

The Waste Management Plan of Flanders : an Example for SE European Countries

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Over the past 25 years the region of Flanders (Belgium) has developed a well-functioning and effective waste management approach, evolving from zero policy to an integral waste management system achieving impressive results, the best in the EU. The household waste management plan involves many stakeholders, including households, policy institutions and implementing agencies, municipalities and intermunicipal partnerships, and market players involved in consumption and waste management. The plan focuses on sustainable development and permanent management of materials. As such, various action programs are implemented according to four main objectives : (1) prevention and environmentally responsible consumption, (2) reuse, (3) selective collection and recycling, (4) final treatment or disposal. The potential of the Flemish example for implementing sustainable waste management plans and setting-up cradle-to-cradle mechanisms in SE European countries will be documented with figures and concrete cases.

Key words: Flanders / Waste management plan / Prevention / Reuse / Recycling / Treatment

1. Introduction

Within the country of Belgium, Flanders has a population of 6,162,000 and covers an area of 13,599 km² divided into 5 provinces and subdivided into 308 municipalities with an average population density of 455 inhabitants per km² (Figure 1). As waste generation is linked to population growth and economic growth, it is clear that waste management has become an important issue in Flanders, especially since the second half of the 20th century. Problems became evident in the 1970's, as many poorly managed landfill sites had reached their full capacity, causing environmental pollution on several sites. In order to strengthen the control on landfill sites, and break the link between economic development and growing domestic waste volumes, a legal framework was needed, addressing the whole waste cycle from generation to disposal, placing the emphasis on recovery and recycling.

In the 1980's, the Belgian institutions were reformed, and a major part of the competences passed from the Belgian national level to the regional level (Flanders, Wallonia and the Brussels Capital Region). The competence regarding waste management and soil remediation in Flanders were centralised in 1981 to one body, the Public Waste Agency of Flanders (OVAM). The OVAM contributes to a healthier environment and a better quality of life through sustainable management of waste and materials, soil remediation and the prevention of soil pollution.

Similar to the European Waste Directive, the Flemish Waste Decree is based on the so-called Lansink's Ladder, which defines a certain waste treatment hierarchy (Figure 2). According to this approach, the highest priority should be given to waste prevention. Then, possibilities should be examined for high-quality recovery of materials. In so far as recovery in the form of reuse or recycling is not possible, efforts should be made to recuperate the energy content of waste by using it (after post-separation) as fuel in installations with high energy yields. For material that is left, incineration as a form of disposal is preferred, using the energy that is generated. Finally, if there is not enough capacity for incineration, landfilling is applied. However, this is the least desirable processing method.

Consequently, the tasks of the Flemish Waste Agency involve:

- mapping and analysing material cycles with special emphasis on environmentally harmful materials;
- developing actions and tools to prevent leakage of materials from these cycles;
- taking measures to save on raw materials and energy by, where possible, the use of wastes;
- taking measures and setting up campaigns to encourage sustainable consumption patterns;
- the promotion of product quality and the quality of production processes with the emphasis on qualitative and quantitative prevention both in terms of use and of raw materials consumption, waste generation and finally the spread of environmentally harmful materials.

In practice, the collection and treatment of household waste is usually a municipal autonomy. For the organisation of waste management, municipalities often unite to form inter-municipal authorities. In Flanders, the 308 municipalities are grouped in 27 inter-municipal co-operations involved in waste management. An association of municipalities has an average scope of approximately 200,000 inhabitants. The inter-municipal co-operations implement the regional waste management policy, as prepared by the Waste Agency, at the local level. They ensure the collection of household waste and manage waste treatment facilities, like for example recycling yards.

Regulations which result from policy making are brought into practice by the Waste Agency through Implementation Plans. The Implementation Plan for 'Environmentally Responsible Household Waste Management' deals with the planning of household waste prevention, selective collection and recycling, and final waste disposal.

2. History and results of the Flemish municipal waste management plans

2.1. Evolution of waste management plans

OVAM drafted several consecutive municipal waste management plans. The first municipal waste management plan (period 1986-1990) dates back to 1985, and aimed at 'making order out of chaos'. It

started by closing and redeveloping landfills, making maximum use of the existing incineration capacity and giving the go-ahead for the separated collection of municipal waste. The price of landfilling and incineration was raised in order to make separated collection and recycling more attractive and competitive. Waste disposal came with a high price.

Those who wished to dump their waste had to pay. Those who wanted to prevent and/or recycle waste materials were encouraged. Although this plan can in fact be considered as a 'waste elimination plan', it was a first step towards waste prevention and recovery. The second municipal waste management plan (period 1991-1995) built on the success of the previous plan. The emphasis of this plan was on the implementation of the separated collection of municipal waste streams. The plan provided the necessary policy instruments and infrastructures to realise the separate collection of municipal waste at the source, for example by creating a network of recycling yards. In particular for the collection and processing of VFG and green waste, an entire infrastructure was developed. Unlike the first plan, the second waste management plan was clearly focused on waste minimisation and recovery.

The third municipal waste management plan, for the 1997-2001 period (extended by one year) further encouraged the separated collection of municipal waste and set very specific targets to reduce the volume of residual waste as much as possible.

For the separated collection of packaging waste a partnership was set up with Fost Plus, a non-profit organisation accredited for the implementation of the take-back obligation for all kinds of packaging waste from households in accordance with EU legislation.

Several initiatives were also launched for the separated collection of recoverable materials from bulky waste. Prevention and reuse took shape by promoting composting at home as much as possible, by developing a network of reuse centres and by raising awareness and informing the public on how to contribute to waste prevention. The construction of new incineration plants for residual waste was postponed. The available incineration capacity was explicitly tightened so as to encourage prevention

and separated collection as much as possible. The existing incineration plants for residual waste were conformed to the most stringent standards and were optimised with energy recovery systems. Landfilling was further reduced.

The fourth municipal waste management plan for the 2003-2007 period was also based on the evaluation of the results of the previous plan. The main goal of this plan was to consolidate the results obtained and to ensure further progress. Moreover, an implementation, acceleration and intensification was proposed and the best possible mix of instruments was set up to achieve the wide-ranging objectives.

The implementation plan aims to achieve sustainable development and permanent management of materials. In order to treat (virgin) materials in a sustainable manner, an integral approach is needed and not just a solution for dealing with the waste that remains at the end of the material chain. Waste management needs to broaden its outlook and perspective to cover the entire material chain, from the production of materials, goods, and products through to the treatment of household waste.

The most recent (fifth) “Implementation Plan for Environmentally Responsible Household Waste Management (2008-2015)”, was built up around 3 target objectives, which were translated into action programmes. The target objectives have been classified in keeping with the Lansink-hierarchy of waste and materials management:

- Objective 1: the adoption of consumption habits that are more environmentally responsible. The population needs to be given the opportunity to buy and use products that are more environmental friendly. The government is setting herein the right example: it purchases in an environmentally responsible manner and consumes in an environment-friendly way. In addition, the government stimulates the population to adapt its consumption behaviour to fit those practices.
- Objective 2: the production of less residual waste and less waste in general, even though identical quantities of materials may be consumed.

- Objective 3: the final treatment of waste should be carried out in accordance with the principles of 'Best Available Techniques' (BAT).

These objectives aim at satisfying three ambitions:

- The production of as little waste as possible;
- The re-introduction, through recycling, of the largest possible volume of the waste produced into the material chain. This will help in keeping to a minimum the quantities of waste products that need final disposal, as well as limiting the use of new virgin materials;
- The disposition of materials that cannot be recycled in the best possible way.

In order to achieve these objectives, action programmes were established. These programmes can be categorized under three themes:

- Prevention, environmentally responsible consumption, and re-use of products;
- Selective collection and recycling;
- Final treatment.

A general action programme coordinates these programmes, through consultation amongst the stakeholders, and monitoring of the progress of the different actions.

2.2. Results

2.2.1. Reduction of residual waste

Figure 3 shows the evolution of the amount of residual waste in Flanders over the last 20 years and the targets of the waste management plans. This graph illustrates how these targets were continuously evaluated and updated, since they were achieved more rapidly as expected. In the municipal waste management plan (1997-2001) the following tight targets were set for the generation of residual waste for 1998, 2001, 2006 and 2010:

- 1998 : 255 kg/head

- 2001 : 220 kg/head (240 kg/head for coastal municipalities, Ghent and Antwerp, which have to deal with large volumes of waste produced by tourists)
- 2006 : 200 kg/head (230 kg/head for coastal municipalities, Ghent and Antwerp)

The proposed long-term target for the generation of residual waste was: 150 kg on average for all municipalities, in 2010.

In the fourth municipal waste management plan for 2003-2007 these objectives were further tightened.

The following targets were proposed:

- 2003: 180 kg/head
- 2005: 165 kg/head
- 2007: 150 kg/head.

In the most recent waste management plan (2008-2015), this 150 kg/head target for residual waste is sustained (OVAM, 2009).

2.2.2. Increased portions of selective collection and recycling

Volumes of household waste that were landfilled, incinerated and recycled, composted or reused since 1991, are depicted in Figure 4. As to recycling of municipal waste, the objective in the 1997-2001 plan was to increase the separated collection from 34 % in 1995 to 55 % in 2006 (OVAM, 2009). This was the percentage that had to be collected separately and recycled in order to reduce the residual waste volume. In the management plan for 2003-2007, the objective raised already to 66 % in 2000, and 69 % overall in 2008.

2.2.3. Cessation of household waste disposal in landfills

One of the goals of the most recent household waste management plans is the cessation of landfilling as a final treatment method for residual combustible household waste. This goal is almost achieved, as there is a clear decrease in the portion of disposed household waste from 42% in 1999 to less than 4 % from 2006 onwards (Figure 5).

3. Discussion

3.1. Implementation plans: key to success

Belgium, and in particular the Flemish region, is a ‘first mover’ in the waste management field and has attained impressive results. From 2007 onwards, 70 % of the household waste was collected separately and less than 3% was landfilled. As the goals of waste management plans were achieved, the focus of legislation has shifted from final disposal of waste in sanitary landfills to the prevention and recovery of waste. Old decrees were amended in this sense. In general most of the targets of the waste management plan 2003-2007 and 2008-2015 have been met or are likely to be met in the near future.

A mix of policy measures has supported this diversion of waste from landfills. The mix comprises several measures on regulation, voluntary agreements, market-based instruments and a high level of communication to motivate the inhabitants. The agreements or the consensus-based policy is a preferred approach in the Flemish region.

Interesting outcomes of the policy are that there is a high acceptance in the population to spend time and money on separating and composting waste; that concerns about waste management and littering rank high on the political agenda; and that some of the initiatives go further than seen elsewhere in Europe (Skovgaard, 2008).

The implementation plan (for 5 years) is a key measure as – once approved by the government - it comprises provisions that apply to all public authorities. Because of this regulatory nature, all relevant parties are involved in the process and contribute with suggestions. Accordingly, the link between the targets of the waste plan and the agreements with municipalities is logical.

Legal instruments involved in the implementation of the waste policy are, for example, landfill and incineration prohibitions, and the methodical approach to the waste problem through drafting waste

management plans, or take-back obligations, based on the principle of producer responsibility and the polluter-pays principle.

