

**Evaluation of waste policies
related to the Landfill Directive
Hungary**

**Prepared by:
Marton Herczeg,
European Topic Centre on Resource and Waste Management**

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**Project manager:
Almut Reichel
European Environment Agency**

Author affiliation

Marton Herczeg, Danish Topic Centre on Waste, <http://www.wasteandresources.dk/>

Context

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European Topic Centre on Resource and Waste Management
Højbro Plads 4
DK-1200 Copenhagen K
Phone: +45 72 54 61 60
Fax: +45 33 32 22 27
Email: etc@etc.mim.dk
Website: <http://waste.eionet.eu.int>

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Country introduction

Hungary has made the transition from a centrally planned economy to a market economy. The increasing per capita income is now reaching nearly two-thirds that of the EU-25 average. The private sector accounts for over 80% of GDP, in which the sectoral breakdown is as follows: agriculture 3.1%, industry 32.1% and services 64.8%. The population of 10 million is subject to a rate of decrease of 0.25 percentage per annum. Population density is approx. 110 person/km².

Approximately 4.6 million tonnes (23 million m³, around 460 kg/capita p.a.) of municipal solid waste (MSW, or municipal waste) is generated in Hungary annually. Out of this amount, around 62% is household waste, the rest is waste that can be treated together with household waste and is generated by institutions, service providers, and businesses.

For decades the dominant form of waste management was landfilling. In the past, all municipalities operated one or more landfill sites, generally not constructed and equipped with technologies of modern waste management. These sites were basically waste dumps operated by the local councils at that time.

Before 1989, municipal waste management was not subject to extensive regulations and focused only on hazardous wastes and collection of municipal waste from households. It was a basic service, usually free of charge, making people unaware of the costs and environmental impacts of their waste production. Hungary set up its Ministry for Environment (currently Ministry for Environment and Water, KvVM) in 1989, and then started to gradually implement waste management policies, primarily in order to approximate its practice to the EU standards and aquis similarly to other new Member States.

The country has been going through a full reform and change in waste management practices over the last ten years. Outdated, small landfills will be all closed by 1 January 2009 in parallel local councils starting recultivation works¹ and setting up modern regional waste management facilities serving large areas and several municipalities.

Despite the growing level of household consumption and thus, the generation of municipal waste, the general environmental awareness of the nation has been increasing continuously, bringing different aspects of environmental protection in the forefront of public concern. However the willingness to pay for environmental services is still marked by the old tradition of free or cheap state services. While the population density is high in the central region around Budapest, where the country's only municipal waste incinerator is operating, other parts of the country have lower population density, making transportation costs a more significant factor of waste management.

Financial resources for setting up waste management facilities are made available by the state and local municipalities' budget as well as private enterprises. However, modernization is extremely dependent on EU structural funds from which a significant share (generally 50%, but up to 80-85%) of the projects (estimated at EUR 680 million altogether) is covered.

¹ Recultivation: aftercare and clean-up of sites after closure of landfills. The purpose is to improve the surface of the landfill by a proper coverage layer and fitting the landfill into the landscape after cleaning up the area, if necessary.

1. Lessons learnt

For decades, the dominant treatment of municipal waste in Hungary was landfilling. It is clear that the new landfill and waste management policy is due to the efforts made toward the uptake of EU regulations and objectives.

Although waste management planning is intended to follow a top-down approach by applying national objectives in regional and local planning, local projects of small municipalities are often hindered by various political and other non-professional reasons. Experience in Hungary shows that these factors may be a barrier to starting local waste management projects timely in line with the policy objectives.

The diversion of municipal waste and biodegradable municipal waste (BMW) from landfills is only possible by means of waste prevention and by material and energy recovery.

- Regarding waste prevention, the general increase in domestic consumption and production has not been reflected in an increase in the amount of waste generated. However, the reasons behind this phenomenon are unclear: pre 2004 statistics are not considered to be reliable enough for building conclusions, but changes in consumption patterns and the emerging role of services in the economy could be two significant reasons.
- Furthermore, material recovery is an approach widely accepted by the public, and the population seems to cooperate in terms of using free of charge separate (packaging) waste collection facilities. Home composting is gradually improving in line with a generally raising trend in environmental awareness. Short-term policy targets have generally been met by an improved system of waste recovery.
- However, a strong discrepancy seems to be present in the current system. Despite growing environmental awareness, the acceptance of incineration is extremely low, leaving limited scope for policy-makers when formulating strategies to divert waste from landfills.
- Moreover, there are problems with material recovery of BMW as well: basically, due to strict technical standards on composts and the general public aversion to waste-derived composts, the market for recycled products including composts is limited.

This situation has improved during the last few years for material recovery of waste tyres due to the expansion of a new road-building technology using shredded tyres in the road basement to make it more flexible. Without this option, it is uncertain whether the 50% target for material recovery on waste tyres could have been met. High prices of secondary products from waste tyres have only been achieved thanks to a European level marketing of these products, because the domestic market is too small.

Construction and demolition waste is regulated separately, and the recycling rate of this waste stream must reach 50% by the end of 2008 according to the Hungarian National Waste Management Plan for 2003-2008.

2. Understanding the overall strategy for diversion of waste from landfill

In line with the overall goals of the acquis and waste policy of the European Union, **the Hungarian National Waste Management Plan (NWMP) is implemented to ensure that national policies and regulations will address diversion of waste from landfills.** Following the EU waste hierarchy, the preferred means of diversion are prevention, recycling and recovery. The NWMP targets to reduce both the amount of municipal waste and specific waste streams including BMW, paper, tyres, glass, packaging wastes, plastics and hazardous wastes on landfills.

The basis of the present NWMP was introduced in Hungarian legislation in 2000. The first plan is designed to integrate the “sustainability principles” into the framework of waste management practice. National waste management plans are defined for six years according to the detailed specifications of Government Decree 126/2003. The first National Waste Management Plan for the period of 2003-2008 **has four different levels for planning:** national, regional, local and site level. These levels are drawn at administrative levels and hydro-geographical regions.

At **national level**, the Ministry of Environment and Water is the authority that prepares the legislative frame for waste treatment and management and elaborates the National Waste Management Plan. The NWMP is defined in line with the planning periods of the National Environmental Programmes. The Ministry is in charge of permits for waste management activities affecting the whole territory of the country; transboundary waste shipments; collection and shipments of hazardous waste; handling of special wastes. Approval of agreements between manufacturers and dealers (or the organisations representing them) and the local governments on waste collection as well as classification of unknown wastes and new waste treatment technologies are also assigned duties of the Ministry.

At **regional level**, on the basis of the NWMP the seven regional Inspectorates for Environment, Nature and Water are responsible for developing regional plans, which should also be elaborated at municipal level. The county government, in harmony with the national and regional plans and in consultation with the local governments existing within the territory of the county, may draw up an independent county waste management plan. Inspectorates also review and check harmonisation of waste management plans of counties, local governments and enterprises in their territories.

At **local level** (there are 2 135 municipalities in Hungary), in harmony with the objectives and tasks included in the national and regional plans and with the spatial planning plans, the authorities draw up local waste management plans for the territory under their jurisdiction. In addition, the local governments organise and maintain a waste treatment public service. They fulfil reporting obligations to the National Statistical Programme on waste management policy and the municipal waste collecting companies. Regional Inspectorates for Environment, Nature and Water issue permits in all of the waste management issues they also control the plans of local municipalities, and approve the individual waste management plans.

The basis of **waste management** planning has been defined along the same **principles** at each level of planning. The main goals of the NWMP follow the **waste hierarchy of the EU** and include different **means and actions** to achieve the waste management objectives and targets.

Table 1. General targets and actions of the NWMP

General principles	General actions and means
<ul style="list-style-type: none"> • reduction of waste production; • encouraging economic material and energy management and improve recovery; • minimizing waste landfilling; • improving the standard and safety of waste management, reducing the risks; • urging stakeholders to fulfil legal requirements and principles, while making the regulating system complete; • developing the system of waste monitoring and data quality (recording, statistical data reporting, measurements and site audits); • encouraging the development of up-to-date, complex waste management systems; • strengthening the cooperation between public and private sectors; • gradually abolishing polluting resources and contaminated sites. 	<ul style="list-style-type: none"> • Waste prevention and minimization of waste quantity and hazardousness. • Precautionary principle: wastes with unknown risk must be handled as highest risk level wastes. • Producer responsibility: responsibility for production and product lifetime, improving reusability and waste management. • Stakeholder responsibility: producers should act in cooperation with other stakeholders. • Responsible care: waste owners should act to minimize impacts on the environment. • BAT: facilitation of best available and efficient solutions in current technological and economical circumstances: environmentally friendly, material and energy efficient technologies and shift towards the use of less harmful materials. • Polluter Pays Principle: the producer or owner of the waste has to pay the waste management costs and/or cost of damages and remediation. • Vicinity principle: wastes should be handled at the nearest appropriate site. • Rationality principle: economic, safety and management considerations to be applied when designing regional sites. • Facilitation of management of the total amount of self-produced waste.

These general principles serve as the basis of the current objectives of municipal and special waste management. In line with the overall goals of the NWMP, **two important strategy papers** (relevant to this study) have been prepared by the Ministry of Environment and Water: *Strategy for the Management of Biodegradable Waste in Municipal Solid Waste Management 2004-2016* and *Development Strategy for Municipal Solid Waste Management, 2007-2016*. These documents serve as the basis of future developments for municipal waste and BMW.

2.1. Objectives set for municipal waste, BMW, tyres and C&D waste

In addition to setting up general principles, **specific goals and targets are also set** by the National Waste Management Plan (KvVM, 2002 and KvVM websites) regarding municipal waste. Relevant to this study, the most important goals are the following:

- **Waste prevention:** by the end of 2008 the total amount of waste generated should not exceed the level of 2000 in absolute amounts. In addition, growth in municipal waste amounts should not exceed the 50% of the actual GDP growth rate.
- **Recovery:** by the end of 2008, 40%, and 50% by 2012 of all waste streams should be material recovered or used for energy recovery.
- **Landfilling:** revision and closure of old landfill sites till 1 January 2009. A ban has been in force since 2003 on dumping of waste tyres, and on rubber grindings as of 2006. Separate collection and recovery of these materials must be ensured accordingly.

Regarding special waste streams, the ban on landfilling of waste tyres has prescribed to divert all waste tyres from landfills since 2003. Legal requirements also set a compulsory minimum ratio of 75% collection (after the 70% target set for 2004), and a 50% material

recovery besides the 50% maximum of energy recovery for **waste tyres collected** since 2005.

Reduction targets have also been set for the **biodegradable components** of municipal solid wastes. **BMW sent to landfill has the following interim reduction targets: 75% by 2004, 50% by 2007 and 35% by 2014 in percentage of the amount produced in 1995 (1 170 000 tonnes of bio-waste and 765 000 tonnes of paper waste).** Thus, the Hungarian targets were originally set two years ahead of the transposed Landfill Directive targets. However a modification was made of the Act on Waste Management in 2007, **so from January 2008 the latter two targets are set for 2009 and 2016, respectively.** The act prescribes that the targets should be fulfilled both at local and regional levels.

Construction and demolition wastes are addressed as special waste streams, where recycling is the favoured option, but so far the rate of recycling has not been improving dramatically.

