

# Good practices of waste management in Visegrad countries





## Experiences with **Complying with the Landfill and Framework Directives and examples of good practice in the Visegrad Four Countries**

European legislature represents an important driving force of waste management development in the Visegrad Four countries. The highest impact on waste management of cities and municipalities has the Landfill Directive 1999/31/EC, requiring reduction of biodegradable waste amounts going to landfills, and Waste Framework Directive 98/2008, laying down targets of material recovery of municipal waste.

The Landfill Directive 1999/31/EC in its Article 5 requires reduction of biodegradable waste going to landfills to the level of 75 %, 50 %, and 35 %, in 2006, 2009, and 2016, respectively, in relation to the production in 1995. The Czech Republic, Poland and Slovakia have an exception residing in that they may meet these aims with a postponement of 4 years (for the reason that they landfilled more than 80 % of solid municipal waste in 1995). Hungary did not request the postponement. Article 6 of the Directive requires that only waste that has been subject to treatment is landfilled.

The Waste Framework Directive 2008/98 requires recycling of 50 % of municipal waste, namely at least 50 % of paper, plastic, glass, and metal. The member states had 4 possibilities for determination of the recycling level, namely:

- a) 50 % recycling of paper, plastic, glass, and metal, from household waste
- b) 50 % recycling of paper, plastic, glass, and metal, from municipal waste and similar trade waste
- c) 50 % recycling of household waste
- d) 50 % recycling of municipal waste and similar trade waste.

It should be noted that complying with the above-mentioned Directives is not trouble-free in the Visegrad Four countries. In view of the fact that majority of changes are made at the level of cities and municipalities, the situation regarding the Directives should be thoroughly explained also to them, in order that necessary measures be taken in time. In our opinion, it is crucial to clarify, on the EU level, the methodology for proving compliance with the individual Directives, and to find the way how to support prevention, for example, home composting, within the framework of this. After all, the best waste is the one not produced.

### **Landfill Directive**

**The Czech Republic** set, on the basis of records, the production of biodegradable municipal waste (BMW) to be 1530000 tons (148 kg/inhabitant) in 1995. However, this amount does not include all green waste, both of municipal and household origin, as it was not managed according to the Act on Waste (home and community composting, illegal landfills). 11475500 tons may be landfilled in 2010, 765000 tons in 2013, and 535500 tons in 2020. The aim was met in 2010 (999047 tons), however, a higher than allowed amount of BMW was landfilled in 2013 (895192 tons, it means ca 59 % of the set value of 1995). Compliance with the aim is proved by a calculation, using analyses of waste going to

landfills as the basic data. In the Czech Republic, the term of ban of mixed municipal waste landfilling has been set already (2024).

In order to meet the set aims, the Czech Republic amended the Act on Waste in 2014. Starting from 2015, municipalities are obliged to separate paper, plastics, glass, metals, and biodegradable waste of plant origin. Furthermore, the Czech Republic adopted a ban of mixed municipal waste landfilling (2024). It also decided to not regard mixed municipal waste as treated anymore (waste separation in households will not be regarded as sufficient treatment). It means that all such waste will have to be subjected to treatment. The term for entering this measure into force has not been set yet.

**Hungary** estimated the production of biodegradable municipal waste (BMW) to be 2,34 million tons (234 kg/inhabitant) in 1995. Out of this amount, 1.57 million tons was biodegradable waste (35 %), and 765000 tons was paper (17 %). Material flows recording has only been started in 2004, this being also the first year since waste statistics exist in Hungary. Aims set for years 2006 and 2010 were met by Hungary. Compliance with the aims is proved by subtracting the annual amount (of paper, biodegradable waste ...) diverted from landfills from the data concerning 1995.

Hungary does not plan complete ban of mixed municipal waste landfilling. Only ca 70 landfills are in operation currently, and transport distances are rather high already (landfills that were not in accordance with the European legislation requirements were closed down by the end of 2009). Hungary has built a sufficient number of composting plants, many of them have shortage of inputs.

**Poland** determined biodegradable municipal waste (BMW) production to be 4380000 tons (155 kg/inhabitant in cities, 47 kg/inhabitant in the country) in 1995. The calculation was based on waste production in the individual areas (city/country), and the biodegradable components share therein. Similarly as in the Czech Republic, green waste was not fully taken into account in Poland. Aim for 2013 has not been met, it has been exceeded by ca 15 %.