Another key measure is the relatively high landfill tax that has been a strong incentive for municipalities and waste organisations to recover and recycle waste (Figure 6).

Some institutional aspects needed for successful waste management & implementation are:

- Association of municipalities:

Intermunicipal co-operation is strongly recommended because the level of an association of municipalities proved to be a perfect level for activities in the field of waste prevention and recycling; especially the establishment of a network of recycling yards, composting activities, etc... Municipalities are responsible for the implementation of the local, regional and national waste management planning. Moreover, these inter-communal associations can keep a steering role in maintaining the control over the cost for waste collection and treatment.

- Public - Private Partnerships (PPS):

There are several types of PPS, ranging from contracting out the implementation of the waste policy to a the private sector e.g waste collection and final treatment, over participation of the public sector in a private company (vice versa), to different types of concessions.

Municipalities finance their waste services by imposing fixed tax (yearly) and cash tax (Pay-As-You-Throw, PAYT). The combination of a fixed tax and a PAYT tax reduces residual waste. The total cost of household waste management is estimated at approximately 220 € per household (2.4 persons) (IEEP, 2009).

The environmental agreement is specific for Flanders. On the one hand, it is remarkable that a relatively low subsidy of, on average EUR 22,000, seems able to motivate municipalities into introducing collection systems and facilities faster than defined in the waste plan. On the other hand, the administration of the agreement has become more burdensome as the requirements have become

more demanding (or complex). It should also be kept in mind that over the years many resources, human as well as economic, have been invested in the waste management system.

3.2. Trends

3.2.1. Waste as a source of energy

The Flemish region strictly adheres to the principle of self-sufficiency with regard to final disposal. The required processing capacity was increased by means of mechanical-biological processing plants and fluidised bed incineration plants. Energy is recovered from residual waste as much as possible, through incineration and recovery of landfill gas (Figure 7 and Figure 8). Only wastes that cannot be incinerated can be sent to land.

3.2.2. Sorting and recycling: saving natural resources and saving energy

The manufacturing of packaging consumes large quantities of raw materials. Aluminium is made from bauxite, steel from coke and iron ore, PET plastic from petroleum, glass from sand, and cardboard from wood fibres. Recycling thus contributes to the saving of these natural resources.

Recycling also saves energy. Energy demand in general is increasing dramatically and is becoming more and more expensive. Most of the energy consumed comes from non-renewable resources such as petroleum, coal, and natural gas. All of these sources will run out sooner or later. Most packaging requires significantly more energy for its initial production than when using recycled materials. Recycled steel, for instance, requires 70 to 85% less energy. This figure rises to 95% for recycled aluminium. As for glass recycling, it saves 25% of the energy necessary for its initial manufacture from raw materials. Paper and plastic recycling also enables us to make large energy savings.

Moreover, by reducing the consumption of energy needed to manufacture products, recycling substantially reduces the amount of CO₂ emissions. In 2008, 678,896 tons of household waste was recycled in Belgium. As a consequence, 850,000 tons of CO₂ emission was avoided.

3.2.3. Waste management: a new economic sector

Collecting, sorting, and recycling of packaging materials is a rapidly growing economic sector. Thousands of jobs have been created over recent years in this field. It is estimated that the recycling sector employs around 2,500 people in Belgium, a majority of which are unskilled workers (Fost Plus, 2009). In a region like Flanders, waste treatment in general accounts for approximately 8,000 jobs (Herremans et al., 2010).

The recycling market is remarkably stable. Even though the Belgian economy has recently shrunk, as is shown by GDP developments, this does not seem to have affected trends in the quantity of household packaging put on the market (Figure 9). It looks as if the Belgian population still consumes as many packaged products as before, but the content of the shopping basket may have changed. A likely explanation is that cheaper products may have replaced or been added to those that were bought before in order for the shopping budget to remain under control. Also, as a result of the economic crisis, people tend to eat and drink at home rather than going to restaurants. These elements may well explain why the domestic market of packaged consumer products has not been affected by the crisis.

Over the last few years, the share of household packaging landfilled or incinerated without energy recovery has continued to lose ground to waste recovery (Fost Plus, 2010). It even seems that recycling has reached a ceiling (Figure 10). Improvements undoubtedly remain possible, however, as regards the flow of waste assimilated to household waste. Even though today 95% of Belgians have declared to sort their waste, the battle is far from being over. Awareness-raising cannot and must never stop. Above all, sorting must become a reflex, not only at home (this is the case for almost everyone) but also elsewhere in all areas. For example, whereas special attention has been paid to young people up to now – through initiatives developed for schools, youth movements, festivals, etc. – the time has come to gradually raise awareness in other population segments. Companies will thus be encouraged to ask their staff to sort their waste. Up to now, the type of waste produced by companies may still be landfilled and their sorting is not yet as developed as in private households. More efforts must therefore be made, especially by encouraging PMD sorting.

3.2.4. From “waste management” to “sustainable material management”

Managing the material chain as a whole is essential to find sustainable answers to the waste issue. Waste management focuses mainly on the end of life phase, the phase where material becomes waste. However, it makes much more sense to regard the material chain as a whole, i.e. from "cradle to grave" or even "from cradle to cradle". Present-day waste management shouldn't remain on its own, but has to broaden her horizon towards sustainable material management. Materials are the backbone of our economy: they bear our production and consumption patterns. It's proved elaborately that those patterns have to change if we want to keep this planet viable. Sustainable material management is an evolution that is going on worldwide, it is an indispensable criterium for sustainable development in our society.

More specific: environmental pressure through material use and depletion of resources must be reduced. The consequences of the ever growing burden on our environment become clearer every day. Regions like Flanders are dangerously dependent on resources which become more scarce and thus more expensive day by day. A necessary societal swing-round or 'transition' is needed. At the same time this transition offers some interesting opportunities.

Achieving a policy of sustainable material management in a time of growing prosperity, a time where the goal is to have a growing economy with ever growing production and consumption on a worldwide scale is a challenge. Moreover, this transition should avoid exporting our environmental pressure: it should be addressed on a worldwide scale.

3.2.5. Exporting know-how on waste management

The relatively long history of integrated waste management and the success of the policy that was implemented over the last three decades, now allow Flemish waste managers to export their knowledge to other European regions, like South-Eastern Europe. Potential candidates for EU accession need this expertise to strengthen their technical, administrative and programming capacities.

Collaboration thus contributes to improved environmental standard application related to solid waste management, capacity building and raised public awareness concerning environmental issues.

4. Conclusions

Over the past 25 years the region of Flanders (Belgium) has implemented an effective waste management system, and achieved impressive results, the best in the EU. Disposal of combustible solid waste from households on landfill sites has almost ceased. Packaging waste is largely recycled or reused. Residual waste is incinerated with recovery of heat or energy. Innovative techniques are introduced to increase the waste treatment capacity, instead of constructing additional landfills.

Over time, municipalities have been largely responsible for the implementation of the waste policy, which was organized through the creation of intermunicipal cooperations or PPP constructions.

With regard to waste management, we see that the scope has been broadened over time and that integration increased considerably. The effects of the waste policy are:

- the closing of material cycles;
- the prevention of leakage of materials from the material cycles;
- improved savings on raw materials and energy by using wastes where possible;
- the promotion of product quality and the quality of production processes, with the emphasis on qualitative and quantitative prevention both in terms of use and of raw materials consumption, waste generation and finally the spread of environmentally harmful materials

The example of Flanders shows that once the waste policy becomes binding, investments by the industry will nearly automatically follow. The waste policy in Flanders has as such been the driving force for the development of a whole range of industrial activities. Waste management created business opportunities and employment.

Belgian waste management experts have now come to the point where they start exporting their know-how. In this way, they can contribute to the environmentally sustainable economic development of candidate EU member states, by bringing them closer to EU environmental standards, through strengthening administrative structures and introducing new technologies.

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FIGURE 1: Lansink's Ladder

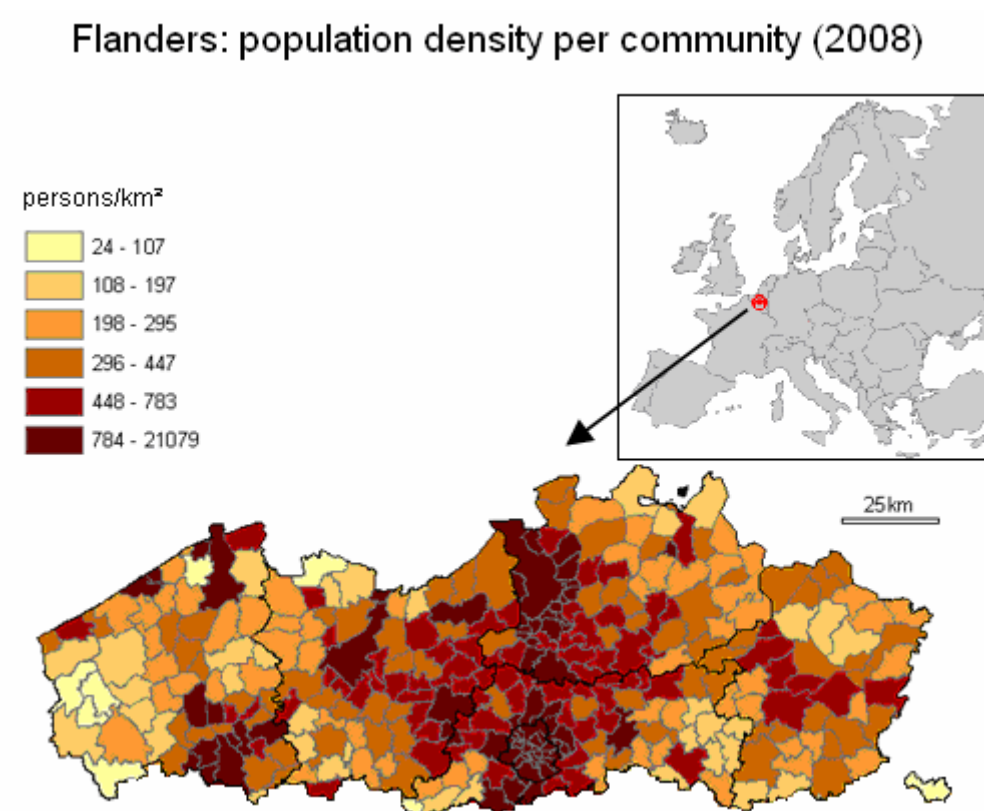


FIGURE 2: Population density in Flanders, per community (Studiedienst van de Vlaamse Regering, 2009)

