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COMPARISON OF THE RECYCLING PERFORMANCE AND THE WASTE LEGISLATION IN HUNGARY AND GERMANY

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Abstract

The European waste management principles are laid down in EU documents. They also include specific targets that Member States have to fulfil within a certain period of time. The three most important documents in this field are the Waste Framework Directive, the Landfill Directive and the Packaging and Packaging Waste Directive. The provisions for municipal waste are defined in the Waste Framework Directive that sets the tasks to be completed by 2020. The comparison of performance indicators of Member States shows that there are significant differences. Having examined the relevant statistics, it is visible that the Central European countries (Visegrad4 countries) have similar performance. Their

indexes are considerably below the top performers' ones. Therefore, it is useful to compare the public service waste management system of two groups above (top performers and V4 countries), because the municipal solid waste produces the most significant quantity and the most complex waste stream. The national waste management systems must conform to EU legislation; however there is a possibility for a free choice in the detailed rules. Through the comparison of the respective waste management systems the similarities and differences are analyzed in this paper.

Keywords: recycling performance, waste legislation

JEL code: K32; Q19

Introduction

The EU has an important role to protect the environment and human health by reducing the generation of waste and by applying the re-use, recycling and recovery (General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' - Decision No 1386/2013/EU of the European Parliament and of the Council, 2013).

The European Union sets out obligations for each Member States in the field of waste management. The regulatory documents are:

- Waste Framework Directive 2008/98/EC
- Landfill Directive 1999/31/EC
- Packaging and Packaging Waste Directive 94/62/EC

They regulate the duties and provide for the goals to be met. This paper aims to examine the specifications and their fulfilment relating to municipal waste.

The targets they set out have been partially fulfilled; however, they make significant commitments for the future. As they regulate in the form of directives, Member States are thus creating the detailed rules.

A significant part of the objectives set out relates to the field of municipal waste.

Municipal waste consists of waste collected by or on behalf of municipal authorities, or directly by the private sector (business or private non-profit institutions) not on behalf of municipalities (Eurostat, 2015). It contains the household waste and similar commercial, industrial and institutional wastes including separately collected fractions (Eurostat, Guidance on municipal waste data collection, 2012). The amount of it in the EU is 255 million tons per year, in Hungary 4 million tons per year.

Members' waste management legislation typically provides for the obligations and constitutes additional implementing regulations. In Hungary, the relevant legislation is the 185/2012 Act on Waste, supplemented by a large body of regulation. Germany, taking into account relevant EU expectations on circular economy, promoted the Act on Circular Economy (Kreislaufwirtschaftsgesetz) in 2012 which also contains the provisions of the former waste management legislation.

The operation of municipal waste is a multilevel process, in which all actors must be active, aware and synergistic. Looking at the performance in the objectives mentioned in the previous points we can see that some of the Member States failed to fulfil them completely. It is necessary to examine the given roles of actors (e.g. legislature, local governments, environmental authorities and agencies, waste producers etc.) with comparison the systems of well-performing countries to non-compliant or only partially performers. It is also necessary to consider the system of incentives and enforcement measures.

Materials and methods

I have studied the relevant provisions of municipal waste in the EU's environmental action programs and directives. The results are presented in comparison tables. The summary covers the planned proposals, which are still under negotiation. I examined Eurostat data, the databases of the Hungarian Central Statistical Office and the data summaries of the National Waste Management Programs for municipal waste management. The data needed for this paper are by all three sources available, I have chosen the Eurostat statistics because it is also the solid and comparable basis of other European countries. It is compared the performance of the high-performing countries and the Visegrad 4 countries in the period from 2004 to 2013. Because there can be observed significant and typical difference between advance party and the countries of the V4, I chose a character from both group: Hungary and Germany. I compared the position of the two countries' in waste generation and in treatment and disposal. I calculate the trends in both countries until 2020 and determined the chances to fulfil the obligations of the year 2020. The two functions typify both the convex and the concave curve, so it was necessary to examine many types of trends. At the linear trending the R^2_{GER} was 0,6511, the R^2_{HUN} was 0,913, the equations of Germany and Hungary were respectively $y = 0,6345x + 58,98$, and $y = 1,96x + 6,02$. At the power trending the R^2_{GER} was 0,8143, the R^2_{HUN} was 0,7132, the equations of Germany and Hungary were respectively $y = 57,902x^{0,0498}$, and $y = 8,3019x^{0,426}$. Other trend calculating options did not give any acceptable outcomes (e.g. low goodness of fitting) for the countries future performance.