Municipal waste management in municipalities and cities in Poland is regulated not only by the Act on Waste, but also by the Act on Maintaining Order and Cleanness in Municipalities<sup>1</sup>. In 2012 and 2013, requirements of the European Directives were incorporated into the Act. The Act requires that the municipalities ensure collection of paper, plastics, glass, metals, beverage cartons, biodegradable waste, and other biologically degradable materials. Containers for separated waste collection must be easily accessible and their number must be sufficient to meet requirements of directives valid for the locality in question. Municipalities must also ensure collection of bulky waste, medicines, batteries, electrical waste, hazardous and construction and demolition waste, and tyres, and ensure sufficient informing and public education of the inhabitants.

**Slovakia** determined biodegradable municipal waste (BMW) production to be 695000 tons (121 kg/inhabitant) in 1995. The estimation was based on the share of scrap paper and cardboard (238000 tons) and waste from gardens and restaurants (457000 tons). The European Commission questions this number, and proposes production estimate of 944000 tons (174 kg/inhabitant) in 1995, this being increase by 249000 tons, representing 50 % of the mixed residual waste. Compliance with the aim is proved by subtracting the treated amount from the data concerning 1995.

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<sup>1</sup> <http://isap.sejm.gov.pl/DetailsServlet?id=WDU20130001399>

In 2010 already, Slovak legislation laid down that municipalities are obliged to separate biodegradable waste, and banned landfilling of waste from gardens and parks. However, municipalities and cities pushed through a number of exceptions that enabled them to avoid this obligation. Because of that, stricter conditions will be valid from January 1, 2016.<sup>2</sup>

### **3. Compliance with the Waste Framework Directive**

The Waste Framework Directive requires recycling of 50 % of municipal waste, namely at least 50 % of paper, plastics, glass, and metals. The Czech Republic, Hungary, and Poland decided to meet the aim through recycling of 50 % of commodities. Slovakia decided to meet the aim of 50 % recycling of household waste.

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<sup>2</sup> [https://www.envipak.sk/files/documents/zakon\\_o\\_odpadoch\\_2015.pdf](https://www.envipak.sk/files/documents/zakon_o_odpadoch_2015.pdf)

## 4. Good Practice Examples

### 4.1 Czech Republic

Cities and municipalities play the key role in management of waste produced by households in their cadastral territory. Each municipality must decide, at least, how mixed and hazardous wastes will be disposed of in the municipality, how paper, plastics, glass, and metals, will be separated, and whether biodegradable plant waste will be separated and/or composted (this concerns household waste). The Act enables municipalities to issue by-laws defining their waste management system, and to determine also the way of payment for this service. There does not exist an only proper solution. As good practice examples, we mention two examples from the South Bohemian Region. The examples concern a municipality and a city with the lowest mixed municipal waste production in the Region.

#### 4.1.1 Chvalšiny

The municipality Chvalšiny has 1235 inhabitants. The former mayor, and an organic farm owner, Ing. Vlastimil Kamír, introduced the so-called cost-covering system of waste management payments in the municipality in 2005. The basis of the system is that the municipality inhabitants pay a fixed sum, covering costs connected with waste separation and operation of the waste collection site (in 2015, this sum is 150 CZK for the inhabitants from 6 to 70 years permanently living in the municipality, and half of this amount for holidaymakers and people living in vacation villages), and a variable sum paid as a payment for each stamp necessary for emptying a mixed waste container having the volume of 110 litres (in 2015, this sum is 60 CZK per stamp).

Concerning infrastructure, the municipality has a waste collection site, and containers for separated collection of glass and paper (having the volume of 1500 litres) are present in the municipality and in the vacation villages. Further commodities are separated into bags. PET bottles are separated in transparent bags, plastics in yellow bags, and beverage cartons in orange bags. The municipality collects the bags each Wednesday morning, the bags are collected in front of houses. For a full marked bag (marked by house number or name), a new bag is put into the letter box of the respective person. The citizens may put also waste paper, bound by a cord, etc. to the bags. Naturally, the bags may be also left in the waste collection site.

The total municipal waste production in the municipality was around 100 kg per inhabitant in 2012 to 2014. From this amount, 33 to 34 % was separated. This level of recycling is influenced by the fact that biodegradable waste is not included into the recorded waste production and utilization. If people bring biodegradable waste to the waste collection site, the waste will end in the community composting plant operated by the municipality, where wastes from greenery maintenance end, too. However, people do not use this possibility much, majority of them have their own composts. The municipality can chip waste branches for its inhabitants, it owns a woodchipper. The following table summarizes data on waste production in 2012 to 2014.