2.2. Package of measures for diverting waste

The policy measures aiming at the objectives set for different waste streams are a **combination of legal, economic and market-driven instruments.** Most widely applied economic instruments are product charges, fees or taxes (including tax differentiation), deposit-refund systems, subsidies, effluent charges/taxes, user charges, non-compliance fees and voluntary agreements. The most important tools of municipal waste diversion from landfills are **separate collection of wastes, product charges and improving MBT capacities** in order to facilitate the use of stabilized organic waste as an alternative fuel. Regarding used vehicle tyres and BMW, the most important measures are the landfill ban and the product charge, as well as BIO-P, a national programme on BMW, the Strategy for the Management of Biodegradable Waste in Municipal Solid Waste Management 2004-2016 and the Development Strategy for Municipal Solid Waste Management 2007-2016. According to the development strategies, the following waste management and treatment **technical capacities** will have **to be developed** to meet all targets by 2016:

- Waste separation facilities: 373 000 tonnes
- composting sites: 282 765 tonnes
- MBT facilities: 1 120 000 tonnes
- MBT incinerators: 2 x 150 000 tonnes
- Landfills: 13 247 000 tonnes

Regarding **waste prevention** of municipal waste, awareness raising programmes were started by NGOs and governmental organizations to improve public awareness, but without concrete measurable targets.

2.2.1. Ban on landfilling

The purpose of this key direct legal measure is to achieve a proper ratio and composition of the waste landfilled, to be in compliance with the Landfill Directive and divert waste streams from landfills to incineration and recovery. In all types of landfill it has been banned to dispose mainly hazardous waste streams including waste tyres and shredded rubber and organic wastes (partially, in line with the interim targets for BMW) since 2003.

2.2.2. Separate collection of waste streams

Another key measure to divert municipal waste from landfills, was the **introduction of separate waste collection systems** throughout the country. A general campaign was launched in 2001 to gradually extend the network of (usually free of charge) separate waste collection systems. **Purpose of the instrument is to dramatically increase the rate of recycling by enabling the population to more easily recycle waste materials.**

Integration of the private sector into the separate waste collection systems is gradually being extended. The following waste streams are usually covered by separate waste collection “islands” (containers at public places for separately collected waste) and “recycling centres” (called “waste yard” and operated at small, staffed sites): **metal, plastic, paper, and glass waste**, and (only at waste yards) **hazardous waste** (e.g. batteries). BMW, mainly green garden waste, is usually collected upon request by the waste service provider or organized campaigns of municipalities (usually in autumn and spring). Provisions of the Waste Management Act required that by the year 2005 at least 40% of the population should have **access to separate collection** of packaging materials; this should be increased to 60% by 2009 and 80% by end of 2013 according to the strategy.

2.2.3. Environmental product charges

Considered by policy-makers to be **the most important economic instrument** of the Hungarian environmental policy related to waste management, **the eco-taxation system of product charges has been in place since 1995**. Certain products which have an impact on the environment have been charged with a product charge payable upon domestic distribution (or use for own purposes). Rates are fixed for **tyres, packaging materials, advertisement brochures** and crude-oil products (lubricants, in practice), cooling materials and refrigerators and electronic equipments. For example, item-based product charges are applied on the packaging of commercial beverages. **Exemptions or discounts** apply to eco-labelled products, or **charges are retransferred to the producer or the importer that has fulfilled recycling or recovery targets**, so in practice it is an instrument to ensure achievement of recycling targets. The charge must be paid by the producer (or importer), and thus by the consumers. The Ministry of Environment and Water reserves part of the collected money for recovery and other environmental projects. **For tyres**, currently, the product charge is HUF 110/kg (approx 40 eurocent per kg of tyre). Payment of product charge can be avoided, if the producer or the importer **collects or ensures the collection of** waste tyres weighing at least 70% of the tyres sold. This can be achieved by **contracting one of the three waste tyre collection coordinating organizations, a so called public benefit company dealing with tyre recycling**.

2.2.4. National Bio-waste Programme (BIO-P, 2005-2008)

The national programme to **promote the diversion of BMW from landfills**, was launched in 2005. The order of priority is to reduce BMW by recycling (paper), composting, biogas generation, MBT and thermal utilization (KvVM, 2005). According to the plan, 1 564 million tonnes of BMW must be separated and recovered in 2008, as the maximum amount for landfilling (after pre-treatment) is 1.1 million tonnes. The programme calls for gradually extending the system to include garden waste, green waste from public parks, organic kitchen waste and paper by 2008.

Table 2. Targets for BMW set by the Bio-P

Year	Generated municipal waste (1000 tonnes)	Generated BMW (1000 tonnes)	Maximum share of BMW on landfills (%) (1000 tonnes)		BMW to be recovered (1000 tonnes)
1995	4 500	2 340	100	2 340	
2004	4 729	2 461	75	1 755	706
2007	5 019	2 612	50	1 170	1 442
2008	5 119	2 664	47	1 100	1 564
2014	5 764	2 997	35	819	2 178

Source: KvVM, 2005

The Bio-P uses different measures in order to meet the ambitious targets. It aims at:

- dramatically (about 8 times!) improving the separate collection of BMW. Most importantly green waste from gardens is considered by the MoE to have a great potential for improvements of collection;
- initiating a project on capacity building, implementation and improvements in appropriate technologies of separate collection, pre-treatment and recovery of BMW;
- facilitating the production of secondary products or non-products of biowaste, such as high quality compost, alternative fuels, etc.;
- (re)defining the legal requirements regarding the use and utilization of products made of BMW (composts, stabilized biowaste, solid residues), including the implementation of quality management of compost, and setting up standards for other BMW originated products and non-products;
- using low quality composts and stabilized bio-wastes for recultivation works (keeping in mind that landfills that are non-compliant with the EU requirements will have to be closed by 2009);
- better PR and communication to facilitate a wider uptake of separate waste collection.

2.3. Stages of implementation

After having the legal basis of environmental protection established in the mid-1990s, the main goals and priorities were the harmonization of the Hungarian regulations with the EU aquis and measures to meet the different criteria on waste management as well. Most important stages regarding management of municipal waste, BMW and tyres in the implementation of regulations and strategies were the following:

1995	Act LIII of 1995. Act on the Protection of the Environment. Act LVI of 1995 on Environmental Product Charges - including tyres.
2000	Act XLIII of 2000 on Waste Management. The principles and aims of the Hungarian waste policy. The Act on waste management is the main piece of waste legislation in Hungary. Preparation of the National Waste Management Plan is legally prescribed.
2001	Government Decree on municipal waste management 213/2001 (XI.14.) establishing the criteria for municipal waste management. Extensive programme on separate collection of waste streams
2002	The first National Waste Management Plan (2003-2008) is adopted by the Parliament (12/12/2002)
2003	Framework for the details to be included in the plans. Government Decree on WM planning 126/2003. (VIII.15.) Ban on landfilling of special waste streams (incl. tyres) was introduced, modifying Act Government Decree 53/2003 modifying the regulation on Product Charges
2004	Strategy for the Management of Biodegradable Waste in Municipal Solid Waste Management 2004-2016 Minimum rate of waste tyre collection is set at 70%.
2005	Launching the National Bio-waste Programme (Bio-P) for 2005-2008 Minimum rate of waste tyre collection is set at 70%. Government Decree 320/2005 modifying the regulation on Product Charges
2006 November	22/2001. (X. 10.) Declaration of Minister on the landfilling of waste changed by 20/2006. (IV. 5.) Declaration of Minister on the landfilling of waste and the criteria and rules of the waste deposition. Development Strategy for Municipal Solid Waste Management, 2007-2016.
2007	Modification of the Waste Management Act: setting targets for BMW for 2009 and 2016 in accordance with the targets of the Landfill Directive.

3. Understanding the associated package of measures

3.1. Relationships with other policy interventions

The following measures are **closely or indirectly linked** to the policy measures for diverting waste streams from landfills. Most of the initiatives are **strongly related to implementation of EU regulations**. Basically, these policies do not formulate separate strategies for waste management rather they have been integrated into the overall strategies and plans in harmony with the general improvements in environmental policies.

3.1.1. *Incineration Directive*

During Hungary's accession to the EU only two out of the 41 Hungarian (hazardous) waste incinerators were complying with the requirements of the Incineration Directive. After the modernization of the existing incinerators, by **meeting the deadline** set during the accession for 30 June 2005, currently 32 incinerators at 30 facilities are authorized to handle hazardous waste with a total capacity of 150 000 tonnes per year.

The **only municipal waste incinerator** of Hungary located in Budapest was under reconstruction between December 2002 and December 2005. It restarted with an increased capacity from 350 000 to 420 000 tonnes per year.

3.1.2. *Packaging Waste Directive*

Government Ordinance 94/2002 implements the targets set by the Directive on Packaging and Packaging Waste (94/62/EC). Hungary will have to meet the following recycling rate targets for packaging waste: 50% by 2005 and 55% by 2012. The regulation is harmonized with the Act on product charges, implementing producer responsibility to fulfil the targets.

A **50% recovery rate target was set and met** for packaging wastes already in 2005: out of 835 000 tonnes of packaging waste, 393 000 tonnes (47.1%) and 29 000 tonnes (3.4%) was recovered by material and energy recovery, respectively. A key for successful improvements in waste recovery was the introduction of separate waste collection.

3.1.3. *ELV Directive*

Producer responsibility was implemented in line with Directive 2000/53 on end-of-life vehicles (ELV). The obligation of the manufacturer is to take back the end-of-life vehicle and to organize, develop and operate a collection network of end-of-life vehicles. The car owner pays a charge, when the car is deregistered to cover waste treatment costs.

3.1.4. *WEEE Directive*

Government Ordinance 264/2004 implements EU Directive 2002/96, setting up the provision on separate collection for waste of electrical and electronic equipments (WEEE). The producers have to organise the separate collection of electronic wastes. The reusable and recoverable WEEE materials and parts of the equipment must be collected and stored in a way that allows primarily reuse, and secondarily to recover materials. According to the WEEE Directive, consumers can return electronic equipment free of charge to producers and traders in order to improve material recycling.

3.1.5. *Deposit refund system*

This instrument has its origin decades back, when basically only refundable bottles were on the market. The aim of the regulation (set in law in 2005) is to promote the collection of waste packaging and subsequent reuse. This measure does not set compulsory objectives and measures, however in parallel with the objectives of the product charges, it is aimed at facilitating the collection of packaging waste, primarily bottles. The regulation is currently under review, and further extensions of the system are expected to cover batteries and electronic wastes, while there is a proposal to set a compulsory minimum rate for producers to bring refundable bottles on the market.

3.1.6. *Closing and recultivation of old landfills*

In addition to capacity developments, more than 125 **outdated, technologically non-compliant landfills will have to be closed by 1 January 2009**, and then recultivated. In terms of the total reduction in waste treatment capacity this reduction is approximately 50% of existing capacities. In addition, approximately 2435 old, already closed landfills must be recultivated.

3.1.7. *Cross-sectoral relevance with energy and agricultural policy measures*

A new Energy Policy and Renewable Energy Strategy is under preparation and discussion and is expected to promote the utilization of biogas generation at landfills. Also, the National Agro-Environmental Programme is expected to facilitate the use of composts derived from BMW in agriculture. These papers were planned to be finalized in 2008.

3.2. Objectives

The objectives of the above measures are to introduce modern technologies, recycling and energy recovery in line with the EU aquis and meet the targets of the directives on packaging wastes, ELV, and WEEE as indicated.

3.3. Stages of implementation

Operational and technological regulations of waste incinerators have been tightened in a similar manner to those relating to landfilling. Furthermore, embedding the EU policies on packaging waste, WEEE and ELV in national legislation was accomplished between 2002 and 2004.

2002	3/2002. (II. 22.) Declaration of Minister on incineration of waste 94/2002. Ordinance on the rules of packaging and packaging waste
2004	267/2004. Ordinance implements EU directive 2000/53 on end-of-life vehicles Ordinance 264/2004 implements the EU directive 2002/96 on WEEE.
2005	Deposit refund schemes: voluntary way of improving collection of bottles.
2007	New energy and agricultural policies are expected to facilitate biogas generation on landfills and BMW composting in agriculture.
2009	Closing all technologically non-compliant landfills

4. Factors influencing the effectiveness of a policy of waste diversion from landfill

In this section we present a reference indicator related to the Landfill Directive target on BMW, and a number of factors related to the landfill, incineration and recycling of waste. This information serves as input to the proposed methodology presented in Mazzanti and Zoboli (2007) which will also be used in the comparative analysis of the five countries and one region in the study. The information is discussed on the following pages and summarised in the tables at the end of this chapter.

