry out, such as legal matters (Institute for Environmental Policy and Value for Money Division, 2017). Therefore, it is necessary to increase the number of inspectors, to remunerate them adequately and ensure that control authorities have sufficient legal capacities.

PROs should be subject to strict control focused on the purpose of use of resources. According to the Act on Wastes, PROs should not achieve profit, and any profit has to be used to fulfil the reserved duties or

paid to all represented producers, and producers contracted in the previous year, e.g. in the form of fee discounts. The means of profit settlement can be checked today only in formal terms, i.e. whether the profit is provided in the annual report. While some PROs created certain reserves, some smaller ones report a negative level of equity capital, which increases the risk of problems with financing separate collection. On the other hand, the creation of reserves must also have its own rules as these are resources which primarily flow to separate collection. It is also necessary to carry out regular controls of the purpose of use of the resources, which will be carried out in cooperation with the Financial Administration or Tax Authority. The SEI itself cannot perform depth control because it cannot access the overall accounting. No control has ever been carried out as to whether the resources paid to waste management companies really correspond to the costs spent.

Control mechanism can be considerably improved by better data collection. The average length of controls carried out by the SEI exceeds two weeks (Slovak Environmental Inspectorate, 2019), whereas in the Czech Republic it is only three and a half days (Czech Environmental Inspectorate, 2019). Even in the current situation, there is significant potential for time savings by automating a part of control by suitable data collection and analysis. In Austria, a system of electronic data management is in operation; it automatically sends notifications of the violation or threat of violation of law and saves auditors EUR 5 mil. a year (Federal Ministry for Sustainability and Tourism, 2017). For this, it is necessary to bind PROs, municipalities and waste management companies to the provision of more detailed data. It concerns, for example, the gross costs according to materials and type of collection or capacities installed, collection frequencies and collected quantities at the level of municipalities. If, for example, the control authorities had a database of installed capacities and collection frequencies, they could automatically evaluate the fulfilment of the collection standard.

Better data collection can also reduce the administrative load of PROs. Today, they send notifications of wastes to the Ministry on a quarterly basis, and by the end of July they submit a report on the activity for the previous year (the reports are also publicised on the website on a quarterly basis). In order to prevent duplicity, the notifications and reports should be integrated to the maximum extent possible and PROs should be released from the duty of delivering all statements in printed form. The data (such as the quantities placed on the market, methods of waste recovery, lists of contractual municipalities, producers or processing facilities) can be used as the basis for control only in editable electronic form. The publishing of quarterly reports should be simplified as some data is not yet available at that time and other data essentially does not change during the year. The financial results, methods of profit or loss settlement or the costs spent on promotional activities can be replaced by an annex containing the income statement, which will reduce the additional administrative load.

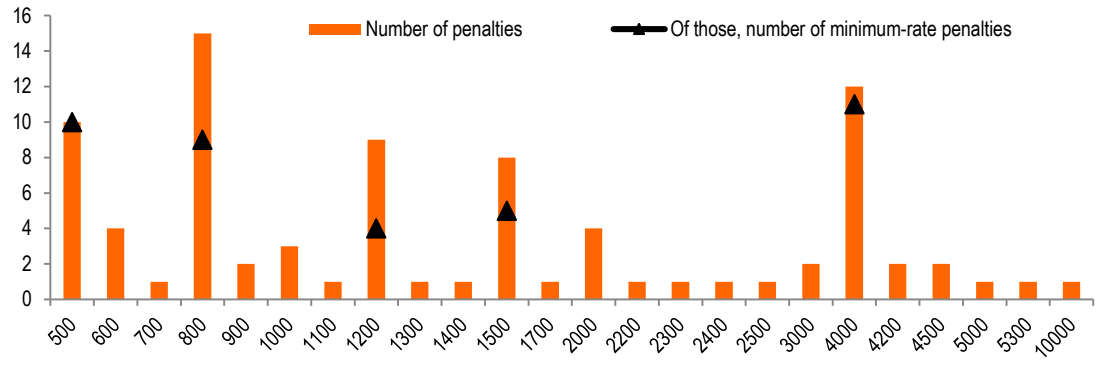
Cross-border sale via the internet without an importer allows avoiding the EPR system, however, to improve the efficiency of cross-border control, the packaging directive needs to be revised. Not all online platforms are aware of their duty to register in third countries, in particular where smaller vendors are concerned. Online sales cause underestimation of packaging quantities placed on the market and insufficient financing due to outages in fees. Directive 2012/19/EU of the European Parliament and of the Council on electrical and electronic equipment waste introduced in practice the fulfilment of reserved duties in other Member States through a permanent representative. To simplify administrative duties, the procedures of registration and submission of reports by electronic equipment producers in all Member States were harmonised (McCarthy & Börkey, 2018). A similar change will have to be adopted for packaging.