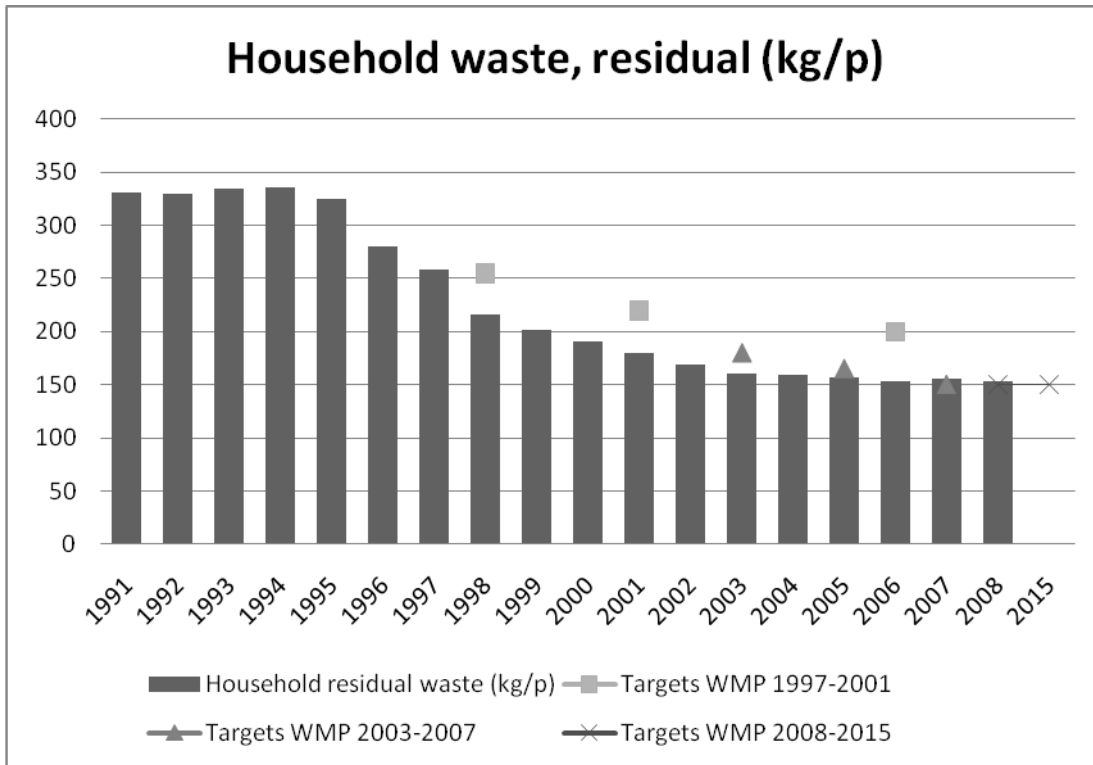


FIGURE 3: Household waste: evolution of residual waste volume versus targets in subsequent waste management plans (1997-2001, 2003-2007 and 2008-2015) (Source: Parent et al., 2004, OVAM, 2008, 2009)

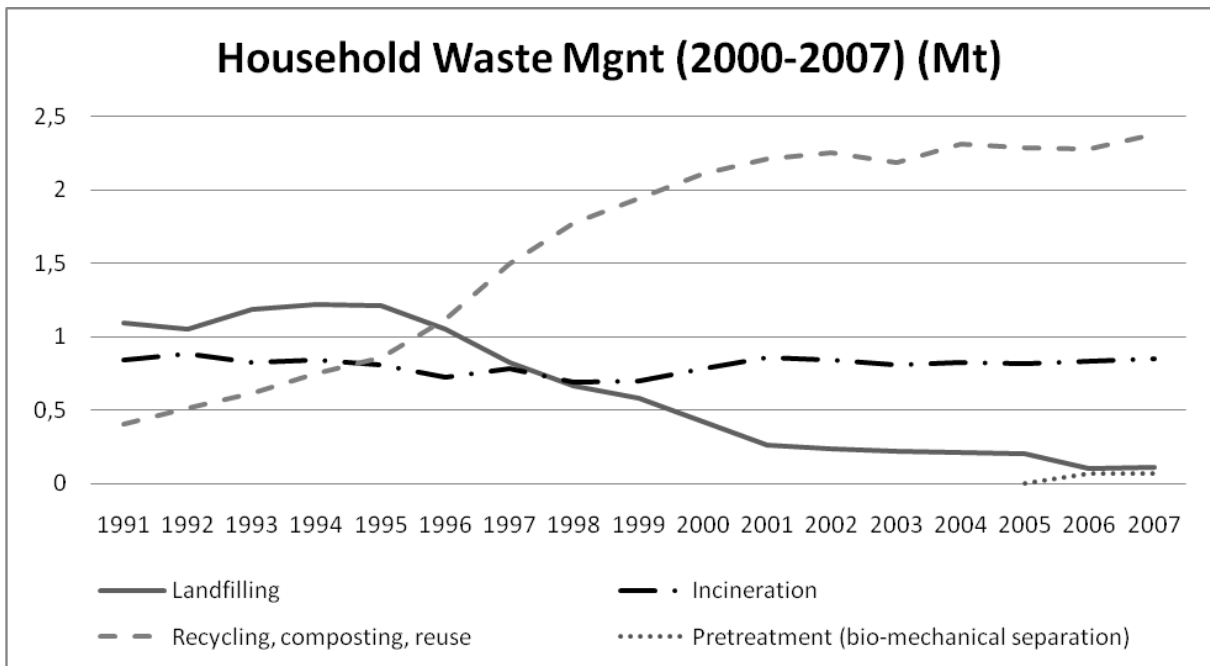


FIGURE 4: Selective waste collection (Source: OVAM, 2009)

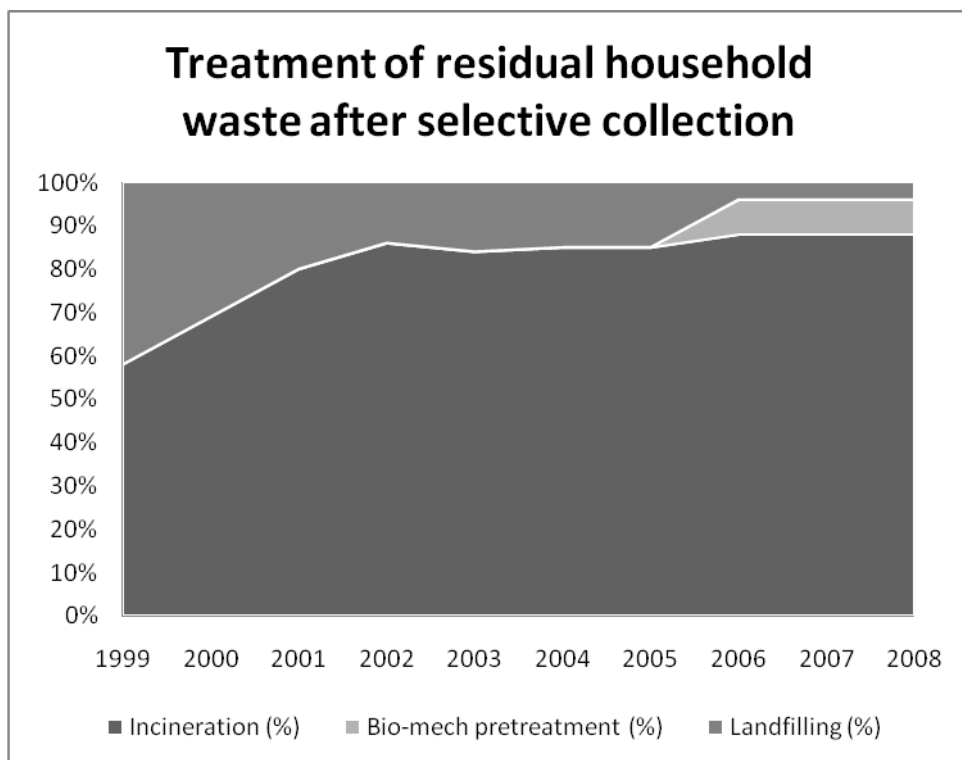


FIGURE 5: Landfilling versus incineration and bio-mechanical pretreatment of household waste (Source: OVAM, 2009).

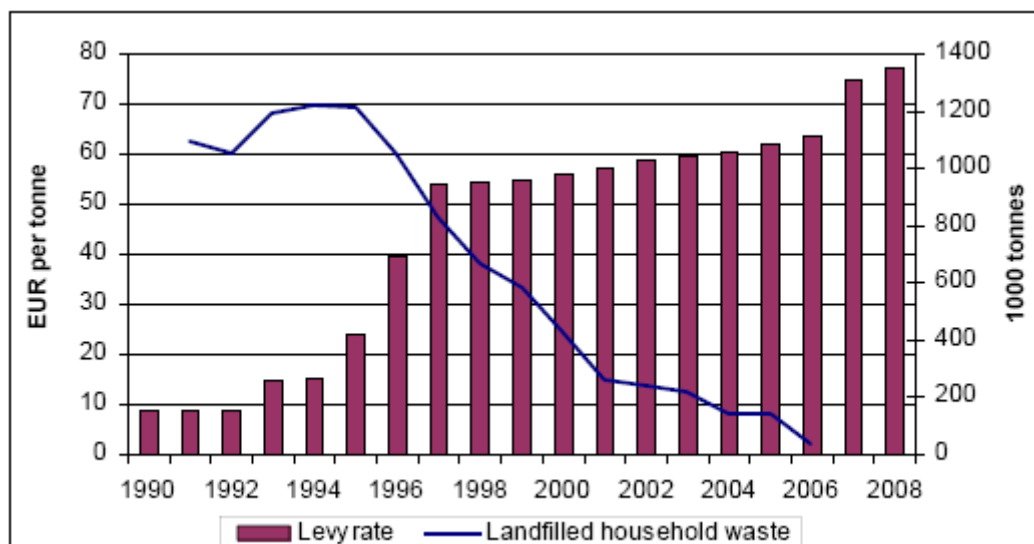


FIGURE 6: Waste disposal levy rates and landfilled quantities of household waste, 1990-2008. (Source: OVAM, 2009).

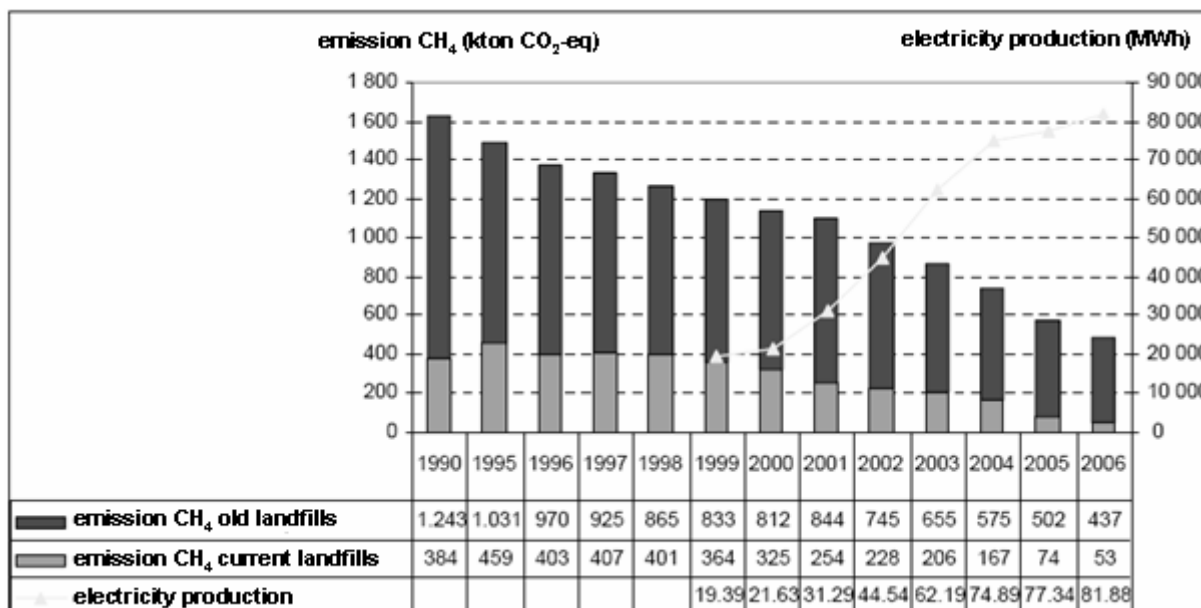


FIGURE 7: CH₄-production and Electricity production on Flemish landfill sites, 1990-2006. (Source: VMM, 2007.)