The key idea of the proposed procedure is that the *causal relationship* between *specific* landfill policy *changes* and the *changes* of an indicator representing waste diversion from landfills is ‘*controlled*’ by the state of other hindering/favouring factors *at the time of policy implementation*. This reflects a system-wide approach, and it should help us to identify the *specific role of policy change* in the framework of *co-causation* arising from the many factors at work in the waste system. The proposed methodology is a mixed quantitative/qualitative one, and it should be able to exploit the information on policy changes and other ‘explaining factors’ in a coherent model-like approach.

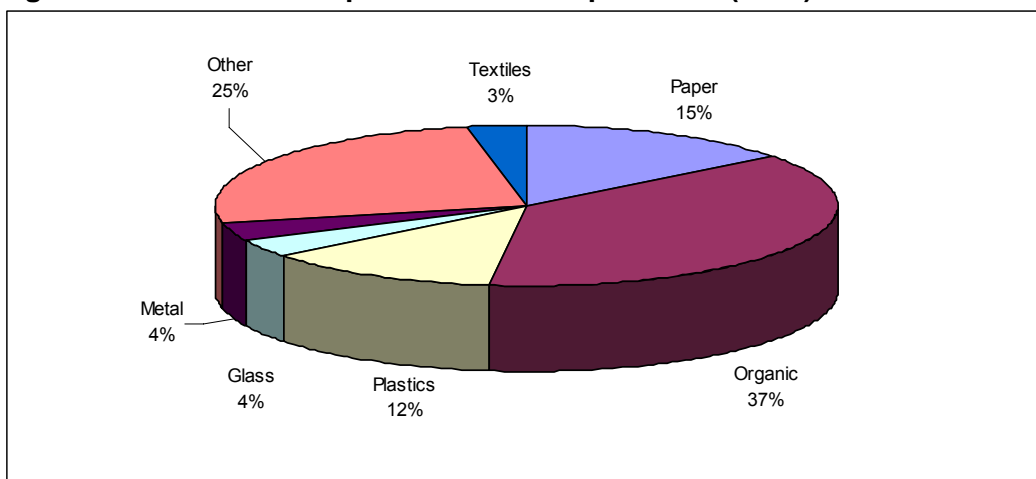
The time of policy implementation is the year where the Landfill Directive was transposed and in the study it is used to assess the trends before and after the policy implementation. However, in Hungary the Landfill Directive was transposed gradually in consecutive steps between 2000 and 2004, and we use year 2000, being the first year of transposition clearly prospecting the full transposition of the directive.

4.1. Development in the reference indicator: BMW landfilled vs. generated amount in 1995 (Landfill Directive target)

Extensive **data series for the amount of BMW** are only available for Budapest, where the utility company has data for long time periods. At national level, based on the data of the Ministry of Environment and Water, municipal waste generated has approximately **52% BMW compounds** (incl. 17% paper and 35% biowaste) in total, and that rate has been stable over the last decade.

It must be stressed that the national strategies consider this ratio relatively stable, so national targets for BMW are set through the management of total amounts of municipal waste. This ratio was proved by empirical research on several landfills as well. A study published by the University of Miskolc (UM, 2006), is based on samples in different regions and an analysis carried out on municipal waste compounds in the country supports these findings.

Figure 1. Waste compounds in municipal waste (2004)



Source: KVVM, 2006

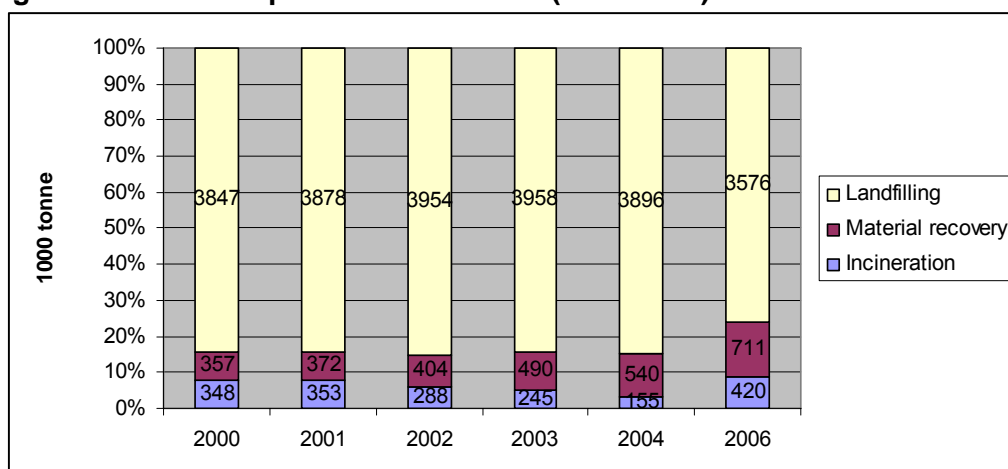
The general **data availability and quality for municipal waste for pre 2004 time series is considered to be poor by all stakeholders interviewed**. It must be stressed that **before 2004** when the new Waste Management Information System (HIR) was launched, all the data available were based only on estimations and non-continuous data collections and not considered to be precise by the experts in Hungary. The new system is being continuously improved. In HIR even non-reported amounts are estimated mathematically based on statistical data. The system is harmonized in terms of EWC codes and is based on compulsory reporting by waste producers, sites requiring environmental permits, waste management companies (collection companies), importers, landfill and incineration operators. The previous database system (HAWIS) had data for 1996-2003, but included only data on hazardous wastes. Therefore, **more accurate and reliable data have only been available since 2004**.

Table 3. Changes in the diversion indicator (2000-2006)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
BMW landfilled compared to BMW generated in 1995 (%)	75	80	85	86	87	81	82	83	83	82	77	75

Source: calculated from Eurostat data on MSW treatment assuming a constant 52% BMW content

Figure 2. Municipal waste treatment (2000-2006)

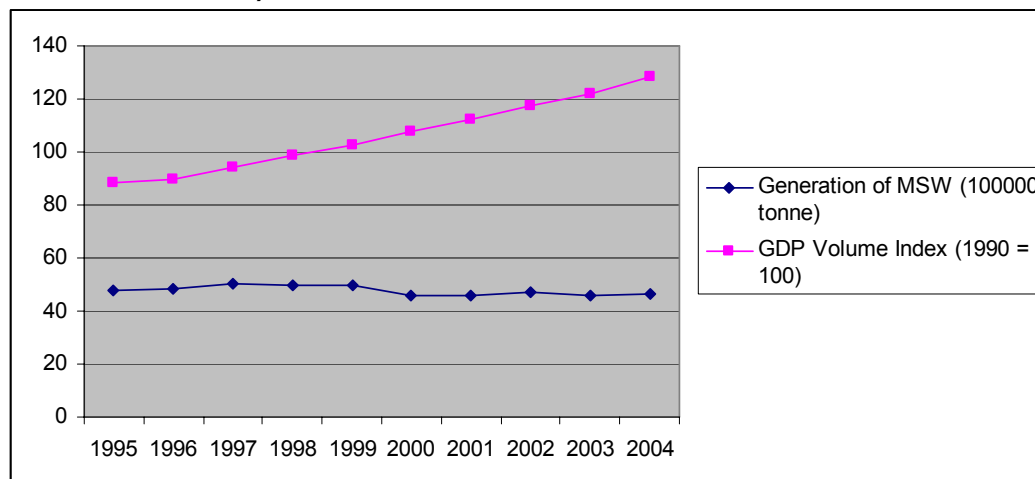


Source: KVVM, 2004, 2005 and 2006

4.2. Factors related to waste generation and collection

The quantity of municipal solid waste has not changed significantly despite the continuous growth in consumption and GDP/capita by 2-6% annually since 1995.

Figure 3. Municipal waste generated vs. GDP volume index² (1995-2004)



Source: KSH

The Municipal Waste Strategy (KVVM, 2006) estimates that the increase in municipal waste will be a maximum of 50% of actual GDP growth, reaching a **maximum 2% annual growth rate**. As mentioned earlier, the **BMW content is estimated to be stable at around 52% of total municipal waste**.

Table 4. Municipal waste generated (1995-2006)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Municipal waste generated (1000 tonnes)	4752	4834	5016	4976	4943	4552	4603	4693	4591	4646	4632	4707

Source: KSH, Eurostat and KvVM

Planning and implementation of **regional waste collection and transportation zones and related waste management facilities** are gradually being introduced under the framework of regional waste management planning. Municipalities must connect to the systems, and the methods of collection applied in the system and the location of the facilities are drawn up. **It must be ensured that all municipalities within the local waste management planning region are connected to a waste management system by 2009**. In accordance with the Waste Management Act, all municipal local governments are obliged to organise public services for waste collection and ensure the treatment of municipal waste either by building waste management facilities, or joining common projects with other local authorities. Organisations collecting, recovering and disposing of waste are eligible to start and carry on their activity only upon a license granted by environmental authorities. They have to keep records of their activity, of the quantity and quality of waste they treat, and they have to report annually to the authorities.

Separate collection of PET plastics, paper, glass and aluminium waste is reaching 15%. By the end of 2006, there were **4 000 separate collection islands and 74 waste yards** in operation in 500 municipalities of Hungary, with a total **capacity of 105 000 tonnes**. According to the information of the Ministry of Environment and Water, approximately **50% of the population** had access to these facilities in 2006.

² GDP Volume index: GDP compared to GDP level in 1995 as 100%

Most of the recycled paper is used by the domestic paper industry (mainly one large producer), while glass is transported for recycling to the Czech Republic and Italy, PET bottles to China, aluminium cans to the United Kingdom and beverage cartons (Tetra-Pak) packaging wastes to Germany.

Some waste management companies and municipalities **apply pay-as-you-throw schemes** in order to provide incentives for people to use the free-of-charge separate waste collection facilities and reduce the amount of unseparated municipal waste. Before 1989 waste management services were free of charge for decades, making people unaware of the real costs of waste generation and management, therefore **higher waste collection fees are not accepted by the public and they are expected to lead to increased illegal dumping.**

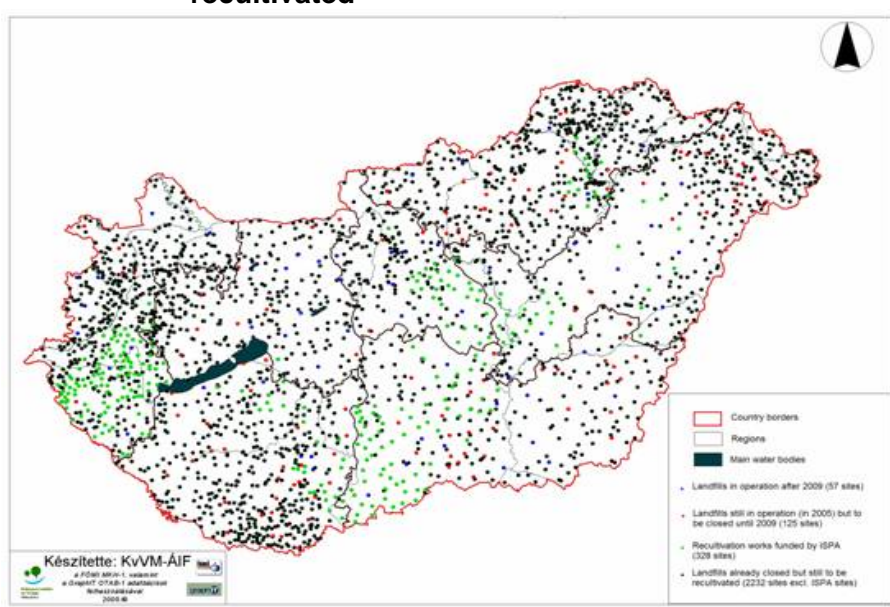
4.3. Factors related to landfill sector

For decades, besides being **a dominant form of waste management, landfills** were not managed safely and in an environmentally sound way. The practice was mainly a simple dumping of wastes on small landfills.