3.3.3 To apply clear and motivating penalties

The Act on Wastes is relatively ambiguous in the matter of exact specification of penalty amounts. They are set in various and very wide intervals from hundreds of euros to EUR 350 thousand. In the subsequent proceedings about the imposition of sanctions, the seriousness and duration of the misdemeanour is taken into account, and in the event of repeated violation, the rate may be doubled. However, penalties

close to the lower limit are imposed in practice. Thus, from 2016 to 2018, the average amount of penalty imposed in separate collection achieved EUR 1,500 and as many as 87 % of penalties were lower than EUR 3 thousand. The review of environmental expenditures also reproached the imposition of penalties close to the lower level (Institute for Environmental Policy and Value for Money Division, 2017). The highest penalty imposed in the area of wastes reached EUR 30 thousand and for separate collection, only EUR 5 thousand. Almost two-thirds of penalties were imposed by the SEI and 37 % by district offices. The biggest share was represented by sanctions for incorrect record-keeping of wastes or unauthorised waste management. See more about penalties in Box 7.

Chart 9: Number of penalties imposed by amount in waste management (2016-2018) (in EUR)



Source: IEP according to the SEI

During controls of PROs, misdemeanours are almost always solved in proceedings about authorisation cancellation. Excessive emphasis on the withdrawal of authorisation destabilises the system of separate collection as smaller misdemeanours may also lead to the withdrawal of authorisation. From 2017 to 2018, 13 controls of PROs were carried out, deficiencies were found in 11 cases. In five cases, authorisation was withdrawn, 3 proceedings were stopped and in three cases, advance preparation of proceedings was started. In practice, the effectiveness of such procedures is disputable as, for example, the PRO Recyklogroup, which lost its authorisation based on violating the financing of separate collection, later obtained authorisation again. The application of penalties is more flexible and acts as motivation to observe the law.

If provisions are violated, control authorities should utilise penalties to a greater extent and desist from the application of corrective measures without the imposition of penalties. Today, PROs are not motivated to observe provisions. In the completed controls in 2017 and 2018, no financial sanction was imposed upon any PRO although several deficiencies could have been solved in administrative proceedings by penalties. Only the duties to eliminate the revealed deficiencies, to hold employees responsible and within the set period, and to submit a report on the fulfilment of corrective measures were imposed. In particular, due to the time-demanding process, the imposition (Busuttil, et al., 2016) of financial sanctions is also a problem in other European countries (Deloitte, 2014). Romania is a good example, where a penalty of as much as EUR 19 mil. was imposed upon 6 PROs in 2015 for failure to fulfil objectives and false reporting (Busuttil, et al., 2016).

Penalties should be bound to the degree of violation of the provision to maximum extent. If the objectives of collection are not fulfilled to an extent of 1 % or even 10 %, a penalty could be levied against PROs in the amount of EUR 1,500 to 200,000, which allows imposing different penalties for a similar misdemeanour. Determination of penalty in EUR per ton below the objective is a better method. In addition to the failure to observe recycling objectives, such calculation can also be applied when collection objectives or standards of collection are not observed. In the SR, such a system will be applied in the deposit-refund system for single-use beverage packaging. In Belgium, sanctions are applied for the non-fulfilment of objectives in the amount of EUR 1,000 for each non-recycled and EUR 500 for each unsorted ton of waste. In Romania, a penalty of EUR 210 per ton is paid for failure to fulfil the objective (Busuttil, et al., 2016). In Israel, Act No.

5771/2011 introduced penalties amounting to (after conversion) EUR 390 per ton below the recycling objective. This rate has been gradually increased to EUR 650 per ton. Where this principle cannot be applied, the interval can be cancelled and the misdemeanour can be defined more precisely, which will provide the inspectors with stronger support in imposing penalties.

The producer must bear the final responsibility for unfulfilled duties passed on to the PRO. In the current system, there is relatively much room for unsound price competition, when some PROs attract producers with low prices, yet later are not able to fulfil their duties and lose authorisation. The exaction of consequences of unfulfilled duties from producers as well will increase producer cautiousness in selecting a PRO and stabilise the market. Such procedure is also recommended by the UN Environment Programme in its EPR Manual (UNEP, 2017). Already today, the law allows transferability of at least some sanctions to producers (e.g. for failure to observe the objectives of recycling). However, it is not applied in practice because in such case, it is also necessary to carry out control at the place of the entity, which is not feasible in the event of collective fulfilment of duties of thousands of companies.