Waste kind	2012	2013	2014	2012	2013	2014
	(t)	(t)	(t)	(kg/inhab.)	(kg/inhab.)	(kg/inhab.)
paper	12.4	18.5	16.3	10.1	15.0	13.2
plastics	8.6	12.5	11.0	7.0	10.2	8.9

glass	12.6	12.5	10.2	10.3	10.1	8.2
edible oil	0.6	0.0	0.0	0.5	0.0	0.0
textile	0.0	1.7	0.5	0.0	1.4	0.4
mixed waste	60.2	73.9	52.5	49.4	59.9	42.4
bulky waste	7.5	11.5	25.4	6.1	9.3	20.5
hazardous waste	0.0	0.7	0.8	0.0	0.6	0.7

The municipality incomes and costs concerning waste management are balanced. Budget costs in 2013 amounted to 393131 CZK (318 CZK per an inhabitant). The municipality does not have problems with illegal landfills. It regards the cost-covering system to be an advantageous solution for municipalities of a similar size.

#### 4.1.2 Písek

Písek has around 30,000 inhabitants. The town Písek has been developing its waste management conceptually and in the long term. It operates its own landfill, and the company ODPADY-PÍSEK s.r.o. operates a separation line for plastics and paper, within the framework of a joint project with the town Strakonice. Waste management in the town itself is provided for by the company Městské služby Písek s.r.o., owned by the town. The company provides for transport of the individual components of municipal waste, operation of waste collection places, and a composting plant. In addition to that, it takes care of the town greenery, and provides for a number of other services.

In Písek, the following kinds of waste are separated: paper, plastics together with beverage cartons, mixed glass, biodegradable waste, textile, and electrical waste. In the town, there are 145 separated waste collection sites, 12 textile containers, and 12 electrical waste containers. In the city, there are 2000 containers for biodegradable waste (having the volume of 240 litres).

Further kinds of waste are accepted by the waste collection places. Specifically, this concerns the following kinds of waste: old furniture, wood, carpets, PVC, old clothes, textiles, household appliances, all secondary raw materials, and, further, hazardous wastes, such as accumulators, oil filters, oils, polluted textiles, brake fluids, mercury-containing waste (fluorescent lamps, discharge tubes), paints, varnishes, old medicines, and galvanic cells. Collection of tyres and construction waste is also provided for. There are seven waste collection places in the town. Three of them are in operation seven days a week, two of them 4 days a week, and two of them operate on Saturdays.

Year / Waste kind	2010	2011	2012	2013	2014
	(kg/inhab.)	(kg/inhab.)	(kg/inhab.)	(kg/inhab.)	(kg/inhab.)
paper	32.9	32.2	28.0	26.0	24.4
plastics	16.0	16.8	14.9	14.7	14.5
glass	10.0	9.3	8.1	8.6	11.2
biodegradable waste	45.6	39.2	69.0	150.5	215.9
mixed waste	213.9	204.2	149.7	140.5	133.5
bulky waste	-	-	29.3	29.1	32.2

It is obvious from the table that the mixed waste amount has been decreasing, even in spite of the fact that the town changed the method of payments for waste management in 2012 and introduced a local fee (in 2013, it amounted to 590 CZK). This is mainly thanks to permanent public education

and possibilities the town offers to households. For example, approximately a quarter of the separated biodegradable waste has been produced by households (1380 tons). Collection quality is good. In order to support this aim, 50 bags for biodegradable waste are distributed into each household annually.



## 4.2 Hungary

In Hungary, municipalities are in charge of municipal waste management. The waste management system is ensured for them by public service providers, through public procurement. Households pay overall fixed fee that does not cover all costs. Currently, the situation in Hungary is such that the waste management companies may not even transfer the extra costs to the households. Because of that, foreign waste management companies left the country. The missing motivation is reflected also in the overall results of municipal waste management. In spite of the fact that 95 % of households know how to separate waste, only ca 5 % of waste is utilised.

### 4.2.1. Alsónémedi

Alsónémedi is situated in the central region of Hungary, at a distance of 6-8 km to the South from Budapest - in the capital's agglomeration. The township's current population levies at about 5200 inhabitants but it grows slowly and steadily due to the new arrivals from other towns.

All these measures made it possible by the 2010's – besides implementing the obligatory measures required by the law and creating documents governed by regulations (eg.: Waste Management Plan) – to have numerous studies and measures ensure that all aspects of environmental protection receive special attention, including waste management. The following section is a list of measures to help waste reduction.