By 2009, technical criteria regarding waste landfilling and regulations must be completely met by all operating landfills. Modernisation of the existing regional landfills and establishment of new regional landfills must be completed. New facilities should serve at least 100 000 inhabitants in order to replace out-of-date small capacity landfills. The number of landfills operating in the country shall not exceed 100 sites altogether.

At the same time, out-of-date and/or uneconomical landfills must be closed and re-cultivated (approx. 2500 sites). The programme for municipal waste management and re-cultivation of abandoned landfills, which is part of the National Environmental Programme, was launched in the 1990s, however most of the re-cultivation works will be carried out between 2007 and 2013.

Figure 4. Geographical distribution of existing landfills and sites to be re-cultivated



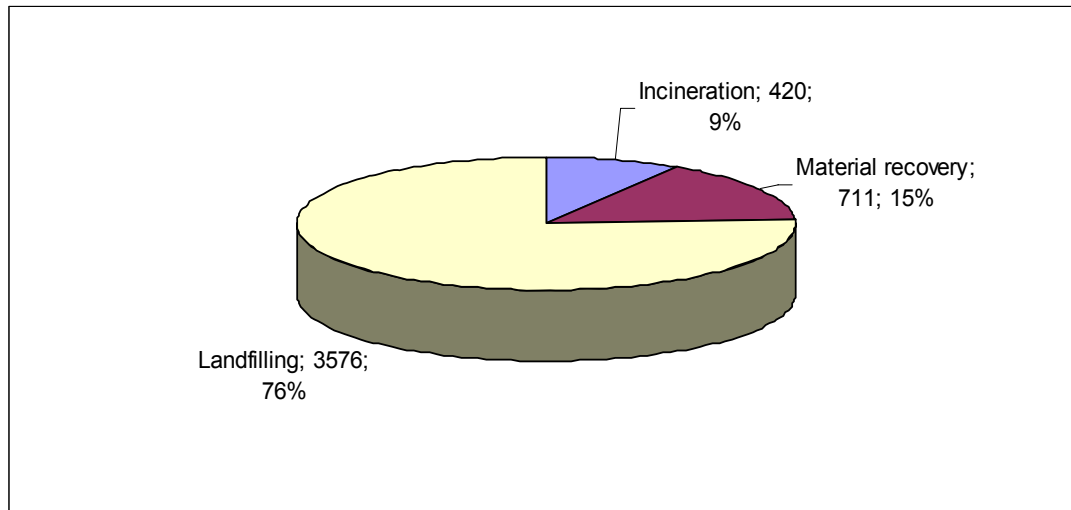
Source: KvVM

In 2005 there were 178 landfills in operation, out of which only 53 sites have permission to operate after 2009. The NWMP favours using re-cultivated areas for waste management purposes (waste yards, composting plants, separation plants, construction waste treat-

ment, etc.). According to the development strategy **13 247 000 tonnes of landfill capacity must be developed** until 2016 to meet all targets.

In 2006, after the municipal waste incinerator in Budapest restarted, the landfilling of municipal waste has been slightly decreasing.

Figure 5. Treatment of municipal waste in 2006 (1000 tonne)



Source: KVVMM, 2006

4.4. Landfill Directive transposed

Gradually, all targets of the Landfill Directive were introduced between 2000 and 2004 in the Hungarian legislation before the accession to the EU. In summary, by transposing the directive **technical modernization** of waste treatment facilities and **closing of old sites** were given top priority in waste management.

Four exemptions were granted during the accession procedures, out of which two are relevant to waste management. They were already met by the deadlines prescribed:

- Incineration of hazardous waste – by 30 June, 2005
- Packaging waste – by 31 December, 2005

Since 2003 the **ban on landfilling** has diverted hazardous wastes, tyres (also shredded tyres since 2006), untreated sludge, animal wastes and organic wastes (in line with the interim targets for BMW) from landfills.

Currently (April 2008) **there are no taxes on landfilling**, however the Ministry considers this as an instrument with very high potential to be implemented in the next few years.

Current **gate fee prices applied for landfilling** by site operators are approximately the following: HUF 8800 (EUR 35)/tonne for municipal waste; HUF 3800 (EUR 15)/tonne for BMW; and HUF 1380 (EUR 5.50)/tonne for C&D waste.

4.5. Factors related to incineration sector

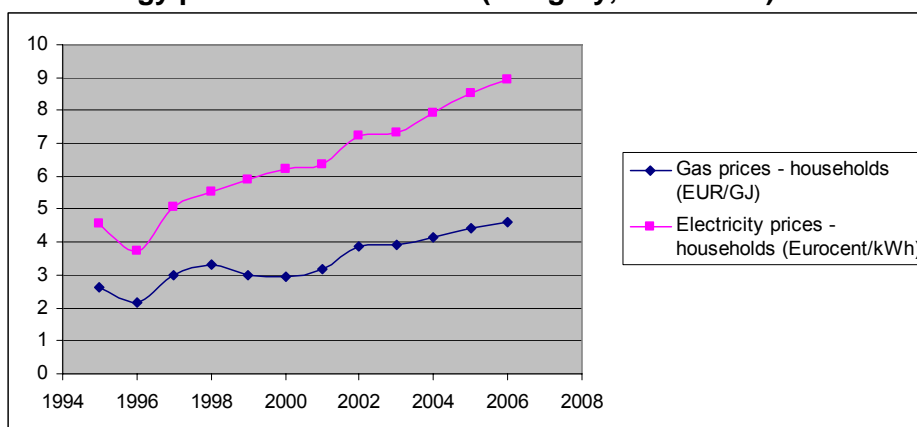
Generally, the **incineration of municipal waste has no long tradition** in Hungary. Cheap land prices and a rather low concentration of inhabited areas were not favouring factors for setting up additional municipal waste incinerators. In recent years, **public acceptance of waste incinerators has been very low due to environmental and, first of all, public health concerns.**

The **only municipal waste incinerator** of the country was built in the 1970s in **Budapest**. Modernisation of the facility was finished in 2005 in view of legal requirements and the technical standards set by the Incineration Directive. During the period of its modernization (between December 2002 and December 2005) most of the municipal waste generated in Budapest was taken to landfills. Since then, it has been **operating with an increased capacity of 420 000** tonnes per year. This is around 36% of the municipal waste generated in Budapest (1 150 000 tonnes). The city generates 26% of all municipal waste generated in the country (approx. 4 600 000 tonnes).

According to the NWMP, **a maximum of six** (one for each territorial planning region) waste **incinerators** serving at least 300 000 inhabitants **could get a permit** for construction in the vicinity of large towns. These would contribute to decreasing landfilling. Decisions regarding the establishment are still ahead, and feasibility studies of the facilities must be made when the regional waste management plans are developed, with the cooperation of Regional Development Councils, Municipal Governments of the Counties and the agreement of inhabitants concerned. Investment projects are to be prepared and the necessary technical-economic surveys are to be completed by end of 2008. Nevertheless, as mentioned earlier **public acceptance of waste incinerators is extremely low making permitting of new incinerators impossible so far. However, consultations should be finished in due course in order to meet the legal requirements by January 2009.**

Nevertheless, in parallel with **increasing energy demands of the country, gas, fuel and electricity prices have been dramatically increasing** in the last few years. On the other hand, the country is heavily dependent on energy supplies (gas and oil) from Russia. These factors **would highly justify energy recovery according to officers of the MoE and the Inspectorates.**

Figure 6. Energy prices in households (Hungary, 1995-2006)



Source: Eurostat

The NWMP highlights that certain sensitive regions of the country (e.g. where industrial activities are concentrated, where the geological conditions are special, where tourism represents a seasonal change, or where more of these factors are present simultaneously) construction of an incinerator can only be postponed for a short period of time in order to comply with interim targets of the Landfill Directive (KvVM, 2002, 2006 and KvVM websites).

4.6. Factors related to MBT

Biological-Mechanical-Treatment (MBT) is a preferred way of stabilizing unseparated municipal waste to recover valuable materials and produce a fuel suitable for co-incineration in power plants and waste incinerators. Currently the **installed capacity of MBT is 40 000 tonnes**. In order to meet the targets set up by the policy under the Land-fill Directive, it is planned in the current strategy to **increase the technical capacity of MBT plants to 1 120 000 tonnes**, (approx. 25-30 sites) and start MBT co-incinerators at two or three power plants, treating at least 2 x 150 000 tonnes by 2016. There are four cement plants in operation currently and five large power plants where fuel derived from MBT could be co-incinerated, and it is very likely that at least two plants will start co-incineration within two years.

4.7. Factors related to material recycling and recovery sector

For packaging waste, out of 835 000 tonnes of packaging waste generated in 2005, 393 000 tonnes (47.1%) and 29 000 tonnes (3.4%) was recovered by material and energy recovery, respectively. A key for successful improvements within waste recovery was the start and gradual extension of separate waste collection systems after year 2000.

Currently, 33 sites with **composting installations** are in operation, but they are struggling to find markets for their products. Capacity usage is very low, only around 50%. Basically, the **demand for compost is extremely low, only 5% of the compost is sold on the private market. Compost production** sites have the following capacities installed according to the latest survey (Progressio, 2006):

- Capacity (in permits): 301 443 (tonnes/year)
- Capacity (actually installed): 250 778 (tonnes/year)
- Amount of BMW actually treated: 126 909 (tonnes/year)

Paper prices have been continuously increasing since 2002. According to the largest waste paper recycling company of Hungary (Dunapack zRt.), since the first quarter of year 2005 waste paper prices have risen six times with around 37.5-44.5% altogether. Waste paper prices, accounting for about 60% of paper production prices were increasing less than virgin paper prices.

4.8. Summary of factors related to waste generation and collection

On the following pages we present the favouring and hindering factors of the methodology presented in Mazzanti and Zoboli (2007) which will also be used in the comparative analysis of the five countries and one region in the study.

Using the terminology in the methodology, there *was not* a trend of diversion from landfill (i.e. decreasing ratio 'BMW in landfill/BMW production') *before* the directive implementation and it *did* change after the implementation.