Box 7: When penalties are higher on paper than in reality

The current legal regulation in the area of wastes expects relatively high penalties up to an amount of EUR 350 thousand. At the same time, it allows for a significant interval, where the upper limit in an extreme case represents more than 130-times the lower limit (pursuant to Article 117 of the Act on Wastes). The application of the Act in practice means that inspectors impose penalties close to the lower limit and the highest penalty imposed so far has been EUR 30 thousand. The Act determines six basic intervals of penalties:

- **EUR 500 to 50,000**: for example, in the event of neglect of municipalities' duties in waste management;
- **EUR 800 to 80,000**: for example, in incorrect waste management during collection or failure to ensure the collection of municipal and sorted waste;
- **EUR 1,200 to 120,000**: for example, if a producer's duties within EPR are not fulfilled;
- **EUR 1,500 to 200,000**: for example, in the event of operation of a waste collection facility and collection yard without authorisation;
- **EUR 4,000 to 350,000**: for example, if the ban on waste deposition or leaving at a place other than the designated place is violated.

Each interval has a specified circle of provisions whose violation may lead to the imposition of a penalty in the respective amount. Most provisions concerning EPR are concentrated in the first and third intervals. Lower penalties were also imposed in administrative proceedings in particular on natural persons and to some municipalities and companies. The penalties are paid in favour of the Environmental Fund. From 2016 to 2018, it collected about EUR 774 thousand from 516 penalties for waste, about one-fourth concerned separate collection. The median of penalties imposed reached EUR 1,200 and the average EUR 1,800. No penalty was imposed on PROs in the above years.

Despite the wide intervals of penalties, in practice they are imposed close to lower limits of individual intervals, as many as 43 % of penalties imposed by the SEI in separate collection were at the lower limit of the rate. Although a penalty of as much as EUR 120,000 is possible for failure to fulfil the producer's duties within EPR, the greatest part of penalties imposed for this misdemeanour were at the lower limit of the rate and the highest penalty reached only EUR 4,000. In addition to the seriousness or period of duration of the activity, other facts are also taken into account, such as whether it is the first or repeated violation of the law by the entity or to which extent the entity is active and cooperates in implementing corrective measures.

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Annexes

Annex 1: Selected comparisons of extended producer responsibility systems

The costs of separate collection are mostly fully settled by the PRO – either in the form of gross costs (SE, EE, LT, CZ, HU, RO, BG, EL, AT) or net costs reduced by the value of collected and sold sorted waste (NL, BE, FR). Norway represents an exception; PROs pay for the material collected. In some countries, full refund of costs remains on paper and the fees of producers are not sufficient to cover the overall financing of separate collection in municipalities (RO, BG, EL). Although in some countries (PL, SI, LU, UK) producers bear full financial responsibility for separate collection in municipalities, these countries also make for such solution (PL, SI, UK) and the full settlement is becoming standard in Europe.

Table 4: PROs and coverage of municipalities' costs for separate collection

State	Coverage of municipalities' costs	Note
NO	A part of costs	Municipalities are financially motivated to supply recycled raw material.
SE	Gross costs	
EE	Gross costs	
LV	Gross costs	They have contracts with waste management companies, half of them are municipal companies.
LT	Gross costs	
PL	A part of costs	Municipalities pay part of the costs themselves as the tradable recycling credits of producers are not sufficient to finance separate collection. Mountain municipalities pay more and participate less. In the future, penalties will be imposed on municipalities if they fail to introduce the system.
CZ	Gross costs	PROs pay for the packaging components in bins. The municipality pays for non-packaging products.
HU	Gross costs	
RO	Gross costs	Separate collection is not financed enough and not all costs of municipalities are covered. In 2011, producers covered the service for 23 % of inhabitants, in 2015 for about half of them, and in 2018, a part of inhabitants was still without the service.
BG	Gross costs	Municipalities below 3,000 inhabitants need not introduce separate collection and some of them have not introduced it. Municipalities in the vicinity of towns may introduce separate collection together with the town.
EL	Gross costs	Municipalities are financially motivated to supply recycled raw material. The system does not contain enough funds and some municipalities are not involved.
HR	Uncovered	Separate collection is being introduced. A state environmental fund is financing it as a pilot project. Beverage packaging and business waste has been collected up to now.
SI	Uncovered	Municipalities pay for collection. Some municipalities, in particular mountain ones, do not sort paper and glass. PROs pay for sorting and recycling.
AT	Gross costs	As much as 33 % of producers' fees goes to municipalities to cover costs. Moreover, producers share the costs of infrastructure in municipalities, e.g. waste bins.
NL	Net costs	Net costs are calculated as costs minus the value of material. They are indexed on an annual basis. As regards plastics, municipalities receive money only for recyclable plastics.
BE	Net costs	Net costs (costs - material value).
LU	A part of costs	
FR	Net costs	PROs pay roughly 75 % of costs, the rest is settled by municipalities from the income from material.
SK	Gross costs	In addition to packaging, PROs also cover costs of non-packaging products. The expenditures on packaging would be lower than EUR 7.4 per citizen.
UK	A part of costs	Tradable producer recycling credits finance the system but are not sufficient to finance it fully. A significant part of costs is settled by municipalities.
ES	Gross costs	

Source: IEP on the basis of the monopoly or largest PROs in individual countries

The service of separate collection is provided to municipalities by waste management companies (sometime municipal ones). If these are private companies, PROs refund them the costs, either in the amount of 100 % of costs (SE, LT, CZ, BG, NL, BE, LU), net costs (RO), a part of costs (PL, UK) or according to tender (EE, EL, AT). In other countries, municipalities are responsible for the fulfilment of collection objectives, thus they bear the costs of their waste management companies (NO, UK); in Slovenia, producers finance the post-sorting of waste on sorting lines and waste recycling.