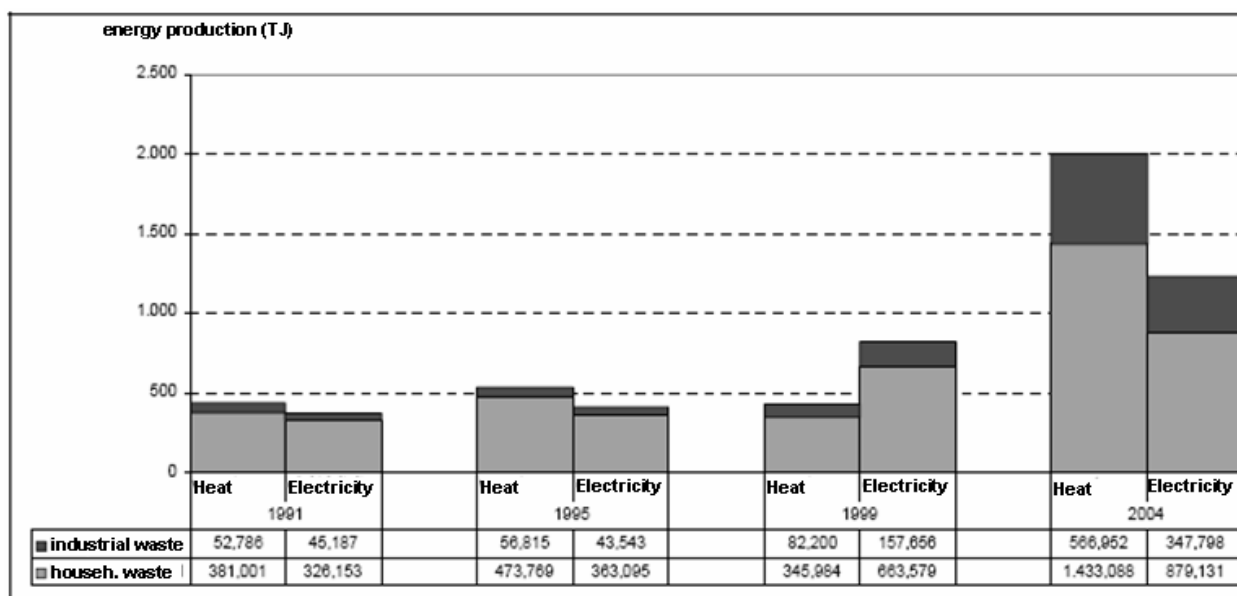


FIGURE 8: Energy production in incineration plants for household waste (Source: VMM, 2007).

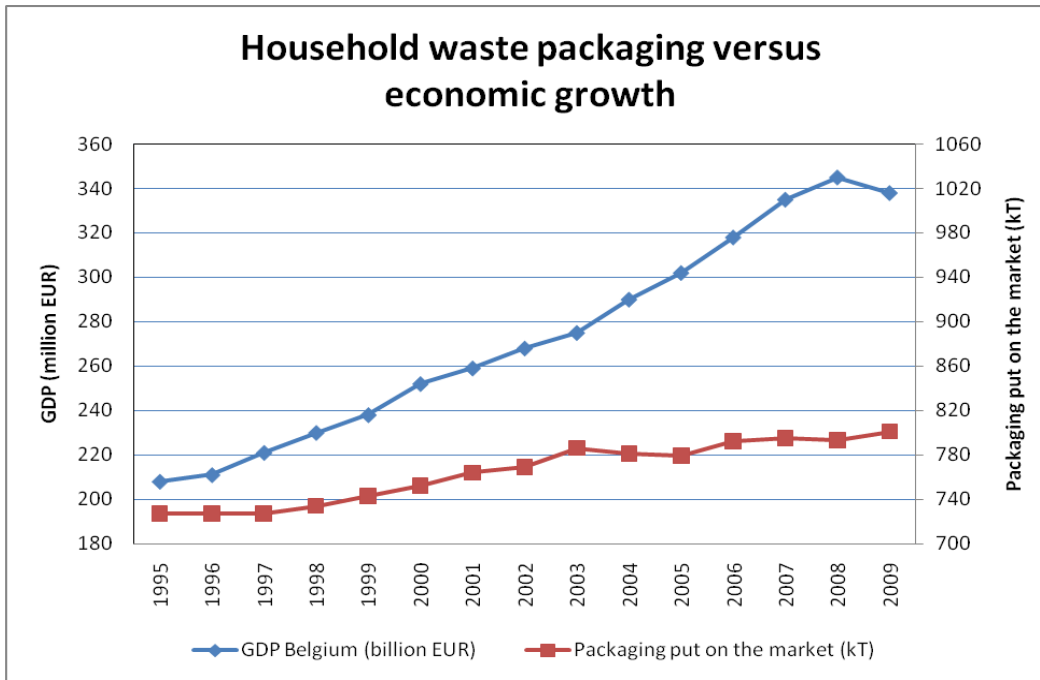


FIGURE 9: Packaging material put on the market versus GDP (Belgium) (Source: Fost Plus, 2010)

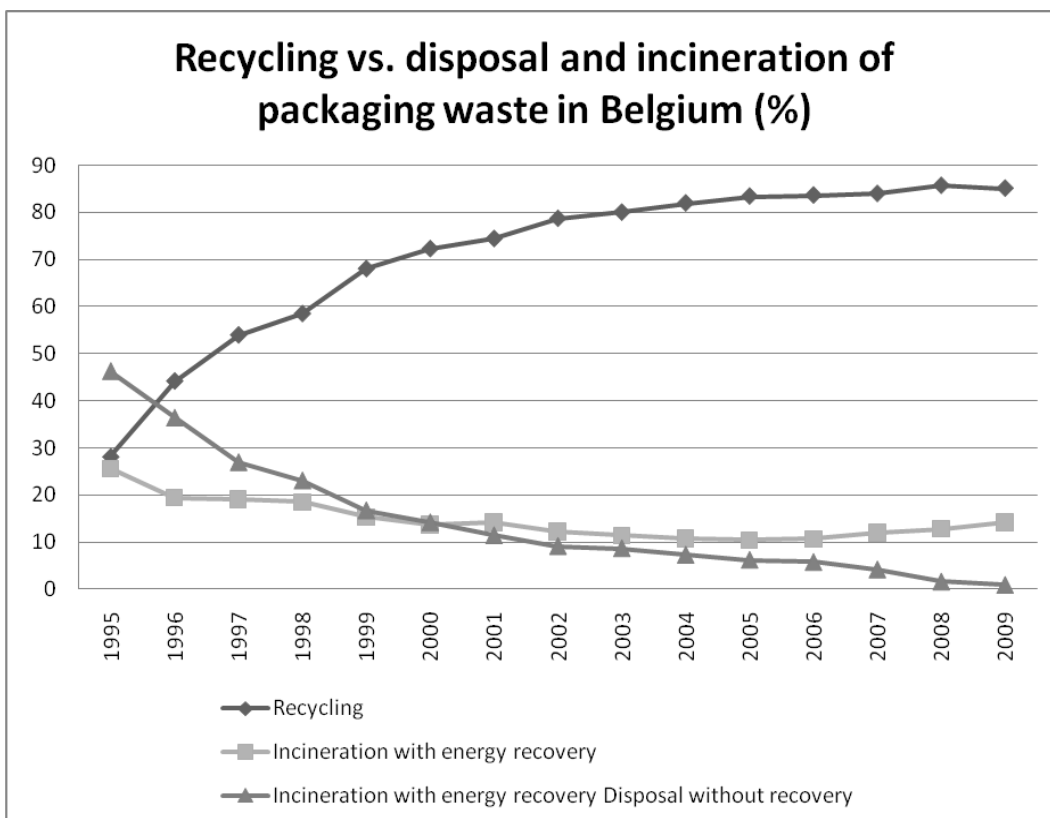


FIGURE 10: Recycling, disposal and incineration of packaging waste in Belgium (Source: Fost Plus, 2010).

PLAN GOSPODARENJA OTPADOM FLANDRIJE : PRIMJER ZA JUGOISTOČNE EUROPSKE
DRŽAVE

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Sažetak

Preko 25 prošlih godina Flandrija (Belgija) je razvila efektivan i funkcionalan pristup gospodarenju otpadom, evoluirajući od nulte točke do cjelovitog sustava gospodarenja otpadom koji postiže impresivne rezultate, najbolje u EU. Gospodarenje otpadom od kućanstava uključuje mnoge interesne grupe, uključujući kućanstva, političke institucije, agencije, općine i međuopćinska partnerstva te sudionike na tržištu uključene u potrošnju i gospodarenje otpadom. Plan je usmjeren k održivom razvoju i trajnom gospodarenju materijalima. Stoga su doneseni različiti akcijski programi, kojima se zadovoljavaju 4 glavna cilja : (1) prevencija i pametna potrošnja, (2) ponovno korištenje, (3) odvojeno sakupljanje i reciklaža, (4) konačna obrada ili odlaganje. Potencijal Flamanskog primjera koji može poslužiti za uvođenje održivih planova gospodarenja otpadom i uspostavljanje kolijevka-kolijevci mehanizama u JI Europskim zemljama, dokumentiran je slikama i konkretnim slučajevima.

Ključne riječi: Flandrija, Plan gospodarenja otpadom, prevencija, ponovno korištenje, reciklaža, obrada

1. Uvod

U sklopu države Belgije, Flandrija ima 6,162,000 stanovnika i pokriva površinu od 13,599 km² podijeljenu u 5 provincija koje su dalje podijeljene u 308 općina prosječne gustoće naseljenosti od 455 stanovnika po km² (Slika 1). Kako je proizvodnja otpada povezana s rastom broja stanovnika i ekonomskim rastom, jasno je da je gospodarenje otpadom postala glavna tema u Flandriji, posebno od druge polovice 20-og stoljeća. Problemi su postali evidentni 1970-ih, jer su se mnoga loše vođena odlagališta u potpunosti popunila, te uzrokovala onečišćenja okoliša na nekoliko različitih mjesta. Kako bi se pojačala kontrola odlagališta i slomila veza između ekonomskog razvoja i rastućeg volumena otpada iz kućanstava, potrebna je pravna okosnica koja bi opisala cjelokupni tijek otpada od nastanka do odlaganja, s posebnim naglaskom na oporabu i reciklažu.