Table 5. Factors influencing effectiveness of a policy for municipal BMW diversion from landfill, Hungary (1995-2004)

Favouring/hindering factors	Influence on diversion	Justification of the +/- sign	Indicators	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Factors related to BMW landfill policy															
Landfill directive transposed	+	Legal framework in place.	Set in law since 2000.	0	0	0	0	0	1	1	1	1	1	1	1
Landfill tariffs/gate fees for BMW	+	Still low costs of landfilling, but gradually increasing.	Approximately 35 €/tonne currently.	Current prices for landfilling: 8800 HUF/tonne for municipal waste 3800 HUF/tonne for BMW, 1380 HUF/tonne for C&D waste.											
Landfill tax on BMW	-	No taxation.		0	0	0	0	0	0	0	0	0	0	0	0
Prohibition of untreated waste in landfill.	+	Discourage landfill.	Set in law since 2003.	0	0	0	0	0	0	0	0	1	1	1	1
Selective ban on BMW	+	Quantity limitation by law.	Set in law since 2003.	0	0	0	0	0	0	0	0	1	1	1	1
Factors related to waste production and collection															
BMW generation (kg per capita)	-	Approximately 52% of municipal waste.	Approx. 240 kg/capita, below the EU-25 average.	239	244	253	252	251	232	235	240	235	239	241	242
Separate collection for BMW (%)	-/+	Only basic requirement for recycling, however increasing gradually.	Share of produced BMW collected separately (%) is uncertain, however higher for paper and smaller for other kitchen and garden waste.							est. 2.2%	est. 2.2%	est. 2%	est. 5%	est. 7%	est. 8%
'Full cost' collection tariffs/charges	-	Low user charges.	Charges usually cover only direct costs.	Households pay only charges on waste collection. Some municipalities apply pay-as-you-throw schemes to urge people to reduce waste volumes and use separate waste collection facilities free of charge. Charges of collection vary between about 5 to 220 EUR/month with the size of containers and frequency of transportation.											
Factors related to landfill sector															
Share of municipal waste landfilled. (%)	+	High pressure on decreasing capacity.	Landfill share (%) is decreasing since 2004.	75%	78%	80%	82%	84%	85%	84%	85%	84%	85%	79%	76%
Landfill residual capacity for non-hazardous waste (million tonnes)	+	Decreasing landfill residual capacity	Decreased due to closing old landfills, but increasing with new projects.							150	89	80	45		
Land per capita (m2)	-	Around EU average, but scattered: high density in central region.	Land availability: 9233 m2 available per person.		9014	9032	9050	9074	9102	9121	9144	9173	9196	9214	9233

Factors related to incineration sector																	
Share of municipal waste incinerated (%)	-	Low incineration rate makes diversion difficult.	Approx. 9% of municipal waste is incinerated.	7%	7%	7%	7%	7%	8%	8%	6%	5%	3%	7%	9%		
Dedicated incineration capacity for municipal waste (1000 tonne)	-	Only one municipal waste incinerator in operation.	Approx. 9%.	350	350	350	350	350	350	350	<i>Fluctuating. The single MSW incinerator was under reconstruction.</i>				420		
Incineration gate fees	-	Operated by the waste management company of Budapest.	No gate fees.	No gate fee on the only municipal waste incinerator. Only waste collected by the operator is incinerated here. The price used internally for cost calculation is approximately 40 EUR per tonne.													
National policies on RES	-	Extremely low E-RES targets and policy.	Domestic E-RES targets were already met.	RES policy has been in place since 2001 and renewed in 2005. Limited RES-E targets. Penetration is around 3.8% above the 3.6% targets for 2010.													
Factors related to material recycling and recovery sector																	
Packaging and packaging waste policy	+/-	Policy in place since 2002. Increasing recycling capacity. Interim targets of the Packaging Waste Directive were met.	Recycling rate (rec/cons) paper/paperboard in %. Fluctuating between 40-50%	43	45	40	43	42	42	45	45	56	50	50	40		
MBT capacity (1000 tonne)	+/-	Increasing capacity, but still low.	MBT capacity per capita: 40 000 tonnes year														40
Compost production capacity (1000 tonne)	+/-	Increasing capacity but still low. Amount of home actual composting is unknown.	Compost production capacity of composting plants: 250 000 tonne/year									47		200			250

Positive influence = +; negative influence = -; *Italics over grey*= landfill policy factors

Sources: KSH, ETC/RWM Wastebase, Eurostat, KvVM and own calculations

Table 6. Evaluation of indicators for landfill policy since 2000

Landfill policy	Indicator	Strong	Weak
<i>Landfill Directive 1999/31/EC transposed</i>	<i>Dummy (1/0) If implemented no later than 2003 =1</i>	1 Implemented in 2000	
<i>Landfill tariffs/gate fees for BMW or MSW (excl. VAT and landfill tax)</i>	<i>Average for country, or the highest gate fee and the lowest gate fee, % increase up to 3 years after impl.</i>	1 Still low costs of landfilling, but gradually increasing. Approximately EUR 35/tonne currently.	
<i>Landfill tax on BMW (or MSW)</i>	<i>Average for country, or the highest and the lowest tax, % of gate fee</i>		1 There is no landfill tax in place
<i>Prohibition of untreated waste in landfill</i>	<i>Dummy (1/0) If implemented no later than 2005 =1</i>	1 The landfill ban was implemented in 2003	
<i>Selective ban on BMW</i>	<i>Dummy (1/0) If implemented no later than 2005 =1</i>	1 The landfill ban was implemented in 2003	
Summary evaluation		Globally strong: 4 out of 5	

Based on information in Table 4 the landfill policy for 2000 score four of the five indicators as strong and thus the summary evaluation is ‘globally strong’.

Table 7. Evaluation of favouring and hindering factors since 2000

Favouring factors (+ sign)					Hindering factors (- sign)				
	Indicator	Strong if	Weak if		Indicator	Strong if	Weak if		
Related to waste production and collection									
1	Separate collection for BMW	Share of BMW collected separately of generated household waste, %	>30%	< 30%	1	BMW generation per capita	BMW generation, per capita tonnes	> EU25 average	< EU25 average
				8%					241 kg
2	'Full cost' collection tariffs/ charges	Share of waste management cost covered by tariffs, %	> 90%	<90%					
				Very low user charges.					
Related to landfill sector									
3	Landfilled MSW of MSW generation	Landfill share of household waste generation, %	>EU25 average	< EU25	2	Landfill residual capacity (non-hazardous waste)	Landfill capacity (non-hazardous), as % of household waste generated	> 5 years of generation	< 5 years of generation
			73%						Decreasing due to closure of old landfills, and delays in new landfill projects.
					3	Land availability	Land per capita in m2	>5000	<5000
								9233 m2	
Related to incineration sector									
4	Dedicated incineration capacity for MSW (available)	Incineration capacity, as % of household waste generated	If capacity > 20% of generated MSW	If capacity < 20% of generated MSW	4	Incineration gate fees for MSW (3 years after implementation)	Average for country, or the highest gate fee and the lowest gate fee, EUR/tonne	> 30% increase in gate fees	< 30% increase in gate fees
				9%					Not relevant.
5	National policies on RES	Distance-to-target for E-RES on domestic electricity consumption, %	< 50% of the 2010 target has been met	> 50% of the 2010 target has been met	5	Share of MSW incinerated	Incinerated household waste over household waste generation, %	> EU25 average	< EU25 average
				RES targets (3.6%) were met already in 2005.					9%
Related to material recycling and recovery sector									

	Favouring factors (+ sign)				Hindering factors (- sign)				
		Indicator	Strong if	Weak if		Indicator	Strong if	Weak if	
6	Packaging and packaging waste policy	Recycling rate paper and paperboard, %	> 50% Other packaging waste targets met and around 52%.	< 50% Fluctuates between 40-50%					
7	MBT capacity	MBT capacity per capita	> 20% of BMW generation	<20% of BMW generation Reached 40 000 tonnes in 2006.					
8	Compost capacity	Compost production capacity, tonnes/year	> 20% of BMW generation)	20% of BMW generation Reached 250 000 tonnes in 2006.					
	Summary evaluation	Globally weak: 7 out of 8	Globally strong: If at least 5 strong out of 8	Globally weak: If at least 5 weak out of 8		Summary evaluation	Globally weak: 4 out of 5	Globally strong: If at least 3 strong out of 5	Globally weak: If at least 3 weak out of 5

The favouring factors related to waste production and collection, landfill sector, incineration sector and material recycling and recovery sector are globally weak in comparison to the EU-25 average, however many indicators have been developing substantially with the implementation of the Landfill Directive since 2000. On the other hand hindering factors are also globally weak, posing no substantial barriers for the slight developments observed in trends.

Table 8. Policy evaluation for Configuration 3 of diversion indicator: ‘there was *not* a trend of diversion from landfill *before* the directive implementation and it *did* change after the implementation’

Combination	Landfill policy change	Favouring factors +	Hindering factors -	Summary evaluation
6	Strong: <i>The existing policy was far from the directive or was already in line but its change went beyond the directive</i>	Weak	Weak	Effective: policy has been active and it was able to exploit ‘neutral’ favourable and hindering factors for improving the trend

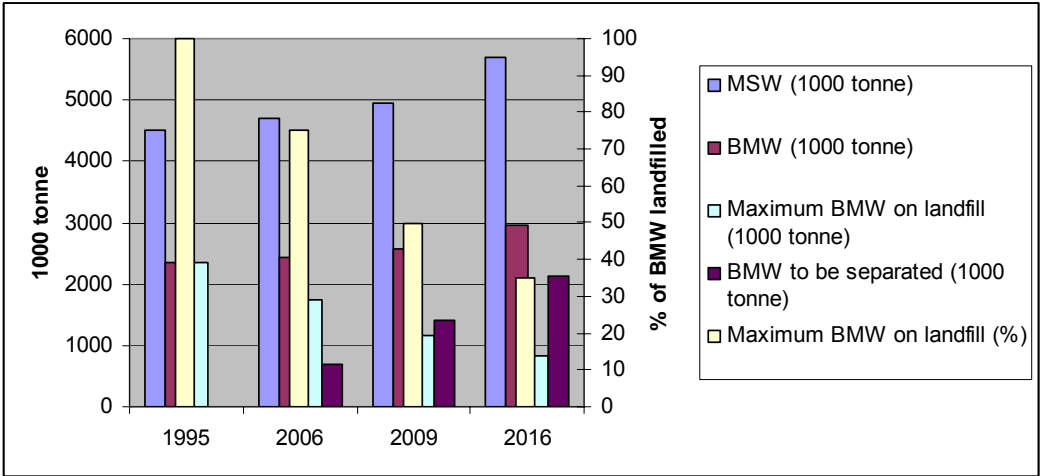
Based on the proposed methodology the summary evaluation shows that the policy has been ‘effective’.

5. Assessment of the status of municipal waste, tyres and C&D waste

5.1. Status of municipal waste and BMW management

As presented, the amount of municipal waste generated annually in the country has stabilized at around 4.6 million tonnes, but a maximum annual growth of 2% is expected. Also, the composition is judged to be relatively stable, approximately half of the waste is BMW compounds (incl. 17% paper and 35% bio-wastes).

Figure 7. Targets for BMW treatment (Hungary, 1995-2016)

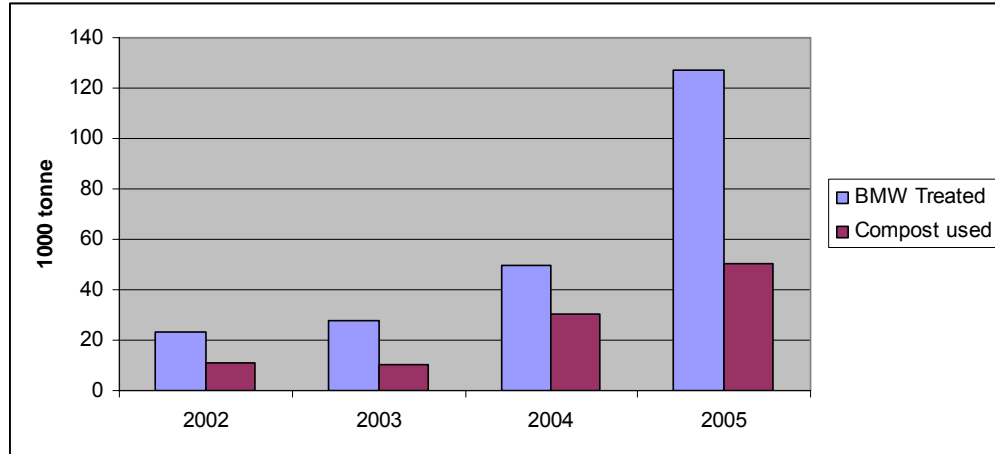


Source: KVV, 2004

Interim targets set for 2006 by the Landfill Directive and for 2004 by the Hungarian policy, were met in 2006 due to a dramatic increase in material recovery, primarily due to improved separate paper (and packaging paper) collection.