Proper waste management activities are expensive; in my experience it is possible to achieve significant results only with the use of strict legislative measures. Since the creation of the detailed rules is the task of the Member States it is reasonable to compare the two countries' legal systems for waste management. I examined the legal hierarchy and the content of the

laws and regulations. The results are summarized in the following tables. After the legal analysis I draw conclusions and make recommendations.

Result and discussion

Frames of the waste management in the EU

The environmental action programmes

In the European Union there are environmental action programs (EAP) since 1973. The sixth action program was in force from 2003 to July 2012.

The Sixth Environmental Action Programme set the environmental objectives and priorities as an integral part of sustainable development in the EU (Environment 2010: Our future, Our choice' - The Sixth Environment Action Programme, 2015). In addition, special attention will be paid to four priority areas for action. One of this four was the „Sustainable use of natural resources and management of wastes” in December 2005. One of its main idea is that waste volumes are predicted to continue rising unless remedial action is taken. Further measures are needed to encourage recycling and recovery of wastes. As specific measure specifies

- quantitative and qualitative reduction targets
- ensure source separation and recycling
- development of legislation of biodegradable waste and packaging waste (Taking sustainable use of resources forward - A Thematic Strategy on the prevention and recycling of waste, 2005).

The principles are the continuity and the interdependence by the creating a new environmental programme, the starting point of it is the evaluation of the former programme. Based on the assessment of the 6th EAP clear targets were:

- decreasing the amount of waste being landfilled, increasing the separately collected streams
- recycling targets for household waste
- tightening minimum targets for separate collection and/or recycling and recovery of the waste streams.

Furthermore it is necessary to set concrete measures for source separation (Final Report for the Assessment of the 6th Environment Action Programme, 2011).

The current „Living well, within the limits of our planet” document sets the EU priority objectives for 2020, in line with a vision for 2050.

The EU is committed to

- protect the environment and human health
- prevent or reduce the impacts of waste
- reduce the impact of resource use and improving the efficiency of such use
- apply the waste hierarchy

It is made clear that there is considerable potential for improving waste prevention and management to make better use of resources, open up new markets, create new jobs and reduce dependence on imports of raw materials. This is connected to the programme Resource Efficient Europe, requires the full implementation of EU waste legislation throughout the Union, based on strict application of the waste hierarchy and covering different types of waste.

The EU stated that there is a need of the further implementation of the Shared Environmental Information System principle of „produce once, use often” (General Union Environment

Action Programme to 2020 'Living well, within the limits of our planet' - Decision No 1386/2013/EU of the European Parliament and of the Council, 2013).

The directives

The waste related directives formulate the specific objectives, what are drafted in the environmental action programs. The directive influencing municipal waste collection system is the Waste Framework Directive. Further detailed rules are added in Packaging and Packaging Waste Directive and in the Landfill Directive.

Waste Framework Directive (WFD)

Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste was the former legislative framework for the handling of waste in the EU. The Sixth Environment Action Programme calls for the development or revision of the legislation on waste, including the development of measures regarding waste prevention and management, including the setting of targets. These requirements were laid down in the 2008/98/EC directive, the Waste Framework Directive.

Important requirements in WFD involved municipal waste are, that Member States shall take measures to promote high quality recycling and, to this end, shall set up separate collections of waste where it is technically, environmentally and economically practicable and appropriate to meet the necessary quality standards for the relevant recycling sectors.

By 2015 separate collection shall be set up for at least the following: paper, metal, plastic and glass.

By 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight (2008/98/EC, 2008).

New proposal in 2014

The Waste Framework Directive ordered that by 31 December 2014 at the latest, the Commission shall examine the measures and the targets, and if necessary, reinforcing the targets and considering the setting of targets for other waste streams (2008/98/EC, 2008).

Therefore in summer of 2014, the European Council reviewed the legislation and the goals of the recycling in the EU Waste Framework Directive, the Landfill Directive and the Packaging and Packaging Waste Directive. As a result new elements and goals were set. The proposal is the part of the circular economy principle.

The proposal claims that in 2011 in the EU 500 million tons of waste was incinerated or landfilled, that could have been otherwise recycled or reused. The recycling of that quantity would improve the resource efficiency and lead toward the circular economy. It is been stated also (again and again), that there are large divergences between the member states in the waste management (Proposal for a Directive of the European Parliament and of the Council amending Directives 2008/98/EC, 94/62/EC, 1999/31/EC, 2000/53/EC, 2006/66/EC, and 2012/19/EU, 2014).