U 1980ima reformirane su belgijske institucije i većina kompetentnosti prešla je s nacionalne razine na regionalnu (Flandrija, Valonija i Brisel-glavni grad). Ovlasti vezane za gospodarenje otpadom i sanaciju tla u Flandriji su centralizirane 1981. godine u jedno tijelo, Flandrijsku Javnu agenciju za otpad (OVAM). OVAM doprinosi zdravijem okolišu i boljoj kvaliteti života kroz održivo gospodarenje otpadom i materijalima, sanaciju tla i sprječavanje onečišćenja tla.

Slično Europskoj direktivi o otpadu, Flamanska uredba o otpadu se temelji na tzv. Lansink's Ladder (Lansinkove ljestve), koji definira određenu hijerarhiju obrade otpada (Slika 2). Prema ovom pristupu, najveći prioritet stavljen je na sprječavanje nastanka otpada. Nakon toga se razmatraju mogućnosti za visoko-kvalitetnu oporabu materijala. Ako nije moguća oporaba u obliku ponovnog korištenja ili reciklaže, potrebno je napraviti određene napore za oporavak sadržaja energije iz otpada koristeći je (nakon post-odvajanja) kao gorivo u visoko-energetskim instalacijama. Za ostatni materijal se preferira spaljivanje, također uz korištenje proizvedene energije. U konačnici, ukoliko količine nisu dostatne za spaljivanje, primjenjuje se odlaganje. Međutim, odlaganje predstavlja najmanje poželjnu metodu.

Zadaci flamanske agencije za otpad uključuju:

- Kartiranje i analizu tijeka materijala s posebnim naglaskom na materijale štetne za okoliš;
- razvoj aktivnosti i alata za sprječavanje izlaza/ispuštanje materijala iz tokova otpada;
- poduzimanje mjera za očuvanje sirovina i energije koristeći, kad je god to moguće, otpad;
- poduzimanje mjera i održavanje kampanji za podupiranje održive potrošnje;
- promoviranje kvalitete proizvoda i kvalitete proizvodnih procesa s naglaskom na kvalitativnu i kvantitativnu prevenciju sa stanovišta korištenja i potrošnje sirovina, proizvodnje otpada i konačno preferiranja materijala koji ne djeluju štetno na okoliš.

U praksi, sakupljanje i obrada otpada iz kućanstava je posao općine. Za te potrebe općine se obično ujedine u među-komunalne institucije. U Flandriji je 308 općina uključeno u 27 među-komunalnih suradnji. Udruga općina ima prosječni djelokrug od oko 200,000 stanovnika. Među-komunalne kooperacije implementiraju regionalnu politiku gospodarenja otpadom na lokalnoj razini. One osiguravaju sakupljanje otpada iz kućanstava i upravljaju postrojenjima za obradu otpada, poput reciklažnih dvorišta.

Politički uvjetovane odredbe u praksu dovodi Agencija za otpad kroz planove implementacije. Plan implementacije za 'okolišno odgovorno gospodarenje otpadom iz kućanstava' bavi se planiranjem, odvojenim sakupljanjem i reciklažom, i konačnim odlaganjem otpada.

2. Povijest i rezultati Flamanskih općinskih planova za gospodarenje otpadom

2.1. Razvoj planova za gospodarenje otpadom

OVAM je napravio nekoliko uzastopnih prijedloga planova za gospodarenje komunalnim otpadom. Prvi plan za gospodarenje komunalnim otpadom (period od 1986-1990) datira još iz 1985, a svrha mu je bila „napraviti red od kaosa“. Započeo je zatvarenjem i ponovnim razvojem odlagališta, maksimalnim korištenjem postojećih kapaciteta spalionica i pružanjem mogućnosti poduzetnicima za odvojeno sakupljanje komunalnog otpada. Troškovi odlaganja i spaljivanja su povećani kako bi

odvojeno sakupljanje i reciklaža postali što atraktivniji i konkurentni. Cijena odlaganja otpada je izrazito visoka.

Oni koji žele odložiti svoj otpad, trebaju za isto platiti. Na ovaj način se potiču oni koji žele spriječiti nastanak i/ili reciklirati otpad. Iako se ovaj plan može smatrati kao 'plan eliminacije otpada', on je predstavljao prvi korak prema sprječavanju nastanka otpada i oporabi. Drugi plan za gospodarenje komunalnim otpadom (period 1991-1995) sadržavao je uspjeh prethodnog plana. Naglasak ovog plana bio je na implementaciji odvojenog prikupljanja tokova komunalnog otpada. Plan je sadržavao potrebne političke instrumente i infrastrukturu potrebnu za realizaciju odvojenog prikupljanja komunalnog otpada na izvoru, npr. stvaranjem mreže reciklažnih dvorišta. Na primjer za sakupljanje i procesuiranje VFG i zelenog otpada, razvijena je čitava infrastruktura. Za razliku od prvog plana, drugi plan za gospodarenje otpadom usmjeren je na minimizaciju i oporabu otpada.

Treći plan gospodarenja otpadom, za period od 1997 do 2001 (proširen z ajednu godinu) još više je poticao odvojeno prikupljanje komunalnog otpada i postavio je vrlo specifične ciljeve za smanjenje volumena ostatnog otpada koliko je god to moguće.

Za odvojeno prikupljanje ambalažnog otpada uspostavljeno je partnerstvo s Fort Plus, neprofitnom organizacijom akreditiranom za implementaciju „take-back“ obveze za sve vrste ambalažnog otpada iz kućanstava u skladu s EU legislativom.

Pokrenuto je i nekoliko inicijativa za odvojeno prikupljanje oporabljivih materijala iz glomaznog otpada. Sprječavanje i ponovna uporaba razvijali su se kroz promoviranje kompostiranja kod kuće koliko je god to moguće, razvojem mreže centara za ponovnu uporabu i povećanjem svijesti i informiranjem javnosti kako da doprinesu sprječavanju nastanka otpaa. Izgradnja novih spalionica za ostatni otpad je odgođena, a dostupni kapacitet za spaljivanje bio je izričito stisnut kako bi se potaknula prevencija i odvojeno prikupljanje koliko je god moguće. Postojeće spalionice za ostatni otpad suočene su sa strožim standardima i optimizirane su sustavima za oporabu energije, a odlaganje je još više je reducirano.

Četvrti plan gospodarenja otpadom za period od 2003. do 2007. temeljio se na procjeni rezultata prethodnih planova. Glavni cilj ovog plana bio je objediniti dobivene rezultate i osigurati daljnji napredak. Predložena je implementacija, ubrzanje i intenzivizacija i postavljena je najbolja moguća kombinacija instrumenata kako bi se postigli široko rasprostranjeni ciljevi.

Plan implementacije nastoji postići održivi razvoji kroz trajno gospodarenje materijalima. Kako bi se obradili (netaknuti) materijali na održivi način, potreban je cjeloviti pristup, a ne samo rješenje za postupanje s otpadom koji ostaje na kraju lanca materijala. Gospodarenje otpadom treba proširiti gledište i perspektivu kako bi pokilo čitav lanac materijala, od proizvodnje materijala, dobara i produkata kroz obradu otpada iz kućanstava.

Najnoviji (peti) "Plan implementacije za okolišno odgovorno gospodarenje otpadom iz kućanstava (2008-2015)", donio je 3 cilja, koje su pretvoreni u akcijske programe. Glavni ciljevi bili su klasificirani u udovoljavanje Lansink-hierarhiji otpada i gospodarenje materijalima:

- Cilj 1: prihvaćanje potrošačkih navika koje su odgovorne za okoliš. Stanovništvu treba dati mogućnost da kupi proizvode koji su prijateljski po okoliš. Vlada u ovom slučaju daje pravi primjer: ona posluje na okolišno odgovoran način. Nadalje, vlada stimulira stanovništvo da prihvati ovakvo potrošačko ponašanje.
- Cilj 2: manja proizvodnja ostatnog otpada općenito.
- Cilj 3: konačna obrada otpada treba se izvesti u skladu s principima "najboljih raspoloživih tehnologija" (NRT).

Ovim ciljevima nastoje se zadovoljiti tri ambicije:

- Proizvodnja otpada u što manjoj mjeri;
- Ponovno predstavljanje, kroz recikliranje čim je moguće većeg volumena proizvedenog otpada u lancu materijala. Na ovaj način će se održati minimalne količine otpadnih produkata koji se trebaju odložiti, kao i ograničiti korištenje novih netaknutih materijala;

- Dispozicija materijala koji se ne mogu reciklirati na najbolji mogući način.

Kako bi se postigli ovi ciljevi, uspostavljeni su akcijski programi, koji su kategorizirani u tri teme:

- Prevencija, okolišno odgovorna potrošnja, ponovno korištenje produkata;
- Odvojeno sakupljanje i reciklaža;
- Konačna obrada.

Opći akcijski program koordinira pojedinačne akcijske programe kroz konzultaciju s dioničarima, i kroz monitoring napretka različitih akcija.

2.2. Rezultati

2.2.1. Smanjenje ostatnog otpada

Slika 3 prikazuje evoluciju količine ostatnog otpada u Flandriji kroz prošlih 20 godina i ciljeve planova gospodarenja otpadom. Ovaj graf ilustrira kontinuirani razvoj i nadopunu navedenih ciljeva, koji su postignuti mnogo brže nego je to bilo očekivano. U planu gospodarenja komunalnim otpadom (1997-2001) postavljeni su sljedeći jasni ciljevi za proizvodnju ostatnog otpada za godine 1998, 2001, 2006 i 2010:

- 1998: 255 kg/glavi
- 2001: 220 kg/ glavi (240 kg/ glavi za obalne općine, Ghent i Antwerp, koje su suočene s velikim volumenom otpada koji proizvode turisti)
- 2006: 200 kg/ glavi (230 kg/glavi za obalne općine, Ghent i Antwerp)

Predloženi dugoročni cilj za proizvodnju ostatnog otpada je: prosječno 150 kg za sve općine, u 2010.

U četvrtom planu gospodarenja otpadom (2003-2007) ovi ciljevi su još više postroženi. Predloženi su sljedeći ciljevi:

- 2003: 180 kg/glavi
- 2005: 165 kg/glavi

- 2007: 150 kg/ glavi.

U najnovijem planu gospodarenja otpadom (2008-2015), zadržan je cilj od 150 kg/glavi za ostatni otpad (OVAM, 2009).

2.2.2. Povećanje udjela odvojenog prikupljanja i reciklaže

Volumen otpada iz kućanstava koji se odlaže, spaljuje i reciklira, kompostira ili ponovno koristi od 1991, prikazan je na Slica 4. Što se tiče reciklaže komunalnog otpada, cilj iz plana 1997-2001 bio je povećati odvojeno prikupljanje s 34 % u 1995 na 55 % u 2006 (OVAM, 2009). U planu 2003-2007, ovaj cilj je narastao na 66 % u 2000, i 69 % u 2008.

2.2.3. Obustava odlaganja otpada iz kućanstava na odlagališta

Jedan od ciljeva planova gospodarenja otpadom iz kućanstava je obustava odlaganja kao konačne metode obrade za ostatni gorivi otpad iz kućanstava. Ovaj cilj je gotovo postignut, obzirom da postoji jasna pad u količinama odloženog otpada iz kućanstava s 42% u 1999 na manje od 4 % od 2006 nadalje (Slika 5).