Table 5: PROs and the rate of settlement of waste management companies' costs

Country	Coverage of costs of waste management companies	Note
NO	A part of costs	Payment to municipalities for a delivered ton of recyclable material.
SE	Gross costs	
EE	According to tender	Including recycling
LV		For a delivered ton of recyclable material
LT	Gross costs	Including recycling
PL	A part of costs	The volume of funds in the system of tradable recycling credits is not bound to costs of waste management companies.
CZ	Gross costs	
HU	In the past, gross costs, today, a state-owned company	Waste management companies have been transferred to state ownership and associated in one company.
RO	Net costs	Gross costs - revenue from the material.
BG	Gross costs	
EL	According to tender	For a delivered ton of recyclable material.
HR	Separate collection is not funded yet	The system seems to be cheap as it only provides a part of services, i.e. industrial waste collection.
SI	A part of costs	PROs pay municipalities only for sorting and recycling.
AT	According to tender	The Austrian PRO ARA gives waste management companies 67 % of income. The rest goes to municipalities.
NL	Gross costs	Including sorting (in the future, including recycling). The costs will be compared with the standard and will be subject to surveillance.
BE	According to tender	Collection and pure processing.
LU	Gross costs	Costs are refunded to private waste management companies, not municipal ones.
FR		Contracts of refunding with municipalities.
SK	Gross costs	
IT	Gross costs	
ES	Gross costs of municipal companies	PROs cover the costs of municipalities and not the costs of waste management companies.
UK	A part of costs	They have a system of tradable recycling credits. The funds generated by the system have not been sufficient for separate collection funding so far.

Source: IEP on the basis of the monopoly or largest PROs in individual countries

The annual costs of separate collection of PROs in Europe range from EUR 1 to 20 per inhabitant, which is, however, incomparable not only due to various price levels but also because PROs in various systems cover unequal parts of costs (e.g. in the United Kingdom, Ireland, and Norway, PROs cover only a fragment of costs and in particular municipalities bear the financial responsibility). The competitive systems, which should exert pressure on price reduction, are not cheaper than the monopoly ones (a suitable comparison is between Slovakia and the Czech Republic).

Table 6: Costs per inhabitant

Country	Competition of PROs/ monopoly of PROs	Costs per inhabitant (EUR/inhabitant/year)
EE	Competition	9.5
SK	Competition	7.4
CZ	Monopoly	5.5
AT	Competition	20
DE	Competition	11.5
NL	Monopoly	6.9
BE	Monopoly	7.9
NO	Monopoly	3.12*
FR	Monopoly	8.9
SE	Monopoly	6.18
ES	Monopoly	10.85
PT	Monopoly	6.8
IE	Competition	2.84*
UK	Competition	1.1*

* without the inclusion of municipalities' costs of separate collection. A significant part of costs is funded by municipalities.

Source: IEP on the basis of monopoly PROs and based on national coordination authorities

Performance of separate collection systems is usually compared according to costs per inhabitant against the rate of packaging sorting reported to Eurostat (OECD, 2016). This, however, is not objective as various countries have differing rates of bad payers and PROs do not bear the same scope of responsibility and do not pay the same package of services. As an alternative of performance assessment, we will use the criterion of introduction of an efficient standard of service and the risk of non-achievement of the objective in 2020. When revising the Framework Waste Directive in 2018, the European Commission designated Member States at risk of non-fulfilment of the objective of 50 % of waste sorting in 2020. Of 14 countries at risk, only three had the service standard in place (ES, PT, FI), as many as 11 of them had none. A failure to achieve the objective threatens as many as seven countries with the competition of PROs and without the introduced service standard, whereas four countries with the competition of PROs and with the introduced standard will probably achieve the objective in 2020. The reason may be that without the introduced service standard, the competition may cause a fight for "valuable municipalities" (cherry picking) and neglect collection from the municipalities considered inconvenient (Rais, et al., 2016).

Table 7: Typology of EPR systems by competition, service standard and risk of objective achievement

	Service standard introduced, no risk*	No standard**, at risk	Standard introduced, at risk*
Competition	AT, LT, DE, UK	EE, LV, BG, PL, RO, SK, MT	-
Monopoly	CZ, BE, NO, SE, SI, NL, LU, FR, IE, IT, DK	EL, HU, HR, CY	ES, PT, FI

* In 2018, the European Commission designated countries at risk of non-achievement of the recycling objective for 2020 (European Commission, 2018).