The WFD focuses on the reusable or recyclable components mixed in the municipal waste or collected separately and prescribe the value of 50% as a target. The proposal focuses as further development of the waste management however on the municipal waste as a whole, not only on its certain components. It determines a major challenge to the Member States,

although the debate is still ongoing. The implementation of it will radically alter the waste management system even in the currently well performing countries as well.

The municipal waste related obligations are summarized in Table 1.

Table 1 Summary of the recent and proposed regulation

date	ratio	operation	material	origin	C/P
by 2020	minimum 50%	preparing for re-use and the recycling	at least paper, metal, plastic and glass	from households and possibly from other origins	current legislation
by 1st January 2020	minimum 50%	recycling and preparing for re-use	municipal waste	household waste and similar to it	proposed legislation
by 1st January 2030	minimum 70%	recycling and preparing for re-use	municipal waste	household waste and similar to it	proposed legislation

Personal compilation, source: (2008/98/EC, 2008), (Proposal for a Directive of the European Parliament and of the Council amending Directives 2008/98/EC, 94/62/EC, 1999/31/EC, 2000/53/EC, 2006/66/EC, and 2012/19/EU, 2014)

Some Member States' performance in municipal waste

In 2011 in the EU 255 million tonnes of municipal waste was produced. The per capita municipal waste generation averaged 503 kg in the EU, ranging from 298 to 718 kg across Member States. On average, only 40 % of solid waste is prepared for re-use or recycle whereas some Member States achieve a rate of 70 %. At the same time, many Member States dispose over 75 % of their municipal waste in landfills (General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' - Decision No 1386/2013/EU of the European Parliament and of the Council, 2013).

Table 2 shows how the recycling rate of the EU developed from 2004 until now. It is visible, that the trend shows a continuous growth, but it doesn't seem to rise after 2010.

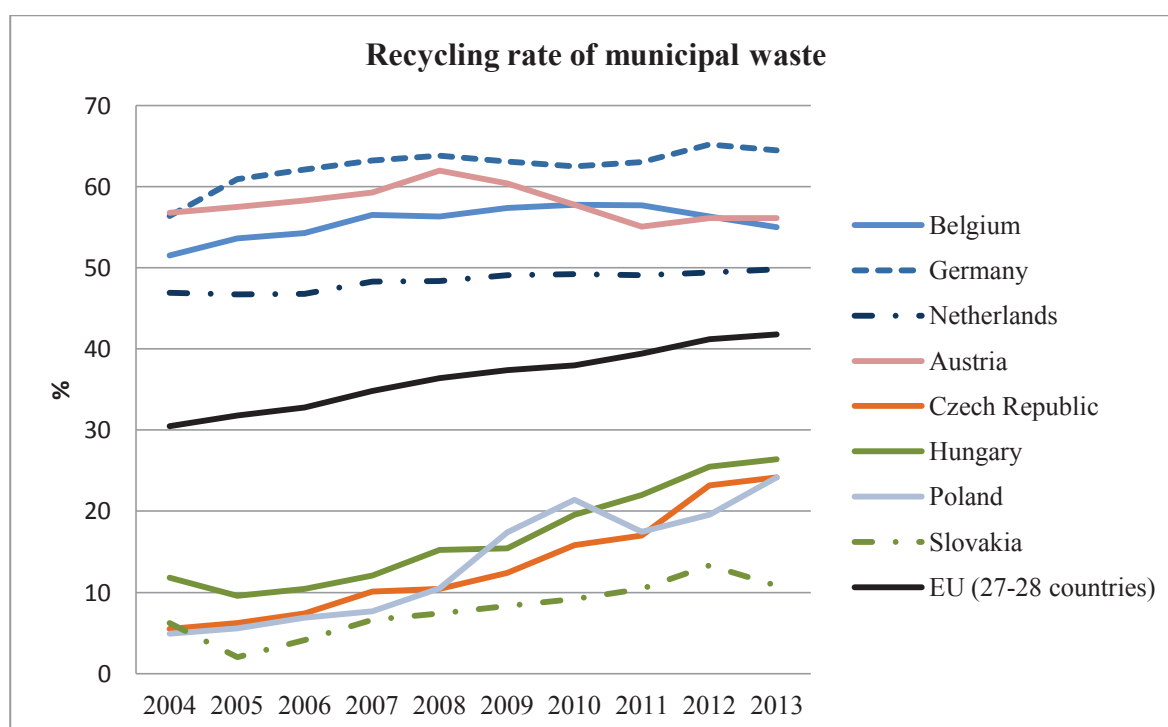
Table 2 Recycling rate in the EU 2004-2013 (%)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU (27-28 countries)	30,5	31,8	32,8	34,8	36,4	37,4	38	39,4	41,2	41,8