3. Diskusija

3.1. Planovi implementacije: ključ uspjeha

Belgija, a posebno Flamanska regija, je 'prvi pokretač' na polju gospodarenja otpadom i postiže impresivne rezultate. Od 2007 nadalje, 70 % otpada iz kućanstava je odvojeno prikupljeno i manje od 3% je odloženo. Obzirom da su time postignuti ciljevi iz planova gospodarenja otpadom, fokus zakonodavstva je preusmjeren s konačnog odlaganja otpada na sanitarnim odlagalištima na prevenciju i oporabu otpada. U tom smislu su i povučeni stari propisi. Općenito govoreći, većina ciljeva iz planova gospodarenja otpadom 2003-2007 i 2008-2015 je postignuta ili će biti postignuti u bliskoj budućnosti.

Kombinacija političkih mjera je poduprla obustavu odlaganja otpada s odlagališta. Kombinacija se sastoji od nekoliko mjera vezanih za regulativu, volontere, tržišno-bazirane instrumente i velike komunikacije u svrhu motiviranja stanovnika. Pristup koji Flamanska regija preferira su sporazumi ili konsenzusi.

Zanimljivi rezultati politike su da je javnost vrlo brzo prihvatila utrošak vremena i novca potrebnih za odvajanje i kompostiranje otpada; zbog čega je gospodarenje otpadom visoko rangirano na političkoj skali; te da su određene inicijative čak i dalje napredovale u odnosu na ostatak Europe (Skovgaard, 2008).

Plan implementacije (za 5 godina) je ključna mjera jer, jednom kad je odobrena od strane vlada, ona uključuje odredbe koje se primjenjuju na sve javne vlasti. Zbog ove regulatorne prirode, sve relevantne strane su uključene u proces i ravnopravno dosprinosu svojim sugestijama.

Pravni instrumenti uključeni u implementaciju politike postupanja s otpadom su, npr. zabrane odlaganja i spaljivanja, metodički pristup problemu otpada kroz predlaganje planova gospodarenja otpadom, ili „take-back“ obveze, koja se temelji na principu proizvođačeve odgovornosti i „onečišćivač-plaća“ principu.

Druga ključna mjera je relativno visoka cijena za odlaganje koja je jako motivirajuća za općine i organizacije koje se bave otpadom u smislu da ih potiče da oporabljaju i recikliraju otpad (Slika 6).

Pojedini institucionalni aspekti potrebni za uspješno gospodarenje otpadom i implementaciju su:

- Udruživanje općina:

Međuopćinska suradnja se strogo preporuča jer je dokazano da je udruživanja općina savršena način za provođenje aktivnosti na polju prevencije nastanka otpada i reciklaže, posebno uspostavljanje mreže reciklažnih dvorišta, itd. Općine su odgovorne za implementaciju lokalnih, regionalnih i nacionalnih planova gospodarenja otpadom. Štoviše, ova među-

općinska udruženja mogu igrati upravljajuću ulogu u održavanju kontrolne nad troškovima sakupljanja i obrade otpada.

- Javno – Privatno partnerstvo (PPP):

Postoji nekoliko različitih vrsti PPP, od ugovaranja implementacije politike otpada s privatnim sektorom npr. sakupljanje otpada i konačna obrada, preko učešća javnog sektora u privatnoj tvrtki (i obrnuto), do različitih vrsti koncesija.

Općine financiraju svoje usluge vezano za otpad putem značajnih fiksnih poreza (godišnje) i gotovinskih računa (Plati-koliko-odbaciš, PKO). Kombinacija fiksnih poreza i PKO naknada smanjuje količinu ostatnog otpada. Ukupni trošak gospodarenja otpadom iz kućanstava procjenjuje se da iznosi oko 220 € po kućanstvu (2.4 osobe) (IEEP, 2009).

Okolišna nagodba je specifična za Flandriju. S jedne strane je zanimljivo da relativno mala subvencija od, prosječno EUR 22,000, može motivirati općine da provode sustave sakupljanja otpada brže nego što je to definirano planom gospodarenja otpadom. S druge strane, administriranje ugovora je postao veliki teret kako su zahtjevi postali zahtjevniji (ili kompleksniji). Treba imati na umu da su tijekom godina mnogi resursi, ljudi, te ekonomija investirani u sustav gospodarenja otpadom.

3.2. Trendovi

3.2.1. Otpad kao izvor energije

Flamanska regija se strogo drži principa neovisnosti u pogledu konačnog odlaganja. Potreban kapacitet za proizvodnju je porastao na osnovu postrojenja za mehaničko-biološku obradu i spalionice s fluidiziranim ležajem. Energija se oporabljuje iz ostatnog otpada što je više moguće, kroz spaljivanje i uporabu odlagališnog plina (Slika 7 i Slika 8). Odlaze se isključivo otpad koji nije moguće spaliti.

3.2.2. Sortiranje i reciklaža: očuvanje prirodnih resursa i očuvanje energije

Proizvodnja ambalaže troši velike količine sirovih materijala. Aluminijski se radi iz boksita, čelik iz koksa i željezne rudače, PET plastika iz petroleja, staklo iz pjeska, i karton od drvenih vlakana. Reciklaža stoga doprinosi očuvanju ovih triju prirodnih resursa.

Reciklaža također štedi i energiju. Potreba za energijom općenito dramatično raste i postaje sve skuplja. Većina potrošene energije dolazi iz ne-obnovljivih izvora poput petroleja, ugljena i prirodnog plina. Svi ovi izvori će se prije ili kasnije istrošiti. Većina ambalaže zahtjeva značajno više energije za početnu proizvodnju nego što je to slučaj kad se koriste reciklirani materijali. Reciklirani čelik, na primjer, zahtjeva 70 do 85% manje energije. Ovaj postotak raste na 95% za reciklirani aluminijski. Što se tiče reciklaže stakla, ona štedi 25% energije potrebne za početnu proizvodnju. Reciklažom papira i platike također se štede velike količine energije.

Smanjenjem potrošnje energije potrebne za proizvodnju, reciklaža značajno smanjuje i količine CO₂ emisija. U 2008. godini, 678,896 tona otpada iz kućanstava je reciklirano u Belgiji te je time izbjegnuta emisija od 850,000 tona CO₂.

3.2.3. Gospodarenje otpadom: novi ekonomski sektor

Sakupljanje, sortiranje i reciklaža ambalažnih materijala predstavlja brzorastući ekonomski sektor. Tisuće poslova je uspostavljeno na ovom području tijekom proteklih godina. Procjenjuje se da je u sektoru reciklaže zaposleno oko 2,500 ljudi u Belgiji, od čega su većina nekvalificirani radnici (Fost Plus, 2009). U Flandriji, u obradi otpada općenito, zaposleno je oko 8,000 ljudi (Herremans et al., 2010).

Tržište reciklaže je izuzetno stabilno. Iako je belgijska ekonomija u posljednje vrijeme smanjena, to izgleda ne utječe na količine ambalaže iz domaćinstava koje su plasirane na tržište (Slika 9). Izgleda da belgijsko stanovništvo još uvijek troši jednaku količinu ambalažnih proizvoda kao i ranije, no

sadržaj trgovačke košare se možda promijenio. Najvjerojatnije je obrazloženje da su jeftiniji proizvodi zamijenili skuplje ili se kupuju jeftiniji proizvodi umjesto onih proizvoda koji su se kupovali do tada, a sve kako bi se zadržala kontrola nad potrošačkim budžetom. Također, kao rezultat ekonomske krize, ljudi su skloniji obroku kod kuće radije nego što odlascima u restorane. Ovi elementni mogu donekle objasniti zašto domaće tržište ambalažnih proizvoda nije pogođeno krizom.

Tijekom nekoliko prošlih godina, udio ambalaže iz kućanstava koji je odložen ili je spaljen bez uporabe energije nastavio je opadati u korist uporabe otpada (Fost Plus, 2010). U nekim trenucima čak izgleda kao da je reciklaža dosegla gornju granicu (Slika 10). Bez dvojbe su moguća određena poboljšanja, posebno na polju toka otpada iz kućanstava. Iako danas čak 95% belgijanaca tvrdi da sortiraju svoj otpad, bitka još uvijek nije završena. Aktivnosti na povećanju svijesti kod građana nikad ne smiju prestati. Iznad svega, sortiranje mora postati refleks, ne samo kod kuće, već na svim područjima. Na primjer, iako se posebna pažnja posvećuje mlađoj generaciji – kroz inicijative u školama, kroz mlade pokrete, festivale itd – došlo je vrijeme da se polako podiže svijest u drugim segmentima populacije. Tvrtke se također trebaju poticati da utječu na svoje zaposlenike da sortiraju otpad. Danas se još uvijek otpad proizveden u tvrtkama odlaže i sortiranje tog otpada još nije razvijeno kao u privatnim kućanstvima. Moraju se raditi veći napori, posebno kod poticanja PMD sortiranja.

3.2.4. Od “gospodarenja otpadom” do “održivog gospodarenja materijalima”

Gospodarenje lancem materijala je bitno za pronalaženje održivih odgovora na pitanja otpada. Gospodarenje otpadom se u većini slučajeva fokusira na fazu „završetka života“, odnosno na fazu kad materijal postane otpad. Međutim, logičnije bi bilo promatrati materijalni lanac kao cjelinu, tj. “od koljevke do groba” ili čak “od koljevke do koljevke”. Današnje gospodarenje otpadom ne smije ostati na trenutnom stupnju, već mora proširiti svoje horizonte prema održivom gospodarenju materijalima. Materijali su glavni oslonac naše ekonomije: oni snose naše uzorke proizvodnje i potrošnje. Elaborirano je da se ovi uzorci moraju promijeniti ako želimo zadržati održivi planet. Održivo gospodarenje materijalima mora biti evolucija širom svijeta, i ono predstavlja neophodan kriterij za održivi razvoj u našem društvu.

Još podrobnije: mora se smanjiti pritisak na okoliš kroz korištenje materijala i iscrpljivanje zaliha resursa. Posljedice rastućeg pritiska na okoliš postaju jasnije iz dana u dan. Flandrija i regije poput nje, opasno ovise o resursima koji postaju sve rjeđi i stoga sve skuplji iz dana u dan. Potreban je potpuni društveni preokret ili tranzicija.

Postizanje politike održivog gospodarenja materijalima u vremenima rastućeg prosperiteta, u vremenima u kojima je cilj postići rast ekonomije sa sve većim rastom proizvodnje i potrošnje na svjetskoj skali je izazov. Štoviše, ova tranzicija bi trebala biti upućena na svjetsku ljestvicu.

3.2.5. Izvoz znanja iz područja gospodarenju otpadom

Relativno duga povijest cjelovitog gospodarenja otpadom i uspjeh politike koja se primjenjuje zadnja tri desetljeća, daje za pravo flamanskim managerima koji se bave otpadom da izvoze svoje znanje u druge Europske regije, poput jugo-istočne Europe. Potencijalni kandidati za ulazak u EU trebaju ovakve stručnjake koji bi ojačali njihove tehničke, administrativne i programske kapacitete. Ovakva suradnja dovodi do poboljšanja u primjeni okolišnih standarda koji su vezani uz gospodarenje otpadom, proširenje mogućnosti i povećanje svijesti javnosti po pitanju okolišnih tema.