By the end of 2004, the total **amount of BMW** was estimated to stand at **2.4 million tonnes**, 200 000 tonnes of BMW was composted, including 80 000 tonnes of home composting, 20 000 tonnes was treated by MBT, and approximately 80 000 tonnes was incinerated. An **increasing amount of waste paper** (15-17% of municipal waste) is being collected separately at public and private separate collection facilities, reaching 210 000 tonnes from households and 430 tonnes altogether. Home composting of organic waste is gradually improving and gets more and more popular due to official and NGO-initiated awareness raising campaigns. It is estimated that home composting was around 80 000 tonnes by the end of 2004. BMW composted at composting plants (at new landfills) is gradually increasing.

Figure 8. BMW composted, and compost used



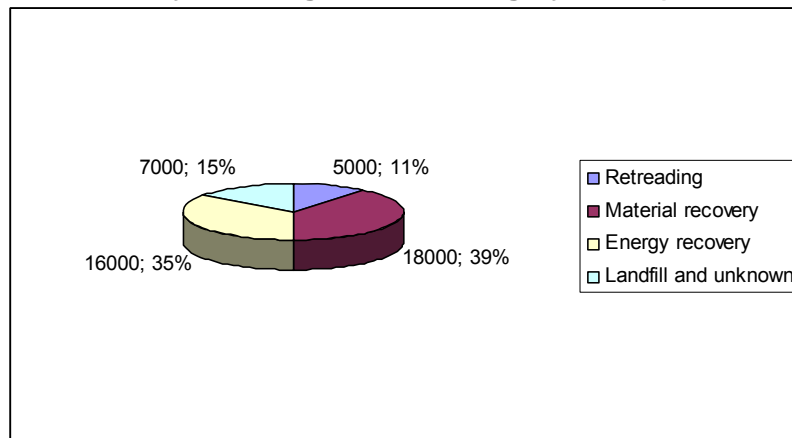
Source: Progressio, 2006

34 sites treat BMW separately, 33 sites are green waste composting, one is an MBT plant. Most of the composting plants (70%) are installations connected to municipal waste landfills, where compost is mainly used as covering material. Currently **only 56 out of 3 167 municipalities** are covered by these installations: total capacity of BMW treatment plants is 301 443 tonnes/year altogether by permits. However, the actual installed capacity is 250 778 tonnes/year, while BMW treated only amounts to 126 909 tonnes/year.

5.2. Status of waste tyres management

Regarding **waste tyres**, 50% of collected waste tyres must be diverted for material recovery, while 50% can be utilized for energy recovery. Before 2003, at least 30% of tyres were landfilled, while, with the introduction of the ban on landfilling in 2003 and the ban on landfilling of shredded tyres in 2006, no waste tyres are landfilled today. Annual sales of new tyres in Hungary are between 40 and 50 000 tonne. In parallel, the estimated amount of annual waste tyres is 35-45 000 tonnes. According to the data of the European Tyre & Rubber Manufacturers' Association, **85% of the 46 000 tonnes of waste tyres in Hungary were treated, thus meeting the targets set by the policy-makers.**

Figure 9. Waste tyre management in Hungary, 2005 (tonnes and %)



Source: ETRMA, 2006

The 70% percent (in mass) target for waste tyre collection is expected to be the highest potential rate of collection justified by the Ministry of Environment for the following reasons: 10% loss in weight is due to the abrasion of tyres on roads, while about 20% is stored in households and garages, either as spare tyres or for different purposes (e.g. as home made protection bumpers on garage walls, etc.).

According to a survey carried out by the largest company dealing with waste tyre collection and management (Öko-Gum) approximately 40-50 000 tonnes of waste tyres are accumulated in households and companies. Nevertheless, some environmental NGOs (including HUMUSZ, interviewed) estimated this amount to be around 300-320 000 tonnes, however this latter statement cannot be verified.

Products manufactured from recycled tyres are relatively expensive, making it difficult to sell them. According to the Ministry of Environment a large share (approximately 22 000 tonnes) of material recovery was ensured in the last two years by **mixing shredded tyre to road baseaments** to increase flexibility of sand.

5.3. Status of construction and demolition waste management

Improved data series are available from 2004, when the new Waste Management Information System (HIR) was launched. For earlier dates, an estimation for year 2000 is available; the estimated amount of C&D waste generated was around 3 000 000 tonnes (NWMP). In 2004 and 2005 **a dramatic increase to above 4 000 000 tonnes was reported due to increasing road and housing construction works.**

Construction and demolition wastes are dominantly landfilled. Prices of virgin building materials are much cheaper than recycled materials. This results in a low (around 25%) recycling rate. C&D waste is often used as covering material on landfills.

Approximately **75% of C&D waste (excluding soil) is landfilled**, only a few (3-4) companies are recycling C&D wastes. Considered to be an inert waste, approximately 40% of the C&D waste is used as **covering layer on landfills**. Generally, a relatively low environmental impact is associated with waste this stream.

6. Analysis of effectiveness of the policies implemented

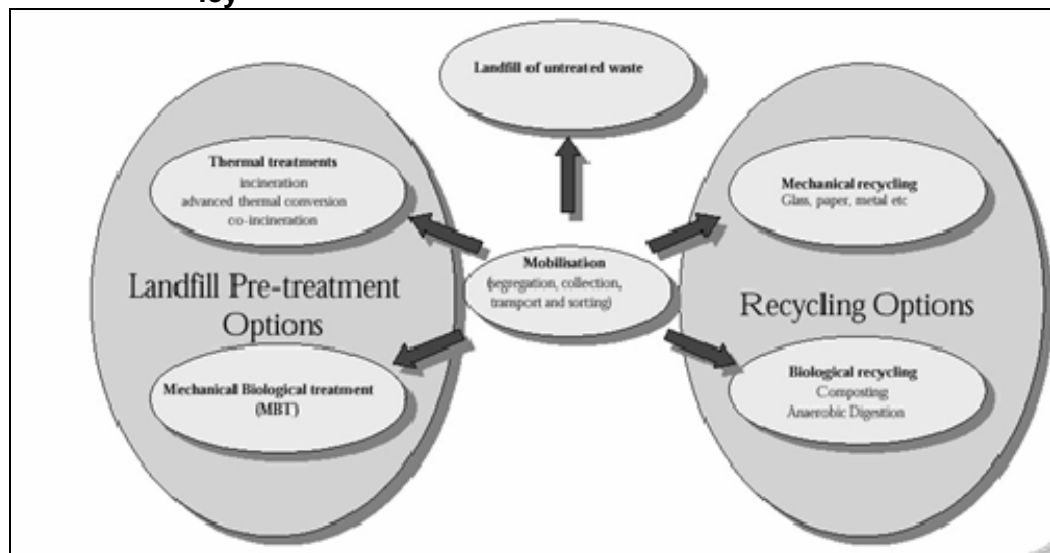
6.1. Policy approach and distribution of responsibilities

The **Hungarian environmental policy, including the waste management policy**, has a very strong “**top-down**” approach, making centralized policy-making subject to application at regional and local levels. Before 1989, municipal waste management was not subject to extensive regulations and focused only on hazardous wastes and collection of municipal waste from households. Hungary has set up its Ministry for Environment in 1989, and then started to gradually implement waste management policies, primarily in order to approximate its practice to the EU standards and aquis.

Top priorities of the Hungarian waste management policies related to municipal waste, including household and biodegradable waste, are:

- to raise capacities of modern waste management facilities and treatment plants, such as regional landfills, waste separation plants, MBT capacities, composting sites, MBT co-incinerators;
- to close old landfills, plan and carry out recultivation of these sites;
- to eliminate illegal landfills;
- to dramatically improve material recovery, through improving separate waste collection of packaging waste and hazardous waste (electronic waste, end-of-life vehicles, batteries, chemical wastes from households);
- to gradually improve data quality of waste statistics;
- to raise public awareness and improve environmental education.

Figure 10. Treatment options considered in the waste management policy



Source: KVVMM, 2005

As discussed in Chapter 3.1 in more detail, the **strategic targets are defined at national level**. National strategic principles and objectives of waste management **must be addressed by regional and municipal waste management plans**. Technical criteria of waste treatment, as embedded in regulations are permitted, supervised and enforced by regional authorities (Inspectorates).

Distribution of responsibilities for the key policy measures analyzed in this paper are summarized in the table below.

Table 9. Responsibilities of key policy measures

Policy measure	Responsibilities
Ban on landfilling	Regional Inspectorates for Environmental Protection, Nature Conservation and Water Management are responsible for issuing permits for landfill site operators, in which they prescribe the type and amount of waste the landfill is authorized to treat. These Inspectorates are in charge of inspections and enforcement of technical standards as well.
Separate waste collection	Waste management companies (usually co-owned by municipalities and private companies) are obliged to meet the objectives (recycling and recovery targets) of the Waste Management Act and organize separate waste collection in their service area or fulfil objectives by outsourcing the fulfilment obligations to specialized recycling/recovery companies. User charges for household waste collection are slowly, but gradually increasing, while public separate waste collection is free of charge.
Environmental product charges	<p>Scope of products, product charge rates, exemptions and discounts are fixed and periodically reviewed by the Ministry for Environment and Water. Producers (or importers) of these products must quarterly report to the Ministry. Producers or importers have different options:</p> <ul style="list-style-type: none"> • pay the full price of product charge; • pay the product charge and the same time by meeting recycling threshold values, (partly or fully) reclaim the charge paid; • contract a coordinating organization, a recycling public benefit company which will organize waste treatment and fulfil targets set for material and energy recovery according to the requirements, so the producer/importer company does not have to pay product charge. <p>Coordinating organizations are registered by the National Inspectorate for Environment, Nature and Water. Revenues from user charges are earmarked for environmental projects.</p>
National Bio-waste Programme	The Ministry for Environment and Water is responsible for preparing calls for proposals for awareness raising projects and (co-)financing technical capacity improvement projects.

6.2. Analysis and discussion

6.2.1. Waste prevention

In general, **waste prevention** has no other (quantitative) targets set by the policy-makers for municipal waste, but reducing the increase in waste generated to maximum half of the GDP growth and keep it below 2% annually. Growing consumption rates, changes in consumer behaviour, market prices and continuously improving environmental awareness have an impact on waste generation. The annual amount of municipal solid waste generated is stabilized at a relatively low level. As often highlighted by NGOs, the **concept of waste prevention almost exists only formally**, and no direct measures aim at the reduction of municipal waste generated. However, **awareness raising campaigns** of the Ministry of Environment and Water, environmental NGOs and municipalities promoting e.g. responsible consumption, home composting and development strategies targeting cleaner production projects could have contributed to an improved ratio of waste generated and level of consumption. The intensity of awareness raising campaigns is expected to improve from the funds of the Environment and Energy Operative Program from 2007 – 2013 (data on budget for promotion campaigns are not available yet).

6.2.2. *User charges*

According to the Act on Waste Management, **costs of waste management** – based on the “polluter pays” principle – should be borne by the generator of the waste. In case of municipal waste, these are the residents of the municipalities. However, direct cost coverage for waste management through **user charges** is a **politically sensitive question**. In the past, it was a basic “state” service, usually free of charge, making people ignorant and unaware of the costs and environmental impacts of their waste production. Many municipalities are not charging waste management costs directly on residents, but cover the costs from local taxes. The system of **pay-as-you-throw** schemes is only applied in a few communities. Typical examples are recreation areas, where the amount of waste generated is higher at weekends or seasonally (summer or winter), and waste is not generated continuously by permanent residents.

It was a common view expressed by state officials and NGOs that a dramatic increase in user charges could in the short term **lead to increasing illegal waste dumping** despite increasing environmental awareness. An option to finance extra costs of separate collection is to contract a “co-ordinating organisation”. These are public benefit organisations established for fulfilling the take-back and recovery requirements based on producer responsibility) which have commissions of the producers. NGOs and civil organizations including HUMUSZ, opt for the implementation of a new system of user charges in order to pay at least partially according to the weight or volume of waste generated.