Personal compilation, source: Eurostat

Figure 1 shows the performance of the best players and the Visegrad 4 countries. Significant and persistent differences can be seen at recycling rates and trends.

Figure 1 Recycling rates in some European countries



Personal compilation, source: Eurostat

Performance of Hungary and Germany

To model the trends until 2020, I focused on Hungary and Germany. Table 3 shows the rates of material recovery of total municipal waste. Germany fulfils since 2005 over 60%, further growth was not possible or expected within the limits of the former waste system. The impact of the new legislation in 2012 will be significantly visible from 2014. Hungary reached with almost continuous progress in 10 years the rate of over 25%.

Table 3 Comparison of the recycling rates in Hungary and Germany

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Germany	56,4	60,9	62,1	63,2	63,8	63,1	62,5	63	65,2	64,5
Hungary	11,8	9,6	10,4	12,1	15,2	15,4	19,6	22	25,5	26,4

Personal compilation, source: Eurostat

The following Tables indicate the operations with municipal waste in Germany and Hungary.

Table 4 The municipal waste operations in Hungary and Germany

Municipal waste generation and treatment (kg/capita/year)		2004	2006	2008	2010	2012
waste generated	Hungary	454	468	454	403	402
	Germany	587	564	589	602	619
total waste treatment	Hungary	450	464	441	403	402
	Germany	587	564	589	602	619
landfill	Hungary	382	377	333	284	263
	Germany	104	4	3	3	1
total incineration	Hungary	15	39	39	41	37
	Germany	152	210	210	223	214
material recycling	Hungary	50	43	60	64	84
	Germany	237	257	277	275	293
composting and digestion	Hungary	4	6	8	15	18
	Germany	94	93	98	101	110

Personal compilation, source: Eurostat

Table 5 Waste treatment rates in 2012 in Hungary and Germany

Municipal waste generation and treatment (kg/capita in 2012)	Hungary	Germany
waste generated	100%	100%
total waste treatment	100%	100%
landfill	65%	0%
total incineration	9%	35%
material recycling	21%	47%
composting and digestion	4%	18%

Personal compilation, source: Eurostat

Table 4 and 5 clearly show that while in Hungary landfill disposal dominates, in Germany the main treatment methods are the material recovery, composting and incineration. In Hungary the incinerated waste quantity is handled by the waste incineration plant of the FKF Zrt. in Budapest. However the value '0%' of the landfilling in Germany is difficult to explain, because cinder and ashes from the incineration plants have to be deposited somewhere.

Varjú finds in a 2012 questionnaire survey that the environmental awareness of the local government is higher than the awareness of the population. This confident awareness conflicts with the fact that environmental activities do not appear at the top of the municipalities' priority list. Moreover the survey revealed that 38% of municipalities in settlements with less than 500 souls do not offer recycling to the population. However, he makes a statement that generally the municipalities are prepared to implement the new waste act in 2012 (Varjú, 2013).

Many factors contributed to the impressive German result: since 2005 it is forbidden to dispose untreated municipal waste; ambitious recycling goals were instituted; incentivising

waste management fees were introduced; and not least the German population has a strong attitude of waste separation (Pomázi, 2013).

The development of the Hungarian selective collection is influenced by many factors. It strengthens the fulfilment of a legal obligation, as well as the new regional complex waste handling facilities co-financed by the EU. A negative impact is the uncertainty of the public service system because of the transitional phase while planning the national strategy. The creation of investment and operation of the existing ones by the public service providers is uncertain because of the overhead reduction.

The emergence of complex waste management systems does not have a clear positive effect. The developed complex systems could be far from the optimal waste management area since they have been created on the ground of the local governments' initiative. Even their technology and size are not always designed to take account of the produced waste amount, of the goals to be achieved and of the financial capacity of the population. Typically oversized projects were completed; this tendency was helped by the EU tenders ("feeling of the free money"). Fogarassy notes that inadequate use of resources can distort the sector unfavorably even for decades. Market distortion can be developed (overproduction/underproduction), since the economical equilibrium can evolve harder (Fogarassy, 2014). Currently, it is visible the increase in the volume of RDF, and the selling difficulties of it.