Until September 2010 separate waste collection was organised around waste collection points where the public could dispose plastics, papers, metals and glasses. In October 2011 the separate waste collection has been introduced which increased both the collection efficiency and the recycling rate ultimately decreasing the amount of solid waste at the same time despite the growing population. The two-bin waste collection system has been introduced in August 2014 which provides the separate waste collection service for every household. The traditional bin collects the mixed household waste while the 120L bin with the yellow lid collects the clean and washed packing materials. The residential waste collection fees last year were set as below:

– regular collection fees in 2014 (net, HUF)					Excess waste bag HUF/pcs (net)
60 L	110 L	120 L	240 L	1,1 m3	
217	325	325	679	3113	307

- Annual **junk collection**: until 2014 the collection of discarded items of all sorts was carried out by the council twice a year but from January 2014 Vertikál Zrt provides this service once a year.
- **Paper collection** is organised by the primary school annually but is removed as part of the separate waste collection as well.
- **Glass waste** collection is still not part of the „separate waste collection at source” system but glass waste can be disposed at four designated waste collection points. The removal is realised by Vertikál Zrt.
- The annual **electronic waste** collection in 2014 was realised by ROLFIM Elektrotechnikai és Finommechanikai Kft. (It resulted into 2971 kg of collected electronic waste in 2014).

- The annual **hazardous waste collection** was organised and financed by the council with the participation of Fővárosi Településtisztasági és Környezetvédelmi Kft until 2014. At present this service too is provided by the utilities. There is no hazardous waste generated by industry, but the agriculturally generated and inadequately treated waste (eg.: chemical containers) means a considerable amount of hazardous material. There were also many tyres that had accumulated and the a large amount of plastic remainings of polytunnels that – though not qualified as hazardous waste – the council still collected, removed and paid for.
- **Medical waste** can be disposed at three places – two doctor's offices and one paediatrician clinic – into sealable plastic containers, which is later transported in vehicles with sealed loading platform under the supervision of the council. The pharmacy and the dentistry organise their own medical waste removal.
- **Animal waste** can be disposed by the public at Remondis Kft.'s collection point in Dabas but Remondis collects it on site too if the waste is located in public place.
- **Used cooking oil and grease** generated at households and primary schools are collected by Biofilter Kft. Restaurants in the municipality have to arrange the proper disposal on their own. The network of domestically used oil and grease collection points is in operation, the MOL petrol station in Soroksár accepts it up to 20 L at a time.
- **Batteries** can be disposed at numerous collection points at schools, nursery schools, and the City Hall. Netta Kft. collects the disposed material.
- Tyre shops in the municipality treat (or have a contractor to treat) their **rubber waste** according to the law (C.S.O. Kft. in Ócsa).
- **Chemical and pesticide containers:** Small containers of pesticides can be collected as communal waste if properly washed. It is not collected separately.
- Maintaining the post of **rangers**, employment of a public area supervisor and a civil guard (with the aim to eliminate and to prevent the creation of illegal waste dump sites in the external areas of the municipality)
- Prioritising the **informing and engaging the public** and the environmental education of the younger generation.

Despite numerous arrangements is still problem lack of public engagement: Households that burn their waste – contaminating the environment – are not unheard of. Furthermore people frequently get their organic waste collected by mixing it with the household waste. The separate collection of organic waste will be compulsory from 2015 but we consider important to foster the household composting as well.

#### 4.2.2. Újpalota

**Újpalota is a borough in district 15 of Budapest, which is made up of three distinct areas:**

*Rákospalota – Újpalota – Pestújhely.* **District 15 lays on the left side of the Danube, in the Northern part of Budapest. Rákospalota and Pestújhely are leafy neighbourhoods with a long history behind while Újpalota is a typical metropolitan housing estate.**

Statistics say that an average household in the capital generates 150 kg organic waste a year that could be easily transformed into compost with a little effort. The aim of the participating organisations is to recycle the *zöldjavak* ('green goods' that is 30%-40% of the household waste) locally instead of discarding them at landfills. The words 'green goods' were created to emphasise that potato peels, apple cores, remainings of vegetables and fruits, cut grass and so on are not waste but important soil-improving materials.

One of the priorities of the programme is to make the people recognise composting as a way of reducing waste and improving the soil. Therefore various information materials have been printed and distributed among both the participants and the interested through the related organisations and at council offices too.

In 2013 the site has been built on an empty plot next to a car park and housed seven composting boxes (further three has been placed at the school nearby). 20 families joined the programme that year which meant about 40-50 participants. A compost master has been elected from among the participants to keep the site tidy and to supervise the composting. Programme was expanded to accept the applications of detached- and semi-detached households as well.

The programme's expansion had the following aims:

- Propagating composting among the public by emphasising its benefits.
- Persuading the participants of the programme to collect the kitchen and garden waste separately.
- Gradually decreasing the ratio of compostable material in the landfill-bound waste at the affected townships.
- Making composting a routine for the participants on long term.
- Making the institutions of the affected townships good examples of composting and managing public space.