** In evaluating the possibility of achieving the recycling objective, the European Commission proposed in 2018 the introduction of the service standard in these countries as one of the means to achieve the objective.

Source: IEP on the basis of the monopoly or largest PROs in individual countries

High-quality sorting and collection near the source of waste, i.e. in households is crucial to increase the rate of sorting. Collection bins close to citizens improve citizens' degree of involvement in sorting. For that purpose, some countries introduced the so-called service standard. As a model, the European Commission mentions Flanders in Belgium, where it is compulsory to collect sorted waste at least once per two weeks from a house; it can be collection by means of bins in houses or by means of bags in high-density housing (European Commission, 2018). However, the service standard can also be ensured by a minimum number of collection points per km^2 (EE), a minimum number of collection points per capita (LV, CZ), strong bargaining power of municipalities (AT, DE), average or maximum distance between the bin and the household (LT, EL). In some countries, such standard of service has not been introduced (BG, PL, RO).

Table 8: Standard of service in a municipality

Country	Is there any criterion for the standard of service?	Infrastructure stability and development is provided by
EE	A minimum number of collection points per km^2	All PROs are in all municipalities and they share costs of infrastructure according to their market share. According to the European Commission, this service standard is not efficient as every citizen may select a different PRO (free market system), thus, in some municipalities, there can be excessive infrastructure, whereas some can have insufficient infrastructure.
LV	One collection point for max. 400 inhabitants	Nobody checks the fulfilment of the standard; service is lacking in particular in small and scattered municipalities.
CZ	One collection point for max. 180 inhabitants	According to the internal questionnaire of EKO-KOM, the average distance from the bin is 91 m and decreases over time.
EL	Internal regulation - a bin max. 70 metres from the house	The standard exists on paper; however, nobody checks it; a part of municipalities are serviced by collection yards and a part of them have no separate collection.
BE	The PRO is responsible for the uniform availability of the service	A monopoly PRO procures waste management companies. Flanders requires pick-up from houses on a monthly basis, for plastics, twice per month. The European Commission considers it a model.
AT	They rely on the negotiation of the involved municipalities, federal states and PROs, where a municipality has a strong bargaining position	Municipalities have a strong bargaining position, in case of dissatisfaction an arbitrator is appointed based on the contract, if the arbiter fails, negotiation continues at the level of the region, ministry and supra-ministerial packaging commission.
LT	The plan of waste management has required an average distance from the bin of 150 metres or 100 metres since 2018	All PROs are in all municipalities, they share costs according to their market share. The standard is checked.
BG	No	Municipalities with fewer than 3,000 inhabitants need not have separate collection. Some municipalities have not introduced it.
DE	Yes	PROs share the infrastructure, procure waste management companies after negotiations with municipalities.
PL	No	PROs do not have enough money to fund the system; some municipalities still have no separate collection and, in the future, will be penalised for it.
RO	No	The European Commission states that the infrastructure is missing and PROs do not fund it fully. In 2015, a penalty of EUR 19 mil. was imposed on PROs for failure to achieve the objective; according to the ministry in the country, as much as EUR 54 mil. was missing in the system, which means as much as EUR 2.8 per inhabitant.

Source: IEP on the basis of the monopoly or largest PROs in individual countries

Separate collection infrastructure consists in particular of bins and bags for sorted waste collection. The infrastructure needs replacement on a regular basis. If it is not owned by PROs, the owners of bins are refunded their purchase according to the required service standard by PROs. PROs never own vehicles, sorting lines or recycling capacities, they only own collection bins. They receive the service of collection, post-sorting and recycling from other suppliers. Several countries (AT, IT, CZ, ES, BE, EL) have specifications of the technical standards of quality of post-sorted material, for which PROs are also financially responsible if they procure such services (Extended Producer Responsibility Alliance, 2018). Within this standard, for example, a maximum level of impurities is set, which does not exceed 10 %. Some PROs also utilise technical standards within competitor competition. The largest Austrian PRO ARA, for example, provides registered trademarks ARArecythen® and ARAprocyclen® (ARA, 2019).

Table 9: Infrastructure ownership in municipalities

Country	Who owns the infrastructure of bins?
NO	Municipalities
SE	PRO
EE	PRO
LV	Waste management companies
PL	Municipalities
BG	PRO
EL	PRO
SI	Municipalities
AT	Waste management companies
BE	PRO
FR	Municipalities
ES	PRO
PT	PRO
IE	Collection points and collection yards are owned by private companies
UK	Municipalities

Source: IEP on the basis of the monopoly or largest PROs in individual countries

Separated waste is partially marketable, the revenues may amount to 25 % of costs of separate collection (AT, FR). Thus, for the balance of relationships between PROs and waste management companies, it is important that the separated material is owned by the entity bearing the costs of its collection, post-sorting and recycling.