4. Zaključci

Tijekom prošlih 25 godina regija Flandrija (Belgija) je uvela učinkovit sustav gospodarenja otpadom i postigla je impresivne rezultate, najbolje u EU. Gotovo u potpunosti se prestalo s praksom odlaganja gorive frakcije otpada iz kućanstava na odlagališta. Ambalažni otpad se većinom reciklira ili oporabljuje. Ostatni otpad se spaljuje uz uporabu topline ili energije. Uvedene su inovativne tehnike kako bi se povećali kapaciteti za obradu otpada, umjesto da se grade nova odlagališta.

Tijekom vremena općine su postale sve odgovornije po pitanju implementacije politike otpada, koja je organizirana kroz međuopćinske suradnje ili PPP ustrojstvo.

Što se tiče gospodarenja otpadom, može se zaključiti da je djelokrug značajno proširen tijekom vremena i znatno se povećala integracija. Učinci na politiku otpada su:

- Zatvaranje tokova materijala;
- prevencija izlaska materijala iz tokova materijala;
- uštede sirovih materijala i energije kroz korištenje otpada gdje je god to moguće;
- promoviranje kvalitete proizvoda i kvalitete proizvodnih procesa, s naglaskom na kvalitativnu i kvantitativnu prevenciju: korištenja i potrošnje sirovina, proizvodnje otpada i konačno na širenje okolišno štetnih materijala.

Primjer Flandrije pokazuje da kada jednom politika otpada postane obvezna, investicije od strane industrije će ju gotovo automatski slijediti. Politika otpada u Flandriji kao takva je predstavljala pokretačku silu za razvoj čitavog niza industrijskih aktivnosti. Gospodarenje otpadom je stvorilo poslovne mogućnosti i otvorilo nova radna mjesta.

Belgijski stručnjaci za gospodarenje otpadom su došli do točke u kojoj mogu izvoziti svoje znanje iz područja gospodarenja otpadom . Na taj način oni mogu doprinjeti okolišno održivom ekonomskom razvoju zemalja kandidata za ulazak u EU, približavajući im EU okolišne standarde, jačanjem administrativnih struktura i predstavljajući nove tehnologije.

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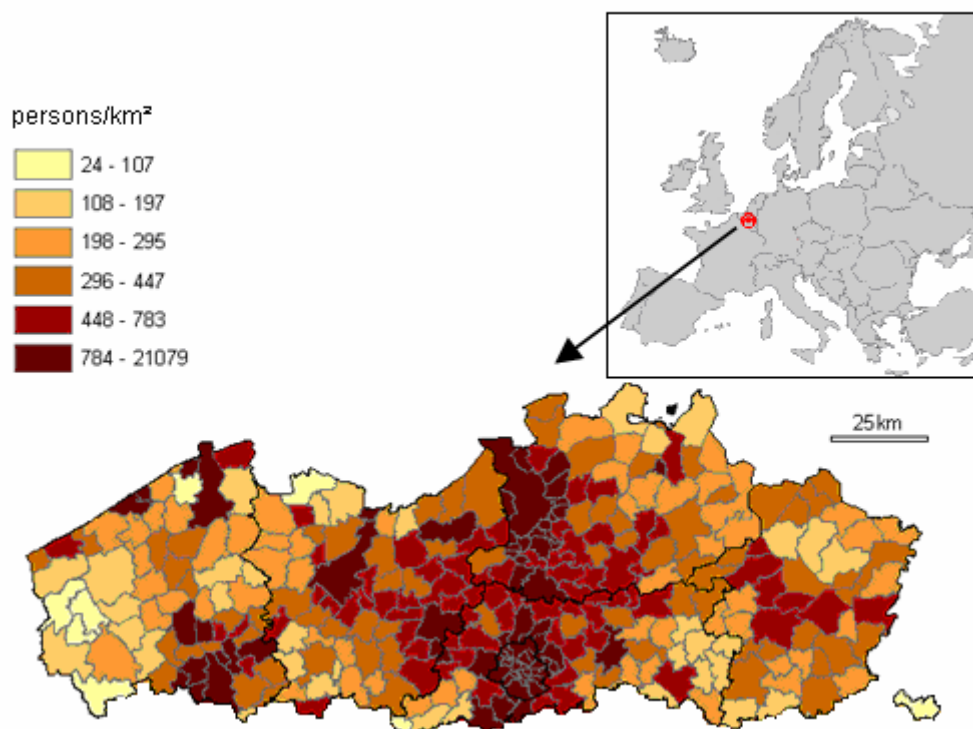
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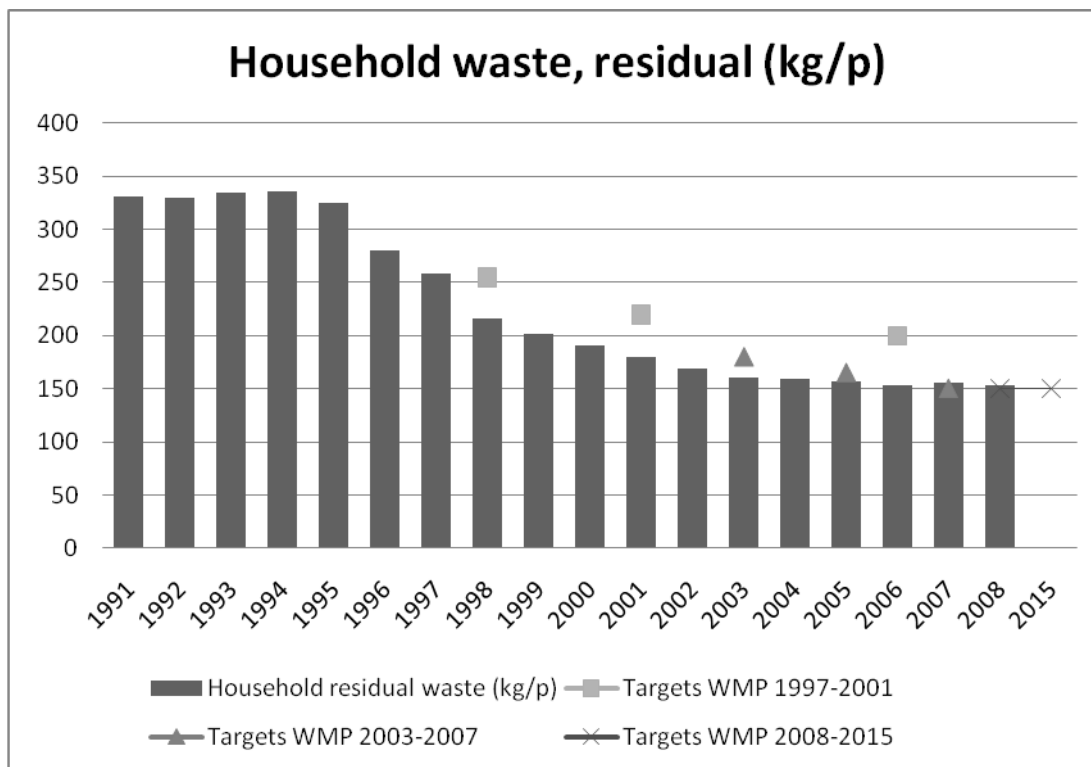


SLIKA 1: Lansink's Ladder

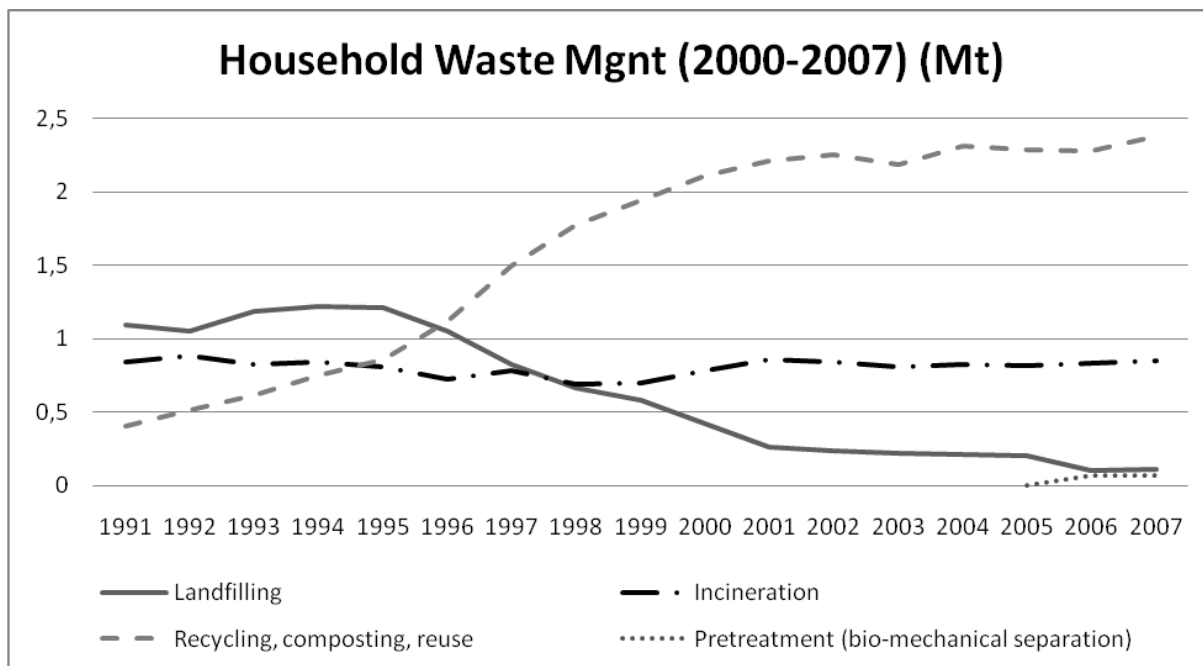
Flanders: population density per community (2008)