After the successful introduction of the composting site at the housing estate 38 pieces of 380 litres and 192 pieces of 600 litres composting bins and also 9 pieces of 900 litres soil composting meshes have been dispensed.

#### Benefits and results of the programme

Participants of the programme – besides collecting domestic green waste – can also use the mature compost. This benefits both the participants with free compost and also the maintainer by decreasing the load on the waste collection system as the amount of total waste can be cut down by up to 30% by the composting system. This translates into lower waste collection fees too since communities could reduce the number of the green coloured, general domestic waste bins after the introduction of the composting site and recycling bins. This saves tens of thousands of Forints for each participating community and also eases the environmental load.

### 4.3 Poland

In Poland, the key role in waste management system is played by authorities managing their territories (gminy). After the requirements of the European Directives were incorporated into the national legislation in 2012 and 2013, each authority must decide, at least, how the municipality will manage paper, plastics, glass, metals, combination packaging, biodegradable waste, mixed and bulky waste, medicines, batteries, electrical waste, tyres, and hazardous and construction and demolition waste. The authorities define the waste management system, as well as the way of payment for this service, by means of by-laws. The by-laws concern not only households, but also other municipal waste producers.

Legislation specifies what level of recycling of paper, plastics, glass, metals, and construction and demolition waste have to be reached by municipalities in the year in question, as well as the method of calculation by means of which they prove it.<sup>3</sup> Legislation also specifies the maximum amount of biologically degradable waste that may be landfilled in the year in question.<sup>4</sup> The authority has to summarize the results of waste management in an evaluation report annually.

#### 4.3.1 Piaseczno

The administrative territory Piaseczno is both of urban and rural nature. In 2014, more than eighty thousand people lived in the region, more exactly, 83,152 people filled in the waste declaration, on the basis of which they subsequently pay waste management fees. Real property owners are obliged to submit the declarations. A person who declares that he or she would separate waste pays 9 PLN monthly for the service, a person who does not want to separate waste pays 18 PLN. By means of that, everybody is motivated to separation. In 2014, 87 % of persons declared that they want to separate waste.

In the administrative territory Piaseczno, there is separated paper, plastics, glass, metals, combination packaging, biodegradable waste (it is also possible to have a composter at home), textiles, bulky waste, hazardous waste, batteries and accumulators, electrical waste, tyres, bulky and construction and demolition waste. The so-called dry waste - paper, plastics, metals, and combination packaging - is collected in yellow bags and containers, glass is collected in the green ones, and bags and containers of another colour serve for collection of biodegradable waste. Other separately collected wastes may be handed over in a waste collection place, or, optionally, in selected places (pharmacies, schools, offices, shops).

The following table states the amounts of separated wastes in tons in 2013 and 2014:

year	Total municipal waste (Mg)	Mixed municipal waste (Mg)	Separated municipal waste (Mg)
2013	24 073.30	11 759.10	6 910.90
2014	27 049.40	3 704.10	19 514.30

<sup>3</sup> <http://isap.sejm.gov.pl/DetailsServlet?id=WDU20120000645&min=1>

<sup>4</sup> <http://isap.sejm.gov.pl/DetailsServlet?id=WDU20120000676>

The following table specifies production of the individual kinds of waste in 2014:

Dry wastes	Glass	Biodegradable waste	Other collected wastes	Mixed waste
15079.5	542.1	2186.7	3704.1	5537.1

Thanks to the adopted system, the Piaseczno region successfully meets all the requirements of Polish legislation, with a reserve:

year	type of waste	the required level of recycling	the resulting level of recycling
2013	The achieved level of restricted weight of biodegradable municipal waste going to landfill [%]	till 50%	11.50%
	The level of recycling and preparation for re-use following fractions of municipal waste: paper, metal, plastic and glass [%]	above 12%	29%
	The level of recycling, preparing for re-use and recovery methods other than hazardous construction and demolition waste [%]	above 36%	88%
2014	The achieved level of restricted weight biodegradable municipal waste going to landfill [%]	till 50%	3.20%
	The level of recycling and preparation for re-use following fractions of municipal waste: paper, metal, plastic and glass [%]	above 14%	37.30%
	The level of recycling, preparing for re-use and recovery methods other than hazardous construction and demolition waste [%]	above 38%	46.50%

In general, it may be said that 84 % of waste was selectively collected in 2014. In comparison with 2013, mixed waste production was reduced from 11759.1 to 3704.1 tons after introduction of the new system. However, even this amount does not end on landfills. Its majority is subjected to mechanical-biological treatment, a small part is incinerated. The total production of municipal waste per 1 inhabitant was 325.3 kg in 2014, and, from this, the amount of mixed waste was 44.6 kg.