Table 10: Ownership of separated material

Country	Who owns the collected material?
NO	Municipalities
RO	Waste management companies
BG	PRO
EL	PRO
AT	PRO
NL	Municipalities
EE	PRO
BE	PRO
FR	Municipalities
PT	Municipalities

Source: IEP on the basis of the monopoly or largest PROs in individual countries

Annex 2: Price lists of Slovak PROs

With some exceptions, on average, the fees of Slovak PROs essentially do not differ from each other. Smaller and newly established PROs tend to compete in prices more significantly. In general, the fees for individual packaging waste streams do not correspond to the costs of their processing and do not differ essentially depending on material (except for wood low in number), in other countries (see Annex 3), fees for individual materials are significantly differentiated. The reason is the fact that the mechanism balancing the contracting producers on the one hand and the municipalities on the other hand is based on the quantity of packaging placed on the market in relation to the total quantity of packaging and non-packaging materials placed on the market. Thus, it does not distinguish quantities from producers by materials, which means in reality that the producer that places only paper packaging on the market must also finance the separate collection of plastics, glass, metal packaging and MCM, thus, the costs are averaged.

Table 11: Price lists of Slovak PROs for packaging producers from 1 January 2020 (in EUR/ton)

PRO name	Market share	Glass	Plastics without PET	PET	Paper and cardboard	MCM	Metals	Wood	Other	Average in PRO
Envi-Pak	48 %	114	111	111	106	106	121	105	104	110
Natur-pack	40 %	96	119	119	96	119	119	39		101
RECobal	3 %	113	109	109	85	103	113	35		95
Elekos	3 %	90	96	91	88	88	86	47	88	84
Nowas	2 %	82	89	89	55	55	92	15		68
Recyklogroup	2 %	75	140	140	80	200	60	9		101
E-cycling	1 %	80	100	100	80	100	110	12		83
Sewa	1 %	85	110	110	80	80	110	10	100	86
OZV Slovensko	0 %	79	88	88	84	91	85	10		75
Asekol	0 %	99	99	99	95	95	99	95		97
Weighted average		104	114	114	99	111	117	69	103	98

Source: price lists of PROs and information on the objective of collection for individual PROs from 1 July 2019 to 30 June 2020

Taking into account that the integration of non-packaging products in the scheme for packaging is relatively rare (it is introduced in Cyprus, the Commission has recommended it to Spain and Romania), no comparison of fees with foreign countries is available. The difference of prices for glass, paper and cardboard is probably caused in particular by historical prices in combination with a high concentration on the part of paper producers.

Table 12: Price lists of Slovak PROs for non-packaging producers from 1 January 2020 (in EUR/ton)

PRO	Market share	Glass	Plastics	Paper and cardboard	Average in PRO
Envipak	48 %	135	108	41	95
Naturpack	40 %	110	119	39	89
RECobal	3 %	129	99	49	92
Elekos	3 %	75	83	61	73
Nowas	2 %	94	92	59	82
Recyklogroup	2 %	75	140	80	98
Ecycling	1 %	100	100	30	77
Sewa	1 %	110	105	30	82
OZV Slovensko	0 %	79	88	84	84
Asekol	0 %	99	99	95	98
Weighted average		121	112	42	91

Source: price lists of PROs and information on the objective of collection for individual PROs from 1 July 2019 to 30 June 2020

Annex 3: Fee amounts in select countries

Table 13: Average fees of producers for the provided quantities, 2019 (EUR/t)

Material	AT	BE	CY	CZ	DE	EE	EL	ES	FR	HU	IE	LV	LT	NL	NO	PL	SI	SE
Glass	87	31	29	74	140	102	11	197	14	19	9	85	79	56	1.4*	18	7	
Plastics	630	426	106	206	1263	409	66	472	346	38	89	159	177	553	141	5	195	334
Paper	90	22	47	96	250	105	53	68	163	19	23	33	38	22	34	3	17	182
MCM	610	618	123	208	765	0	57	323		38	94	0	141	380	0.3*		74	
Metals	275	43	58	74	743	255	15	102	78	38	81	68	54	20	1.1*	19	125	244
Wood	18	618		46		41	10	21		19	11	16	44	20		3	32	

* meaning fee in cents per piece

Source: IEP based on the association of European PROs PRO-E

Table 14: Average fees of producers converted into purchasing power parity, 2019 (EUR/t)