In some areas the reducing of overhead expenses led to such a weak condition of the public service providers that even the completion of the basic services has become impossible. Currently, the government provides an ad-hoc emergency aid as compensatory mechanism to public service providers. By several ministries is under development the future concept of a stable waste public service system, results are expected this autumn.

The upper tables prove the EU requirement of the standardization of the waste statistics as well. In 2012 was laid down the Regulation No 2150/2002 on waste statistics, in 2012 there was still need for further orientation so came out the Guidance on municipal waste data collection by EC and Eurostat, what was followed by the Manual on waste statistics by Eurostat in 2013 (Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics, 2002) (Eurostat, Guidance on municipal waste data collection, 2012) (Eurostat, Manual on waste statistics - A handbook for data collection, 2013). The 7th EAP restatements the need that progress should be made to improve the availability and harmonisation of statistical data.

Comparison of the legislative hierarchy in Hungary and Germany

The Packaging and Packaging Waste Directive from 1994 was inspired by the German Packaging Ordinance (Verpackungsverordnung) of the year 1991 (Ex-post evaluation of Five Waste Stream Directives Accompanying the document Proposal for a Directive of the European Parliament and of the Council reviewing the targets in Directives 2008/98/EC, 94/62/EC, 1999/31/EC, 2000/53/EC, 2006/66/EC and 2012/19/EC, 2014). It also shows the German system's operability. They results also confirm the proper operation of the German system. It is therefore appropriate to review the practice and to put the good solutions after appropriate modifications into the domestic practice.

Table 6 shows the elements and the levels of the Hungarian and German legal system. In both cases is the waste law at the uppermost hierarchy stage. At the second level in Germany are the federal states regulations, in Hungary are the ministerial or governmental decrees. In both countries, the municipal level also has tasks in the operation of the waste management systems.

Table 6 Hierarchy of the municipal waste management legislation

Germany	
1. Circular economy and waste management act	- main source inc. WFD's provision
2. State law of Bundeslander	- determining the subjects to waste disposal obligations - authorizing bodies - municipal waste disposal ordinances - obligations of public authorities: contribute to achieving the goals
3. Municipal waste disposal law	- usage and integration into the public system - municipal garbage collection charges
Hungary	
1. Waste management act	- main source inc. WFD's provision
2. Government regulations	- determining content of the public service - operating conditions for service providers - define the local government duties - define the service fees
3. Municipal waste disposal law	- locally organizing the service

Personal compilation, source: (Waste regulation - Umweltbundesamt, 2015.), (Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen, 2014), (Gesetz zur Vermeidung, Verwertung und sonstigen Bewirtschaftung von Abfällen in Bayern, 2014.), (2012. évi CLXXXV. törvény a hulladékról)

Table 7 summarizes the areas covered by the waste act in Hungary and in Germany. Basically, the requirements imposed by the WFD appear at this level with little differences. Hungary introduced the quantitative requirements set by the WFD, while Germany set the recycling target at a much higher rate.

Table 7 Comparison of the waste related acts in Hungary and Germany

Comparison of the waste related acts	
Germany: Circular Economy Act	Hungary: Waste Act
Focus: circular economy and waste	Focus: waste
Byproducts, end of waste criteria	Byproducts, end of waste criteria
Waste hierarchy	Waste hierarchy
Mixing the waste types is inadmissible	Mixing the waste types is inadmissible
Producers responsibility	Producers responsibility
Promote recycling and other material recovery: paper, metal, plastic and glass has to be collected separately from 1 January 2015 <u>as long as it is technically possible and economically reasonable</u>	Promote recycling and other material recovery: paper, metal, plastic and glass has to be collected separately from 1 January 2015 <u>with door to door collection</u> . <u>Landfill tax paid for mixed waste at disposal</u> .
The preparing for re-use and recycling of <u>municipal waste</u> should be no later than <u>1 January 2020</u> , at least <u>65</u> percent by weight in total.	The preparing for re-use and recycling the <u>paper, metal, plastic and glass fractions in municipal waste</u> should be no later than <u>31 December 2020</u> , at least <u>50</u> percent by weight in total.
The public owned service provider has to draw up <u>waste management concepts</u> and waste balances of recovery and disposal	The public owned service provider <u>establishes the separate collection system</u> . It keeps records of the collected, recovered and disposed amounts. (Specific detailed rules of content of the public service in government regulation)
Waste management plans and waste prevention programs	<u>National and regional</u> waste management plans, <u>national and regional</u> waste prevention programs
Certification of waste management companies	Certification of waste management companies (details in the certification act)
Producer's and holder's obligation for recovery, <u>as long as it is technically possible and economically reasonable</u>	Producer's, dealer's and owner's obligation for recovery or disposal
Public owned waste management for households	Public owned waste management for households and <u>governmental institutions</u> ; public waste management obligation <u>for enterprises in mixed waste</u> .
The owners and holders of the property have to tolerate the monitoring of separate collection	Real estate owner's obligation to collect separately
Requirements for audited company locations (EMAS)	
Requirements for "give back" and "take back" system	