Information source: Analiza stanu gospodarki odpadami komunalnymi na terenie miasta i gminy Piaseczno za rok 2014<sup>5</sup>

<sup>5</sup> <http://piaseczno.eu/index.php?&mnu=290&id=8120>

#### 4.3.2 Babice

Babice is a small administrative unit of rural nature, having 8936 inhabitants. Paper, glass, and plastics together with metals are separately collected in containers, these raw materials may be handed over also within the framework of mobile collecting. Further, there are collected medicines (special containers), and batteries and accumulators (they may be handed over in specified places) here. Mobile collecting is utilised in the case of hazardous waste, electrical waste, bulky waste, tyres, and small construction and demolition waste (50 kg per person). Within the framework of mobile collecting, also biodegradable waste may be handed over. However, the local authority has to be notified about that in advance.

The following table states the amounts of separated wastes in tons in 2013 and 2014:

year	Total municipal waste: (Mg)	Mixed municipal waste: (Mg)	Separated municipal waste: (Mg)
2013	1 461.70	1 216.10	222.30
2014	1 945.10	1 709.70	191.40

Thanks to the adopted system, the Babice region successfully meets the requirements of Polish legislation, with a reserve, with the exception of construction and demolition waste:

year	type of waste	the required level of recycling	the resulting level of recycling
2013	The achieved level of restricted weight of biodegradable municipal waste going to landfill [%]	till 50%	4.47%
	The level of recycling and preparation for re-use following fractions of municipal waste: paper, metal, plastic and glass [%]	above 12%	34%
	The level of recycling, preparing for re-use and recovery methods other than hazardous construction and demolition waste [%]	above 36%	0%
2014	The achieved level of restricted weight biodegradable municipal waste going to landfill [%]	till 50%	17.52%
	The level of recycling and preparation for re-use following fractions of municipal waste: paper, metal, plastic and glass [%]	above 14%	28.03%
	The level of recycling, preparing for re-use and recovery methods other than hazardous construction and demolition waste [%]	above 38%	0%

Waste management fees are based on a number of persons living in the real property in question, and on a fact whether they declare willingness to separate waste. The amount of monthly fee decreases with the number of persons. One person, who separates waste, pays 9 PLN, and if the person does not separate waste, then he or she pays 17 PLN. If nobody lives in a real property, but municipal waste is still produced in it, the fee is based on the volume of the mixed waste container. Again, a discount may be obtained in the case of waste separation.

## **4.4 Slovakia**

In Slovakia, municipalities are legally responsible for municipal waste management. The municipalities lay down in which way the waste will be managed, by means of a regulation. The regulation applies not only to households, but also to other waste producers, natural persons and legal entities, if they produce waste having the nature of municipal waste. Every waste produced within the framework of a municipality (waste produced by street sweeping, waste from street waste bins, waste from greenery maintenance etc.) is also regarded as municipal waste. The municipalities are responsible also for management of small construction and demolition waste produced in their cadastral territory.

### **4.4.1 Palárikovo**

The municipality Palárikovo is a picturesque municipality with lots of greenery and a number of cultural monuments. It has 4332 inhabitants, majority of them living in family houses. In 1999, its municipal landfill was closed down, due to tightening of legislation. Until that year, all municipal waste ended on the landfill (separated collection did not exist in the municipality). The municipality could choose either to transport waste to a distant landfill, and to pay more money for that, or to reduce mixed waste production and to start their composting and separating. On the basis of an analysis (waste analysis, survey of the possibility of raw materials selling), the municipality decided to reduce landfilling.

In 2000, intensive promotion of home and community composting was started in the municipality. Local press, broadcasting, distribution of leaflets, lectures, and school discussions were utilised. In order to support composting, activists manufactured wooden composters in the municipality, and offered them to the people. The municipality bought a chipper, and it has organised chipping of branches for the citizens in the time of tree pruning, directly at their houses. The campaign was repeated each year till 2006, and it included new interesting activities every times. In 2004, two municipal composting plants were built in the municipality. However, their capacity was not sufficient, and, because of that, a new composting plant was built on a plot of land of the agricultural cooperative in 2005. It composts waste from greenery maintenance, cemetery operation, and also waste that households are unable to compost themselves. In the cases of higher waste volume, the municipality offers the households also its transport to the plant.