Material	AT	BE	CY	CZ	DE	EE	EL	ES	FR	HU	IE	LV	LT	NL	NO	PL	SI	SE
Glass	78	28	33	107	130	132	13	215	13	31	8	121	122	50	0.9*	31	8	0
Plastics	568	385	119	297	1177	528	80	516	317	61	79	226	274	491	95	8	238	272
Paper	81	20	53	139	233	136	64	74	149	31	20	47	59	20	23	6	20	148
MCM	550	559	138	300	713	0	69	353	0	61	83	0	218	337	0.2*	0	90	0
Metals	248	39	66	107	692	329	18	111	71	61	72	96	84	18	0.8*	33	152	199
Wood	16	559	0	66	0	53	12	23	0	31	9	23	68	18	0	6	39	0

* meaning fee in cents per piece

Source: IEP based on the association of European PROs PRO-E

Table 15: Eco-modulation of fees for environmentally more suitable materials in EU countries (EUR/t)

Selected stream of waste	AT*	BE	ES	LU	NL	SE	FR**	IT
Metals - aluminium	290	34	102	99		190		
Metals - steel	260	53	85	44		300		
Plastics - reduced rate	630				380	300	263	208
Plastics - basic rate	630				640	370	346	263
Plastics - increased rate							693	369
Plastics - PET		346	377	370				
Plastics - HDPE		342	377	370				
Plastics - biodegradable	400				640			
Plastics - other		510	472					

* Tariff of the largest PRO ARA.

** For France, a maximum scope of rates is provided. The real rate for producer depends on several factors, see Table 16.

Source: IEP on the basis of price lists of foreign PROs

Table 16: French system of bonuses and maluses for fees of producers (in %)

Bonuses	Awareness	Bonus for packaging	Sorting instructions on the packaging	8 %	Bonuses are summed up, however, maximum up to 24 %
			Triman logo on the packaging	5 %	
			QR code with a link to sorting instructions	4 %	
		Packaging-free bonus	Media information campaigns	4 %	
	Waste limitation	Bonus for waste limitation and recyclability	At least 1 step to packaging reduction or improvement of recyclability	8 %	
			Additional bonus for the documenting of the second step and its publishing in the list of good practice of CITEO	4 %	
		Bonus for sorted plastic packaging	PET, HDPE or PP bottles	12 %	
		Bonus for solid plastic packaging recyclable by current technologies 10 %	Hard plastics from PET, HDPE or PP (except for bottles)	8 %	
	Maluses		Packaging with mineral-oil-based agents	10 %	Maluses are summed up, however, maximum up to 100 %. Packaging penalised by a malus is not entitled to a bonus
			Packaging limiting recycling due to its design	10 %	
			Paper and carton packaging with printing, mineral-oil-based	10 %	
			Paper and carton packaging with printing, mineral-oil-based	10 %	

Source: CITEO

Annex 4: Model tender in Belgium

Belgium is considered a model of a well-operating system of separate collection. The process of selection of a waste management company is standardised and tender organisation is among the tasks of associations of local governments in cooperation with the Fost Plus organisation. The process follows European standards of public procurement. The model of tender documentation is available for the call of tenders, which contains a detailed description of the subject of public procurement and bid evaluation. The total model document contains 27 articles and 10 annexes.

In the first part, the contracting authority and procured service are specified. The general provisions explain the terms used, identify the contracting authority and describe the subject of procurement. The bid specification lays down all the compulsory parts, documents and certificates needed to accept a bid as complete. Price conditions, price breakdown to individual items, variant solutions and criteria of assessment of the bids submitted are also specified in detail. The general provisions determine in particular the conditions of communication, such as delivery, invoicing and legal relationships between the contracting entities. The list of terms explains the basic relations in accordance with the contract. PMD, various types of the sorting and recycling infrastructure, form, schedule and area of service provision, administrative support and complaint processing are defined.

The subject of the task describes in detail the service under procurement. Separate collection is defined in the agreement between Fost Plus and the Interregional Commission for Packaging (IVC). Public procurement procedure is selected; the contract may be divided into parts. The contracting authority separately reserves the right to divide the contract into parts. Separate collection in Belgium is based on the collection of blue bags with PMD directly from households (door-to-door). The sorted waste is then transported to sorting and recycling centres.

The introductory provisions define the period for which the service is procured, the contracts are concluded for several years. The contracting authority provides the possibility to organise an information meeting for tenderers to discuss the requirements for separate collection and possibly to clarify discrepancies concerning the service. The Bid Submission article sets the form and dates for delivery and for a change or withdrawal of a bid. Communication within the process of procurement takes place in electronic form. The legal framework specifies the waste legislation, which determines the rights and duties of individual participants.

As regards the form and content, requirements are imposed for the submission of unit price calculations and the calculation of the total contract value. The tenderer must prove its legal competence and submit all the documents in order to be included in the selection process. The quality of the service is specified through the schedule of collection, available and substitute vehicles, the existing and expected collection infrastructure and contracting partners. The tenderer must also submit a plan of service provision in case of extraordinary events, such as road work or strikes. The potential supplier also specifies the method of assurance of sorted item quality in the process of waste transport and handling. The availability of collection yards is proved by information on the time of operation, method of logistics and storage assurance or on the technologies used. The bid also includes the methods of assurance of protection at work, labour rights of employees and environmental management rules.