6.2.3. *Separate waste collection*

Free of charge³ separate waste collection (generally packaging waste such as PET, paper, glass and aluminium cans) is reaching an estimated national level of 15% for these waste streams. **Access to these facilities is ensured for 50% of the population in 2006 and further extension of the system is expected until 2012**. It was a key measure to fulfil the **interim targets set for 2006 by the Landfill Directive** and for 2004 by the Hungarian policy. The technical solutions for **separate waste collection** are defined in the regional and local waste management plans, in accordance with the complex regional waste treatment systems. Experts and stakeholders interviewed all agreed on a **high level of public acceptance** of the gradual improvements in separate waste collection. This service is warmly welcomed by the population, making the environmental attitude a role model to be followed by responsible citizens. Often, **residents are demanding municipalities to extend the service area or increase the capacity of separate waste collection facilities**.

6.2.4. *Diversion of BMW from landfills*

It is obvious that a dramatic **improvement can be expected** only if there is extensive home composting and **separate collection** of biowastes for **large scale composting**. The HUF 2937 million (approx. EUR 11 million) BIO-P programme assists several NGOs and municipalities to start promoting and implementing home composting of garden wastes. To date, there are approximately 3200 registered home composters, but the real amount and capacity of home composting is unknown and estimates could not be given by interviewed stakeholders either.

Nevertheless, the **capacity usage of existing composting sites is below 50%**. There are 24 composting installations at municipal waste landfills and 11 independent installations with an installed full capacity of 250 778 tonnes/year, while the amount of BMW actually treated reaches only 126 909 tonnes/year. Most of the compost produced is usually **used for recultivation and for covering landfills** (on site). Only 5% of the production ends

³ It is free of charge for households as it is a producer responsibility system. However, in the end householders pay via the products they buy.

up as **compost** on the market. The most important **hindering factors** of compost utilization were identified as follows:

- major aversion of potential users (gardeners, farmers) due to lack of trust in secondary materials and the concerns below;
- high nitrate content excludes the utilization at some sensitive areas;
- aversion of users due to the previous concern on nitrate;
- knowledge of using compost is generally low;
- price is not competitive (considering logistics) compared to primary compost and fertilizer prices;
- no permission for immediate use without further special permits.

It is expected by the Ministry for Environment – but debated by NGOs – that separate collection of BMW will not contribute to a satisfactory level of diversion. The chances are high that **incineration** (of MBT fuel) will be favoured **instead of composting**. Consequently, the main **objective is to start co-incineration of MBT fuel** at two or three power plants, attaining at least. 2 x 150 000 tonnes by 2016. It is very likely that these power plants will start co-incineration shortly (in the cities of Várpalota-Inota, Oroszlány and/or Visonta). These installations will co-incinerate only fuel derived from MBT, and **not unseparated municipal waste**.

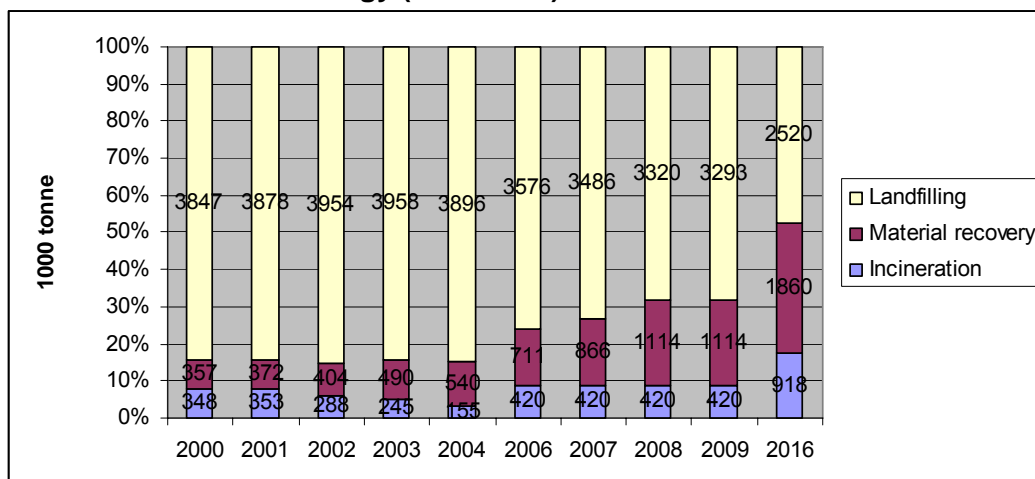
6.2.5. New waste treatment projects

Installing **new regional waste treatment facilities** according to the National Waste Management Plan and Act on Waste Management, is a **top priority**. Considering the fact that all technologically non-compliant landfills must be closed by 1 January 2009, all municipalities **in association with other municipalities** should join regional waste management systems or create their own waste management facilities. After January 2009 only 53 of the landfills in operation will be permitted to operate.

Based on the concerns of BMW diversion presented earlier, the **development strategy** sets three major interim targets **for improving technical capacities** until 2016 to meet all target. The **major steps** of the development strategy until 2016 **are illustrated in Figure 13**.

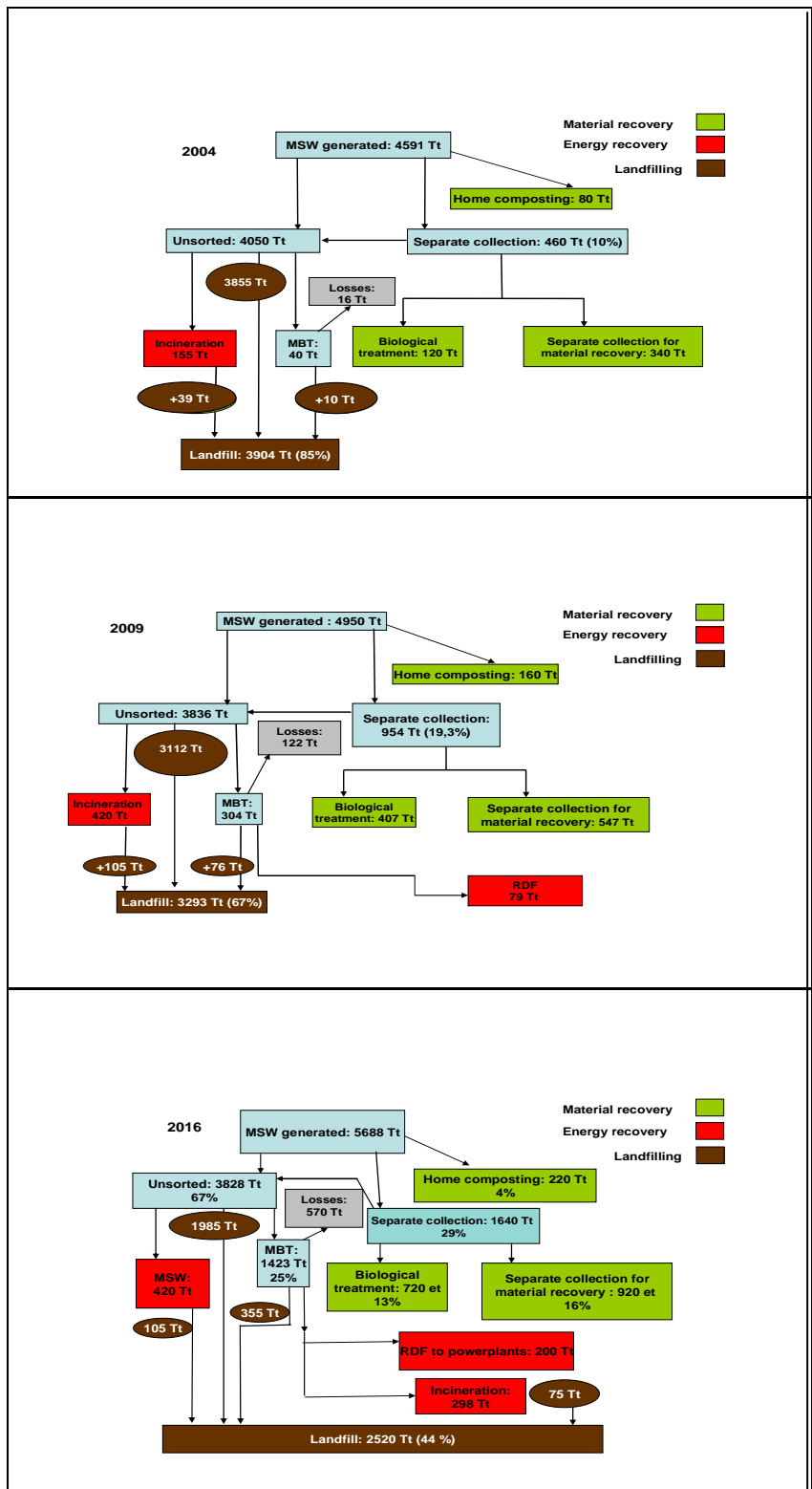
Calculating with the above listed capacity improvement, the present **strategy of diverting municipal waste** from landfills (KVVM, 2006) has the following targets – based on pessimistic (annual growth rate of 2%) waste generation forecasts – for waste treatment options.

Figure 11. Municipal waste treatment – forecasts based on municipal waste strategy (2000-2016)



Source: KVVM, 2005

Figure 12. Municipal waste treatment development strategy (2004-2016)



Source: KVVM, 2006

Financial resources for setting up new waste management facilities are partially covered by the state and local municipalities' budget and enterprises. However, **modernization and new projects are extremely dependent on EU structural funds** from which significant shares (up to 80-85% for some projects) of the projects are covered. The EU structural funds support regional waste management solutions, but unfortunately the progress in setting up municipal associations for raising funds (primarily from the EU Structural Funds) is heavily **hindered by a number of difficulties**. Despite the fact that the NWMP objectives and targets should be implemented at regional and local level, the municipalities have some degree of freedom for acting and implementing waste management in practice. Therefore, starting new projects are often (e.g. at South East of Hungary) biased by **personal and political factors or tensions** between municipalities, thus creating **strong barriers** according to the Ministry of Environment and Waters.

Furthermore, the associations of municipalities often **territorially overlap** with the NWMP **planning regions**, and the practical implementation differs from the regional planning. Sometimes, this **results in a confusion of institutional responsibilities** (e.g. Environmental Inspectorates). Regional Development Councils lack professionals and are in a need of professional capacity building to be able to better coordinate the new regional projects according to the Ministry of Environment. Training programmes are being planned to improve the local capacity of staff.

Currently, there are 17 regional waste management system projects (collection and treatment facilities) in progress of planning and installation: 12 funded by ISPA (Instrument for Structural Policies for Pre-Accession) resources, and 5 funded by the Cohesion Fund. These facilities will start operating between 2007 and 2009 serving 60% of the population (KvVM Website) and 2 214 municipalities. The minimum requirement for new investments is to ensure separate collection of bio-waste, packaging waste and hazardous waste in order to meet the policy objectives. Total costs are estimated to EUR 680 million, of which more than 50% will be covered from European funds.

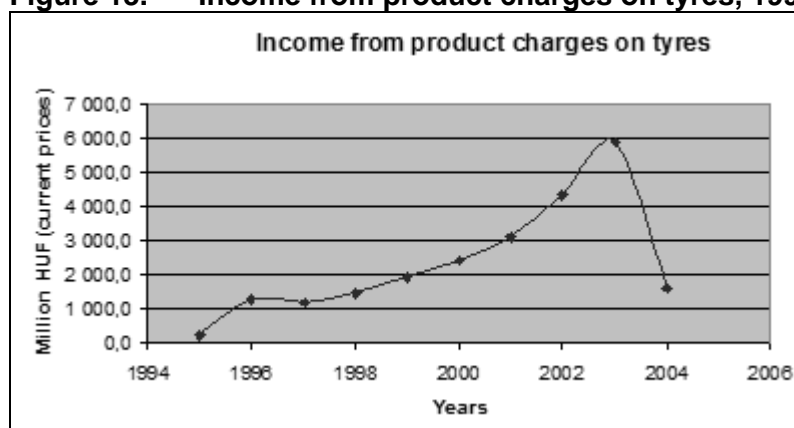
The progress of identifying appropriate sites for **new landfills is often complicated** by the low level of public awareness in terms of the advantages of new modern waste management facilities, resulting in the well-known **NIMBY (not in my back yard) syndrome**: although people are aware of the need for such facilities, they are unwilling to have them in a neighbouring area. The proposal of the NWMP of constructing six new regional **municipal waste incinerators** was basically eroded due to the even more **extreme resistance of the public via consultation processes**.