In 2002, separated collection of further raw materials was started in the municipality. Gradually, there was introduced separation of paper and cardboard, beverage cartons, glass, plastics, metal packaging, textiles, shoes, electronic waste, tyres, batteries, cables, bulky waste, hazardous waste, and small construction and demolition waste. Waste separation is carried out by households, municipal authority, kindergarten and elementary school, agricultural and forest cooperatives, post office, shops, restaurants, and further entities in the municipality. Waste from the cemetery is also separated. Waste is separated into containers and bags, some kinds of waste have to be transported to the waste collection place, or it is necessary to wait till the time when their transport organised by the municipality is announced.

From the very beginning, the municipality has tried to motivate the households also economically. In the beginning, the municipality offered people a discount of 100 SKK from the fixed fee. This motivated 80 % of households. However, because this level did not further increase, the municipality



introduced mixed waste fees according to the waste volume in 2005 (separated waste is for free). Waste producer pays a fee for each emptying of a mixed waste container having the volume of 110 litres, the fee being currently 1.80 EUR.

The example of Palárikovo successfully disproves myths of the type „people are not interested“, „separated raw materials cannot be sold“, „it is too expensive“, „it is not possible to achieve the level of 50 % recycling of municipal waste“, used by lobbyists, politicians, and representatives of local authorities, to mask their indifference, incompetence, and effort to conserve the current inappropriate way of municipal waste management in Slovakia. The results are summarised in the following table:

*Table 1: Municipal waste handled in the municipality of Palárikovo during the project implementation phase.*

Year	Total municipal waste (t)	Mixed municipal waste (t)	Separated municipal waste (t)	Separate collection rate municipal waste	Disposed of municipal waste	Recovered municipal waste
<b>2000</b>	1250.00	1250.00	0.00	0.00%	100.00%	0.00%
<b>2001</b>	985.00	985.00	0.00	0.00%	100.00%	0.00%
<b>2002</b>	868.60	750.00	118.60	13.65%	86.35%	13.65%
<b>2003</b>	724.80	550.00	174.80	24.12%	75.88%	24.12%
<b>2004</b>	1033.40	470.00	563.40	54.52%	45.48%	54.52%
<b>2005</b>	1302.40	330.00	960.90	73.78%	29.68%	70.32%
<b>2006</b>	1400.36	385.00	1009.36	72.08%	30.71%	69.29%
<b>2007</b>	1593.52	380.00	1207.62	75.78%	26.41%	73.59%
<b>2008</b>	1606.14	410.00	1189.54	74.06%	28.68%	71.32%
<b>2009</b>	1721.81	530.24	1182.87	68.70%	34.50%	65.50%
<b>2010</b>	1609.68	530.24	1070.74	66.52%	36.91%	63.09%
<b>2011</b>	1348.17	478.00	865.07	64.17%	37.05%	62.95%
<b>2012</b>	1387.96	455.00	926.88	66.78%	33.91%	66.09%
<b>2013</b>	1 408.58	475.00	927.08	65.82%	34.69%	65.31%
<b>2014</b>	1 439.00	485.00	926.95	64.42%	35.58%	62.99%

#### **4.4.2 Chochná-Velčice**

The municipality Chochná-Velčice has 1732 inhabitants, it is located in the Trenčín district. The majority of its inhabitants live in family houses. Because the overall municipal waste production, as well as costs for its disposal, were increasing in the long term in the municipality, it was decided to reform the system in the beginning of 2013. The aim of the reform was to reduce the amount of waste that would be necessary to landfill, to increase the amount of separated raw materials, and to stabilise costs for the municipality waste management.

The reform was implemented in five steps. The first step was an increase of the fixed fee people paid, in order that the income from this fee fully covered the municipality costs. The fee was increased

from 15 to 25 EUR per person annually. Increase of the fee did not apply to people who signed an agreement on separated collection and home composting with the municipality. In the agreement, they pledged to separate specified waste components, and to compost biodegradable waste (wording of the agreement may be found in an annex to the municipality regulation VZN 5/2012). In 2014, the agreement was signed by 402 of 533 households.

The aim of the second step was to improve waste separation comfort. People were offered a possibility to separate paper, plastics, metal, and beverage cartons, into bags. The municipality transports the bags away from the individual houses each month. Advantages of the old system have been maintained, too. It means that paper is collected within the framework of school paper collection, or it is possible to exchange it for paper products (toilet paper, etc.) in an external company. Further, the municipality increased the number of containers for glass, and it bought also containers for textiles. The number of containers in the waste collection place increased, too. Within the framework of the reform, waste separation was introduced also in the municipal authority and in all organisations established by the municipality (kindergarten and elementary school, school dining room, cultural centre, fire brigade).

In the third step, home and community composting was supported. Greenery maintenance waste is composted in the waste collection place. Households may obtain 30 % grant for composter purchase. The municipal authority and schools have their own composts. The school kitchen disposes its waste in an electrical composter, using bacteria (type GG-02).