The submitted price bid must take into account the indexation of changes of wages and fuel prices. The criteria of exclusion set the conditions under which the bid cannot be accepted (e.g. incomplete documentation, unfulfilled quality, financial or technical criteria, etc.). Bids are evaluated based on multiple criteria, where price has a higher weight (80-60 %) and the quality of the service offered a lower weight (20-40 %).

The supplier of the service is obliged to lodge an annual security and provide cooperation to the authorised state surveillance employee. The bid can be submitted in variant solutions, and during performance it can be changed, for example, under the influence of unpredictable events concerning any of the participating parties. The other provisions set the rules for invoicing for the service provided, resolution of disputes in courts if no mutual agreement is reached, and for sanction mechanisms. The contractual sanctions are set depending on the nature and seriousness of the misdemeanour either in the amount of EUR 5-20 per bag or as a lump-sum in tens to hundreds of euros, e.g. if the required rules of transport, storage or employee qualification are not observed.

The part of Technical Requirements describes in detail the task and its partial acts. Collection from households and requirements for it are defined through:

- bags for PMD and stickers for such bags,
- collection itself and its course, handling, transport and placing in processing facilities,
- selection and location of the necessary infrastructure,
- time and location of collection,
- the schedule needed in terms of frequency,
- substitution for holidays or unperformed collection,
- communication with local governments and schools.

PMD contains plastics, metals and drink packaging. The technical requirements set the particular types of wastes belonging to reserved streams, and the quality of collected waste, for example, in relation to pollution by other components. Employees are obliged to complete compulsory training so that the highest possible quality of service is provided. The whole process is administratively supported by data reporting and electronic communication which the tenderer must be able to provide. All personal data concerning the contracting authority, tenderers or customers must be protected in compliance with the respective regulations.

The tender's "Annexes" part contains official forms and tables for the simplification of bid completing and for more detailed definition of delivery or reporting.

Annex 5: Exceptions in the system of extended producer responsibility

A packaging producer is obliged to join the system if it places at least 100 kilograms of packaging on the market annually. Enterprises with smaller quantities do not enter into contracts with PROs and do not pay fees. Companies must record and report the packing placed on the market. However, besides the packaging placed on the market to consumers, the companies unpack products from suppliers. Thus, they also become waste producers. As producers, they are not responsible for the waste as the supplier has already paid for the packaging within EPR. Nevertheless, the producer is responsible for the waste within the framework of basic duties in waste management. The SEI has recorded cases of business entities illegally managing waste and throwing it into bins for mixed municipal waste.

Abroad too, smaller producers are usually excluded from the main stream of PROs. In the Czech Republic, this concerns companies with an annual production of packaging lower than 300 kg and a turnover of up to CZK 4.5 million. In Austria, exemptions are graded for individual streams: 800 kg for glass, 100 kg for metals, 100 kg for wood, 300 kg for paper, and 50 kg for other materials (Rais, et al., 2016). In Belgium, small entities are exempt from the payment of fees, however, they may throw waste only into bins for separate collection. Thus, the burden is borne in particular by large enterprises. An alternative to possible cancellation of exemptions is also a system with a lump-sum fee for small producers, which ensures minimum participation (Marbek Resource Consultants Ltd., 2007).

Enterprises fulfil their duties themselves within the framework of individual producer responsibility. An individual producer supplies packaging exclusively to other companies. It must operate a functional system of individual management of its own waste. The condition for the grating of authorisation is the ability to recover the packaging waste independently, and at the same time, it must be proved that any waste is sorted and recycled within the corporate sector. In Slovakia, large enterprises operating in the automobile industry, related sectors, metallurgy, chemical or pharmaceutical industry in particular are concerned. In Belgium, these entities are obliged to work out a detailed waste plan, which must be approved by the competent authority, the Interregional Commission for Packaging (IVC).

Far more companies supply packaging not only to other companies but also to end consumers. As they are not able to process all the packaging within the corporate sector, the EPR duties apply to them. Currently, Slovakia does not make a clear distinction between industrial waste and municipal waste, thus both waste types enter the system of separate collection (European Commission, 2018). For example, industrial waste producers must enter into contracts with additional municipalities through PROs, but they will not collect waste from there because it is in industry. PROs subsequently also fulfil objectives through vouchers of waste recovery from waste management companies. For example, in Bulgaria, the PROs would not fulfil objectives without industrial waste, and in Romania, even with industrial waste they still have not fulfilled objectives (Busuttil, et al., 2016). Therefore, in several countries, waste management concerning packaging from industrial operations is separated from the duty to finance separate waste collection. This applies, for example, to the Czech Republic, Belgium, the Netherlands, Germany, Austria, France and Spain.