Personal compilation, source: (Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen, 2014), (2012. évi CLXXXV. törvény a hulladékról)

The real difference between the two waste management systems can be found at the second level of the waste legislation system. In Hungary I put the Waste Act onto the second level as well, since it regulates many things concerning the specific actions and roles in the public service system.

The Hungarian system shares the responsibility between the public service provider, the municipality and the ministry, while the German waste management system holds the districts responsible for the achievement the objectives. Comparison of the regulation in the two countries is provided in Table 8.

Table 8 Comparison of the waste related regulations according to responsibility

Waste Management Act of Bayern	Hungary: Governmental Regulation
State, municipalities, counties, districts contribute as a role model to achieve the objectives and waste hierarchy.	Local government is the organizer of the public service: contract with a service provider after public procurement procedure (Waste Act)
The districts (Landkreisen) and the independent communities are the <i>public waste coordinators</i> (PBC).	Local government establishes the contents of the public service, the mode and system, the rights and obligations ((Waste Act)
PBC's try to make generate less waste. Therefore they employ specialist as adviser for waste producers.	<i>Public service provider</i> (PSP) aims to operate according to waste hierarchy. (Waste Act) PSP inform the residents. (385/2014.)
PBC's are obliged to fulfil recovery rates and disposal regulations, therefore they take measures. They should achieve higher recycling rates if this is technically feasible, economically reasonable and ecologically efficient.	PSP settle and organize the separate collection system. It aims to collect the most possible separate waste streams. (Waste Act). Detailed rules in 385/2014. (streams)
PBC's have facilities for waste recovery and disposal according to BAT	PSP could operate facilities. (Waste Act)
The municipalities belonging to the district support in the implementation of recovery measures in their area. They can even assume duties and responsibilities.	
PBC's regulate the compulsory participation to separate collection and the transfer duty by statute. They define the waste type what manner, place and time are given.	Real estate user collects separately (Waste Act) (streams determined in 385/2014.)
The owner of waste is obliged to transfer.	The owner of waste is obliged to transfer.
PBC' are obliged to assess the fee's	Ministry assess the serve fee. (Waste Act)
PBC's create once a year a waste balance (produced, recovered, disposed etc.). The waste balance is submitted to the government.	PSP create once a year a waste balance. It is submitted to the authority. (Waste Act)
PBC's put in a waste management plan the proposed measures. The plan is submitted to the government.	

Personal compilation, source: (2012. évi CLXXXV. törvény a hulladékról) (Gesetz zur Vermeidung, Verwertung und sonstigen Bewirtschaftung von Abfällen in Bayern, 2014.) (385/2014., 2015)

Conclusions

Hungary and Germany have made appropriate provisions to fulfil the EU waste regulations. However, there is a huge gap between the recycling performance of the old and newer Member States. To achieve the 2020 targets requires significant effort for Hungary. The achievements of the targets, including the introduction of separate collection are obligation of Member States. The system operates in Germany successfully, because responsibility is defined for lower levels also, such as municipalities and districts. In this context, there is a significant difference between the Hungarian and German legal system. The solutions developed by the well-functioning German system can guide the further development of the Hungarian system.

Both countries have legislative regulation according to the obligation of the 7th EAP and the WFD. The mandatory separate collection and the use of the waste hierarchy meet the expectation. However the improvement of the waste management systems will be appreciable after 2014, since the relevant national legislation entered into force in 2012 and in 2013.