The fourth step was an intensive public education campaign, aimed at every house. The households got information on composting, and on the municipality waste management, they could participate in an excursion to a plant treating waste from the municipality. Everybody could get detailed information concerning the system functioning on the municipality web pages (<http://www.chocholna-velcice.sk/komunalne-odpady>). Prevention was not neglected, too. For example, the municipality ordered printing of stickers on letter boxes, rejecting advertising materials.

The fifth step was setting of control mechanisms. The exact number of emptied mixed waste containers is recorded, the containers are visually checked before emptying, 5 to 10 randomly selected containers are subjected to detailed analysis in the waste collection place. Subsequently, people are informed about all the results.

The following tables summarise the municipality results prior to the reform and after it.

*Municipal waste in tons handled in the Chocholná-Velčice municipality prior to the project launched in 2013*

	2005	2006	2007	2008	2009	2010	2011	2012
Total municipal waste:	240.31	232.98	254.24	301.80	276.37	278.46	338.59	356.36
Mixed municipal waste:	190.09	193.97	207.71	239.26	210.55	210.24	228.00	244.12
Large volume municipal waste:	18.75	16.47	14.50	16.30	18.80	22.37	50.05	50.07
Separated municipal waste:	31.47	22.54	32.03	46.24	47.02	45.85	60.54	62.17
Municipal waste	13.10%	9.67%	12.60%	15.32%	17.01%	16.47%	17.88%	17.45%

separation efficiency:								
Disposed of municipal waste:	86.90%	90.33%	87.40%	85.84%	83.70%	84.59%	82.12%	82.55%
Recovered municipal waste:	13.10%	9.67%	12.60%	14.16%	16.30%	15.41%	17.88%	17.45%

*Municipal waste handled in the municipality of Chochoľná-Velčice during the project implementation phase.*

	2013			2014		
	Tons per municipality	Percentage	Kg per inhabitant	Amount in municipality	Percentage	Kg per inhabitant
Disposed of municipal waste:	209.03	63.66%	122.03	149.13	46.91%	87.06
Recovered municipal waste:	119.342	36.34%	69.67	168.807	53.09%	98.54
Total amount:	328.37	100.00%	191.69	317.94	100.00%	185.60

Results in 2014, in comparison with 2012:

- Total municipal waste amount was reduced from 356.36 tons to 317.94 tons, this being decrease by 10.78 %.
- Amount of mixed municipal waste from households was reduced from 244.12 tons to 125.80 tons, this being decrease by 48.47 %.
- Amount of disposed of municipal waste was reduced from 294.19 tons to 149.13 tons, this being decrease by 49.31 %.
- Amount of recovered municipal waste was increased from 62.17 tons to 168.81 tons, this being increase by 171.52 %.
- Amount of emptied mixed municipal waste containers was reduced from 14 715 pieces to 5 592 pieces, this being decrease by 62 %.
- Whereas the municipality had to pay 9391 EUR for waste management in 2012, it reported profit amounting to 1778 EUR in 2014. All the costs caused by the reform (purchase of containers, transport of bags, printing of materials, etc.) were also covered from the saved money.

The example shows that municipalities in Slovakia have sufficient tools to influence waste management methods in their territories.

## 5. Conclusion

Experience of the Visegrad Four countries shows that the states have different approaches to complying with the Landfill Directive 1999/31/EC. This is caused, among other things, also by the fact that waste management level and administration differ in these countries, and that even a unified interpretation of the used terms does not exist. This has manifested itself, for example, in differing balances of biodegradable municipal waste production in 1995, and in different approaches to proving compliance. Another problem of the Landfill Directive is that it hinders prevention. In view of

the fact that it is not clear how to calculate amount of biodegradable waste diverted through home and community composting, these volumes cannot be included into the calculations. Consequently, it results in lower support of home composting and useless transport of biodegradable waste. Households subsequently pay higher costs for higher comfort. Because of that, it is necessary to find a way how to include waste diverted in this way into the balance. This is particularly important for the Visegrad Four countries, where home and community composting has a long tradition.

The individual Visegrad Four countries have different approaches also to complying with the aims of the Waste Framework Directive 98/2008. This is caused by many factors. One of the most important of them is how the country in question implemented the Packaging Directive. This issue is influenced by the fact that there does not exist a unified methodology for proving compliance with the aims, too. This may be of great importance, as may be shown on the example of Poland and the Czech Republic. Whereas the level of 50 % recycling of paper, plastics, glass and metals may be proved for all these four commodities together in Poland, in the Czech Republic this must be proved for each of the commodities individually.

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