6.2.6. Waste tyres

Effectiveness of policy measures for waste tyres is considered to be relatively successful, in the light of fulfilling the objectives set up by the policy-makers of the Ministry of Environment. Nevertheless, the **product charge itself was not strong enough** to divert waste tyres from landfills. As seen in the figure below, the income generated from charges was rising until the introduction of the landfill ban in 2003. This means that producers rather paid the product charge and let the burden of waste management be borne by the state.

The **significant reduction** in incomes from product charges after 2003 is due to the increased level of recovery driven by the implementation of the **landfill ban** which encourages producers to improve recovery systems or pay the price of recycling and recovery.

Figure 13. Income from product charges on tyres, 1995-2004



Source: KSH, 2006

Before 2003, at least 30% of tyres were landfilled. Since the introduction of the ban on landfilling in 2003, followed by the ban on landfilling of shredded tyres in 2006, no waste tyres are landfilled.

Regarding the effectiveness of the product charge on tyres, the key point is that the product charge is **set to a much higher level than service fees** paid in the producer responsibility system for the **coordinating producer responsibility organizations for ensuring full legal compliance with waste recovery targets**. While the product charge on tyres is set as high as HUF 110/kg (approx 40 eurocent per kg of tyre), by the Ministry of Environment and Water, **by contracting one of the three coordinating organizations**, which are so called “public benefit companies” subsidised with special taxation discounts, producers or importers **pay only one third** of that price (between HUF 28-32 + VAT per kg of tyre) as service fees.

Table 10. License fees of recycling organizations

Producer responsibility organization	License fees in 2007 (HUF/kg + VAT)
Öko-Gum Kht.	28
Környezetvédelmi Koordinátor Kht. (Environmental Coordinator)	32
Hurec Kht.	29

The fees are continuously revised in order to keep them high enough to force all producers and importers to meet the policy objectives by contracting one of the recycling organizations.

Nevertheless, additional facilities for material utilisation, pyrolysis and heat recovery needed to be started up for energy recovery, which is the more economic and favoured option (mainly in cement industry).

Utilisation of available capacities is greatly impeded by the lack of demand for the re-processed product (mainly ground rubber). The domestic market is rather limited, which is a serious obstacle to material recovery. As rubber grinding is very energy-intensive and costly, it is not bringing good returns on the market. As a result, there is existing capacity, but economical operation is not considered to be feasible by all stakeholders. Solutions have to be expected from **market creation measures** (e.g. regulation to require rubber surfacing on playgrounds and school yards, in order to reduce the frequency of accidents). In the last two years – based on examples from Finland, where the material recovery ratio is the highest in the world according to the officials of the MoE – a significant amount of shredded tyre is used for road construction and recognized as material recovery. In order to improve **flexibility of the road basement** on sand and gravel surface, shredded tyre is mixed to the basement construction material.

6.2.7. Construction and demolition waste

As discussed, the current policies do not address the management of C&D waste in particular. Consequently, **the overall level of recycling of construction wastes remains low**. Landfilling is still a dominant form of waste disposal, being **still by far the most economical option**. C&D waste used for covering landfills is reported as being re-used/recycled in the statistics. In addition, building standards and norms basically do not contribute to using recycled C&D waste. **Legal requirements** of safety and hazardousness of the secondary materials, as well as **strict technical norms and standards for construction materials**, are barriers to increasing demand for recycled construction wastes.

6.3. Results and effectiveness of waste management policy

Effectiveness of the policy implemented is influenced by several weak hindering and weak favouring factors as presented in Chapter 5 and summarized in Table 7. The influence of these factors on the policy can be judged based on both the actual strength of the factors and the trends recorded in the country.

Regarding the configuration of **the country's performance** in terms of the effectiveness of waste management policy to divert waste from landfills, the policy can be considered as **effective**.

Strong landfill policy changes are due to the implementation of the Landfill Directive. **Before 2000, the existing policy was far from the objectives of the directive** and the dominant form of waste treatment was landfilling. Policy objectives (at least legally) went beyond the directive targets encouraging improvements in material recovery at the short term and the improvements in complex waste treatment options including incineration in the longer term. The policy can be considered as effective based on its short term achievements. Before the policy implementation, there was no diversion trend, but **a diversion trend started after the legal implementation** procedure.

Main policy measures favouring diversion include an **early transposition** of the Landfill Directive, gradually **increasing costs** on waste producers, selective **landfilling bans** on priority waste streams and implementation of **environmental product charges**.

The **waste policy has been very successful** as it was able to exploit **a neutral combination of weak favourable and weak hindering factors** as detailed in Chapter 5 and summarized in Table 7.

- The level of BMW generation per capita – reported to be a constant share in municipal waste – is clearly below the European average. Nevertheless, **separate collection of BMW is still underdeveloped** leading to mixing BMW with other solid wastes. In addition, **user charges are still relatively low** in a European context, however gradually increasing.
- On the other hand, available **landfill capacity** (due to the lack of incinerators and the closure of old landfills), is a clear **pressure** on a demand for solutions alternative to landfilling. **Population density** favours incineration only in the central region of Hungary, where the population density ensures relatively low transportation costs.
- The **only municipal waste incinerator** of the country operating with full capacity only diverts around 9% of total municipal waste generated, but **additional capacities are available for co-incineration in some power plants**. Unfortunately, **RES targets of the country are the lowest in the EU** (only 3.6% by 2010), making it easy to meet without the need to improve energy recovery capacities.
- **Material recovery** of BMW is favoured by increasing composting and mainly MBT capacities, while dramatic improvements in separate collection of packaging waste after the implementation of the Landfill Directive and the Packaging Directive also favour material recovery.

Table 11. Summary of factors influencing the effectiveness of the policy for municipal BMW diversion from landfill

Favouring/hindering factors	Influence on diversion	Justification of the +/- sign	Indicators
Factors related to BMW landfill policy			
<i>Landfill directive transposed</i>	+	<i>Legal framework in place.</i>	<i>Set in law since 2000.</i>
<i>Landfill tariffs/gate fees for BMW</i>	+	<i>Still low costs of landfilling, but gradually increasing.</i>	<i>Approximately EUR 35/tonne currently.</i>
<i>Landfill tax on BMW</i>	-	<i>No taxation.</i>	
<i>Prohibition of untreated waste in landfill.</i>	+	<i>Discourage landfill.</i>	<i>Set in law since 2003.</i>
<i>Selective ban on BMW</i>	+	<i>Quantity limitation by law.</i>	<i>Set in law since 2003.</i>
Factors related to waste production and collection			
BMW generation (per capita)	-	Approximately 52% of municipal waste.	Approx. 240 kg/capita, below the EU-25 average.
Separate collection for BMW	-/+	Basic requirement for recycling.	Share of produced BMW collected separately is uncertain, however higher for paper and smaller for other kitchen and garden waste.
'Full cost' collection tariffs/charges	-	Low user charges.	Charges usually cover only direct costs.
Factors related to landfill sector			
Share of municipal waste landfilled.	+	High pressure on decreasing capacity.	Landfill share has been decreasing since 2004. Was 76% in 2006.
Landfill residual capacity (non-hazardous waste)	+	Decreasing landfill residual capacity.	Decreased due to closing old landfills, but increasing with new projects.
Land per capita	-	Around EU average, but scattered: high density in central region.	Land availability: 0.0091 km ² available per person.
Factors related to incineration sector			
Share of municipal waste incinerated	-	Low incineration rate makes diversion difficult.	Approx. 9% of municipal waste is incinerated.
Dedicated incineration capacity for municipal waste (available)	-	Only one municipal waste incinerator in operation.	Approx. 9%.
Incineration gate fees	-	Operated by the waste management company of Budapest.	No gate fees applied.
National policies on RES	-	Extremely low E-RES targets and policy.	Domestic E-RES targets were already met.
Factors related to material recycling and recovery sector			
Packaging and packaging waste policy	+/-	Increasing capacity.	Recycling rate (rec/cons) paper/paperboard) 40%
MBT capacity (per capita)	+/-	Increasing capacity.	MBT capacity per capita: 40 000 tonnes/year
Compost production capacity (per capita)	+/-	Increasing capacity. Amount of home actual composting is unknown.	Compost production capacity of composting plants: 250 000 tonnes/year

Positive influence = +; negative influence = -; *Italics over grey*= landfill policy factors

7. Main findings

The Hungarian National Waste Management Plan (NWMP) is implemented to ensure that national policies and regulations will address diverting waste from landfills according to the EU Landfill Directive.

A package of different policy measures are aimed at achievement of objectives set for different waste streams which are based on a **combination of legal, economic and market driven instruments**.

The key waste management policy targets set up for 2004-2006 were generally met **successfully**. The key interim deadlines and targets met included the following stages:

- Fulfilling the technical criteria of waste and hazardous waste incineration;
- Meeting the interim targets set for packaging waste;
- Starting and gradually extending the system for separate waste collection;
- Fulfilling the interim goals of the Landfill Directive, although, not meeting the objectives of the Hungarian policy, which is setting interim targets two years ahead of the Landfill Directive;
- Meeting the objectives and targets for the collection and recovery targets for waste tyres;
- A continuous increase in GDP is not reflected in the same growth in municipal waste generation.

Nevertheless, considering the fact the all outdated landfills must be closed by 1 January 2009 and in order to meet the next targets of the Landfill Directive, policy-makers **face several challenges identified during desktop research and stakeholder interviews**.

- setting clear objectives for waste prevention;
- plan and carry out the recultivation of old, closed landfills;
- all municipalities should join the regional waste management systems (or create their own waste management facilities);
- the system of separate waste collection must be further improved;
- improving technical capacities until 2016 to meet all targets;
- markets for recycled materials (including compost and products made from recycled tyres) must be extended;
- raising public awareness and improve communication of waste management objectives, factors and costs.

Obviously, a strong influence of the new landfill and waste management policy is due to the efforts made toward the uptake of EU regulations and objectives. Short term targets were generally met by an improved system of waste recovery.

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www.KvVM.hu

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<http://terkep.kvvm.hu/hirweb/>

Website of The European Tyre Recycling Association
<http://www.etra-eu.org/>

Website of Waste Prevention Alliance (HUMUSZ)
www.humus.hu

I. Annex: List of interviewed stakeholders

Name of Interviewee	Organization	Mode of interview
Mr. Szabolcs Horváth, main counsellor	Ministry for Environment and Water, Department of Waste Management	Personal
Ms. Beatrix Famosi, main counsellor	Ministry for Environment and Water, Department of Waste Management	Personal
Mr. Gábor Balázs, Dr. main counsellor	Ministry for Environment and Water, Department of Waste Management	Personal
Ms. Dóra Kálmán, Head of Waste Management Department	Middle - Danube - Valley Inspectorate for Environmental Protection, Nature Conserva- tion and Water Management	Personal
Mr. László Szilágyi, CEO	Waste Prevention Alliance (HUMUSZ)	Personal
Mr. Gábor Bartus, Dr. expert of waste management socio-economics	Budapest University of Technology and Eco- nomics, Department of Environmental eco- nomics.	Personal
Ms. Zsuzsa Binder Bánhegyiné, main counsellor	Kőbánya Local Municipality, Department for Urban Development and Environment	Phone