Germany and Hungary introduced a multilevel regulatory system. In Germany, the typical system is the regional organization system, in Hungary there are the countrywide valid governmental regulations and the mixed task system between the municipalities and public service providers. Table 8 shows that the Hungarian waste legislation has not settled yet, all three levels contain specific and concrete tasks, regulation and activities.

Since the starting point in recycling and recovery is different in the two countries, therefore it is necessary to use different methods. The following table shows the performance of recycling according to the current trend until the deadline in 2020.

If the current trend continues, Hungary will in 2020 meet the current objectives; Germany will be near 70%. For the steady growth in Hungary it is really necessary to introduce the door to door separate collection. It is necessary to organize information campaigns and stimulate a behavioural change.

However, if the 2014 year proposal of the EC will be adopted in its present form, Hungary has to make a significant effort to fulfil it.

Figure 2 Calculated recycling rates in Hungary and Germany until 2020 (power model)

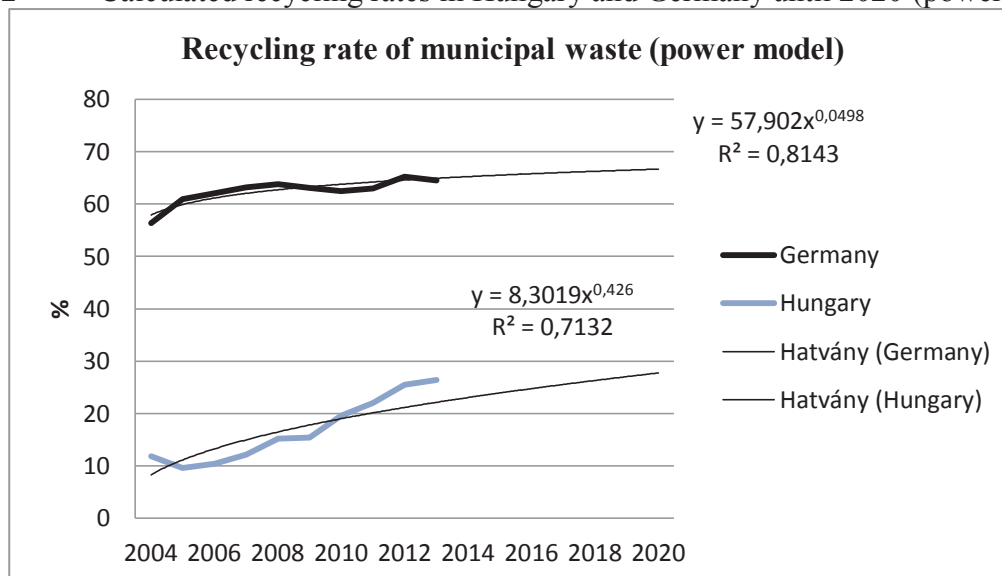


Figure 3 Calculated recycling rates in Hungary and Germany until 2020 (linear model)

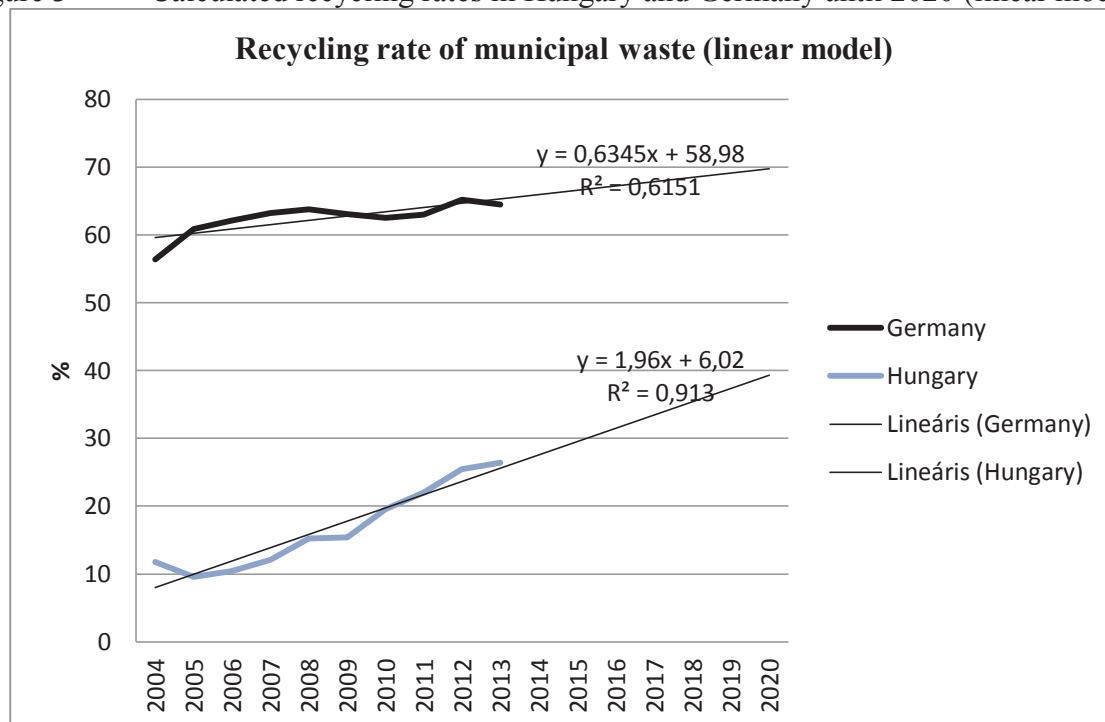


Figure 2 and 3 show the upshot of the various models. Both trends in Germany calculate with a slight increasing. However Hungary has a lot to do to fulfil the EU obligations. In Hungary the power trend seems to be unsuitable, because it stagnates at the current level. To track the dynamics of the linear trend however there have to be a lot of work. The amount of waste composted and fermented must increase and has to create a realistic framework for the use of the resulting compost. The recycling of other materials has to be increased, and it is proposed to build the network of processing facilities. There is a huge difference in the use of incineration between the two countries. While in Germany 35% of the whole amount is incinerated, in Hungary only 9% is utilised this way. This high rate can cause problems for Germany as the EU does not support the incineration of substances, which can be recovered

as raw materials. The value of 0% of the disposed waste in Germany highlights the need to improve the availability and harmonisation of statistical data on waste in the 7th EAP.

The introduction of separate collection in 2015 is one of the EU standards. It is remarkable that the German law requires separate collection only when it is feasible and economically justifiable. Another difference is that the Hungarian system prioritizes the door to door collection, while in Germany the law does not specify the method. The German recovery target is higher than the level required by WFD, while Hungary sets that target.

The deployment of the public owned waste management companies and coordinators is typical. Both the German and Hungarian systems oblige the waste producers and holders to collect the waste separately, Germany give the tool at the level of the Circular Economy Act to inspect the quality of separate collection of the real estate.

A difference in the waste management systems of the two countries is that the German system assigns the districts as the responsible in achievement of waste management objectives, so they have to make arrangements at their own area and population and prove the results. They also set the service fees. In Hungary the responsibility of achieving the EU targets rests at national level. The municipalities and the public service provider have no accountability responsibilities beyond the organization and operation at local level. Thus if the results are below the target (e.g. glass) there is no efficient enforcement measures to improve the performance. However the details of the operation and establishment of the waste management system are strictly regulated in governmental regulations.

According to the 7th EAP the households, the producers of the waste are the first actor in the link of the material recovery. Their active involvement can be promoted with incentive and enforcement measures like the difference between the fees of the diverse waste streams or the control of the separate quality. Efforts should be made to increase environmental awareness. For that task in German system the public waste coordinator has to employ special advisors. In Hungary, the local government regulations may be the tools of the involvement of the households and other waste producers. However, as no responsibility is assigned to the level of local governments by the law, thereby there is no intention and need at local government level to influence the public awareness. In Germany, the legal obligation of local governments is being a positive role model.

It is beneficial in the recent situation, that in Hungary the regional waste management programs and prevention programs are still in preparation phase. This allows putting more responsibility on local governments.

The Hungarian waste management infrastructure has improved significantly in recent years. This is largely owing to EU co-financed subsidies. The resulting systems are typically owned by local government associations. These associations represent even hundreds of municipalities and many thousands residents. Both in Germany and Hungary the development of a modern waste management system that fits to the needs of a complex waste handling facility is beyond the local government's scope. So in Germany is the primary obligor the district and that is why has an important role in Hungary the public service provider. The possibilities of the service provider to activate the waste producer and even the local government are limited, because the provider is a partner by contract for a municipality. Therefore, it seems appropriate to form the category of territorial responsibility for waste management goals and put that responsibility to the waste management municipality associations. This level can effectively work with the regional public service provider and can effectively influence the content of municipal regulations and the service. This latter is also necessary because the logistics of waste collection system should be designed that the collected waste streams meet the needs of the complex host facilities.

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