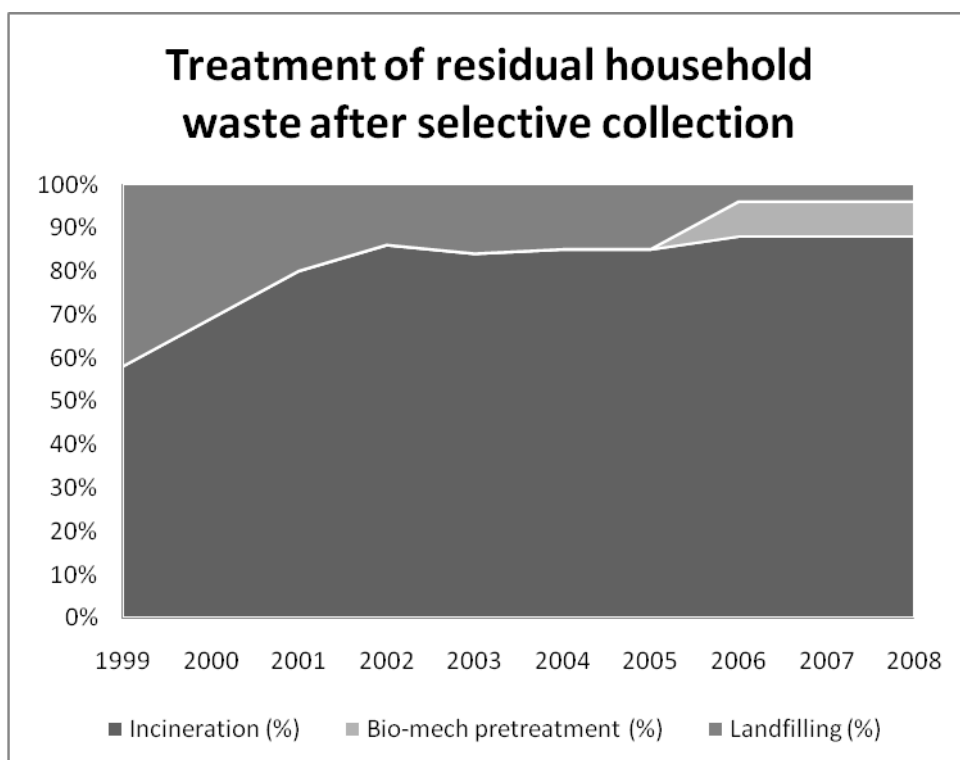
SLIKA 2: Gustoća naseljenosti u Flandriji, po općinama (Studiedienst van de Vlaamse Regering, 2009)



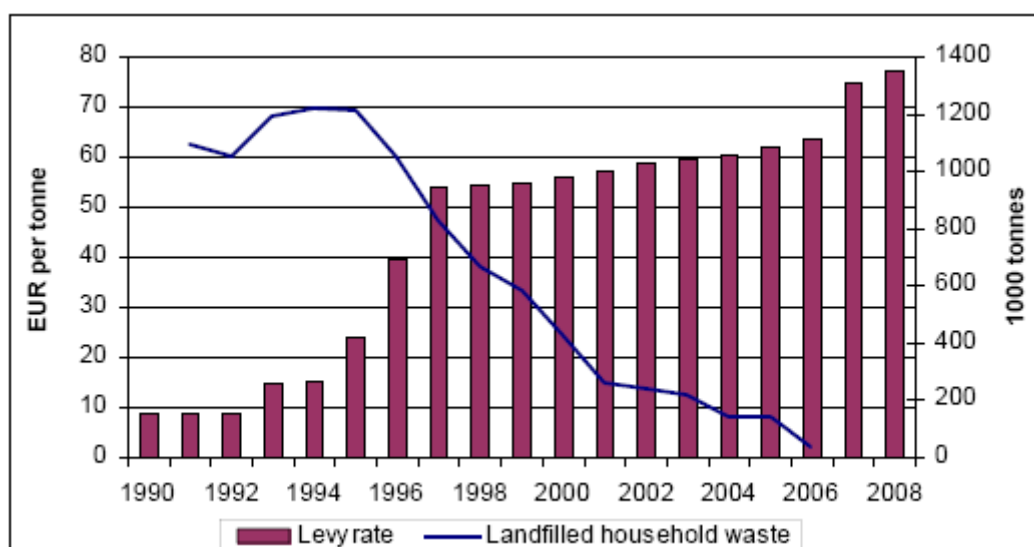
SLIKA 3: Otpad iz kućanstava: evolucija volumena ostatnog otpada nasuprot ciljeva predviđenih planovima gospodarenja otpadom (1997-2001, 2003-2007 i 2008-2015) (Izvor: Parent et al., 2004, OVAM, 2008, 2009)



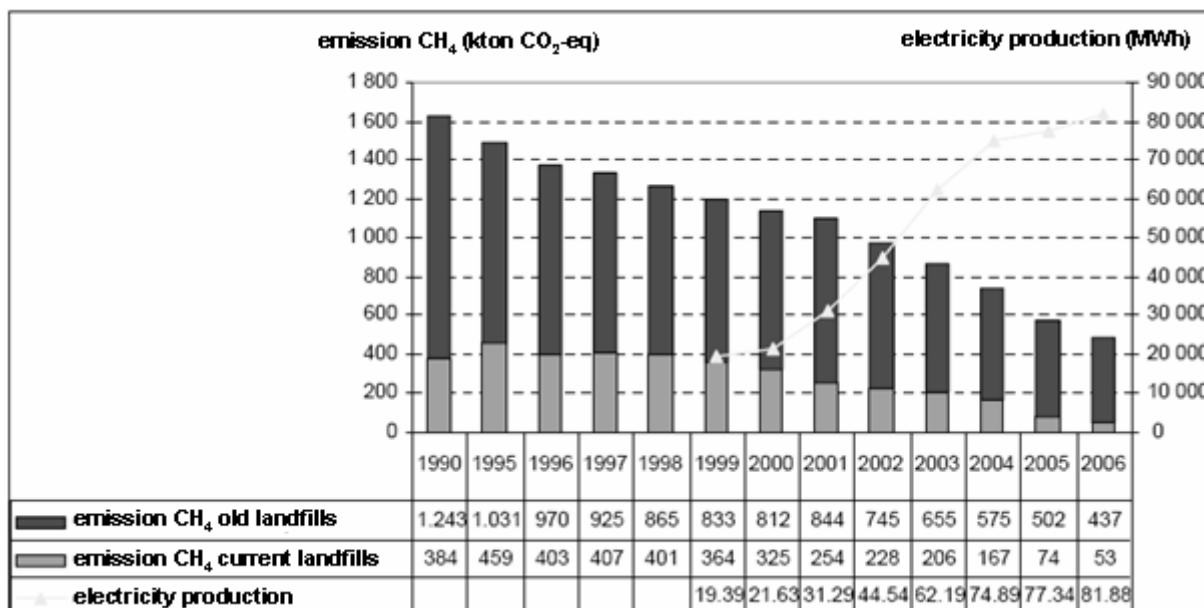
SLIKA 4: Selektivno sakupljanje otpada (izvor: OVAM, 2009)



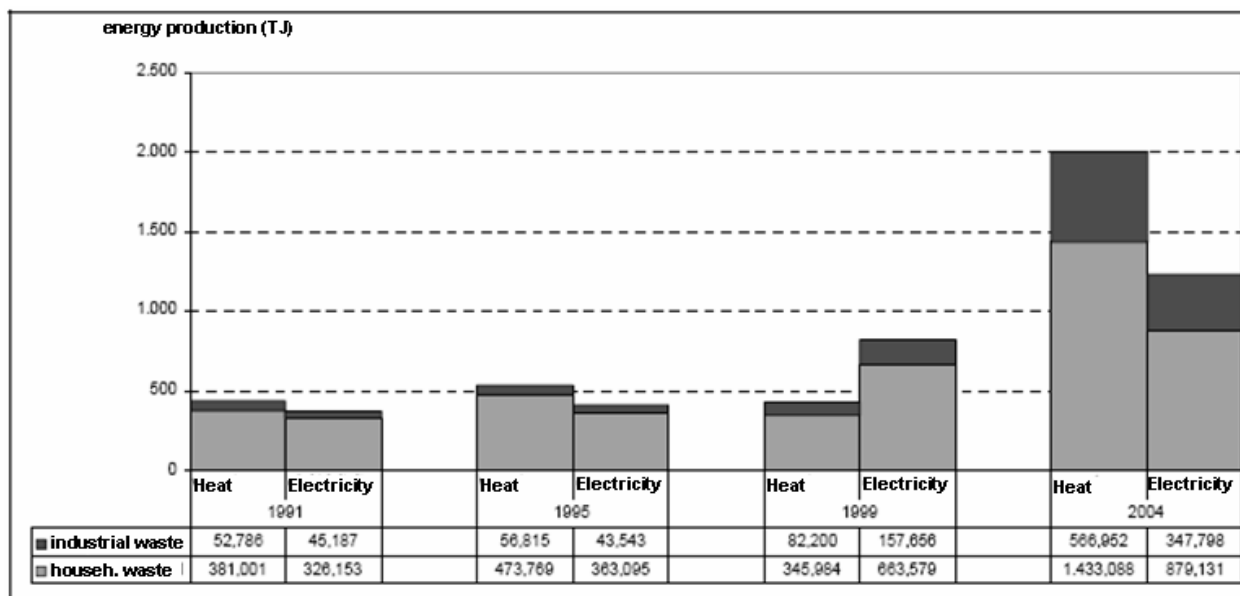
SLIKA 5: Odlaganje nasuprot spaljivanju i bio-mehaničkoj predobradi otpada iz kućanstava (izvor: OVAM, 2009).



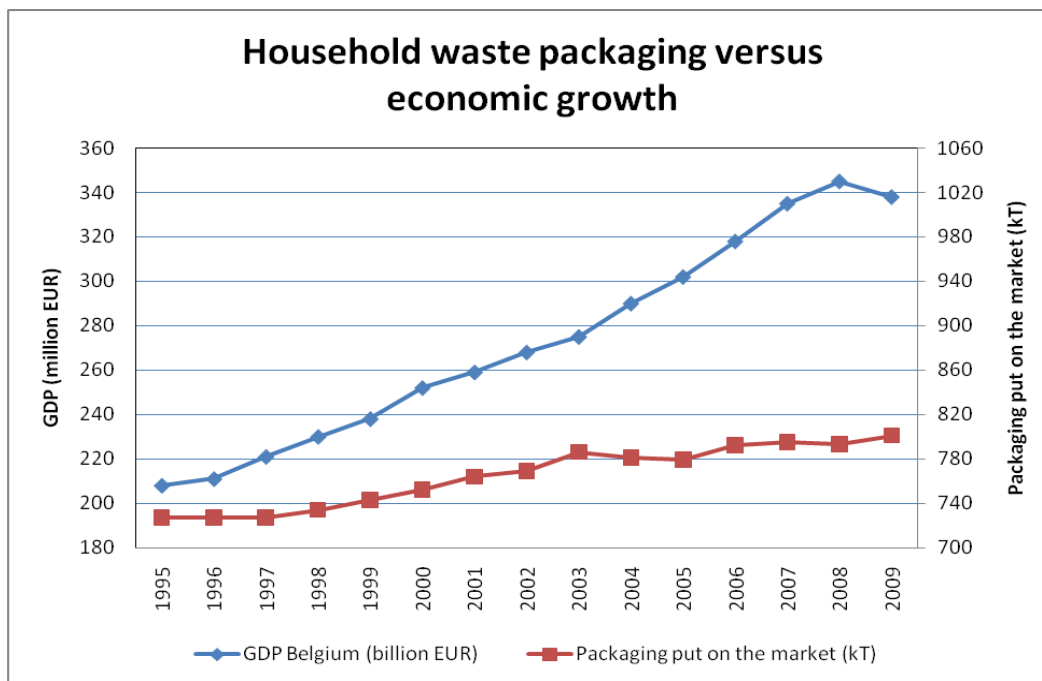
SLIKA 6: Stupanj odlaganja otpada i odložene količine otpada iz kućanstava, 1990-2008. (izvor: OVAM, 2009).



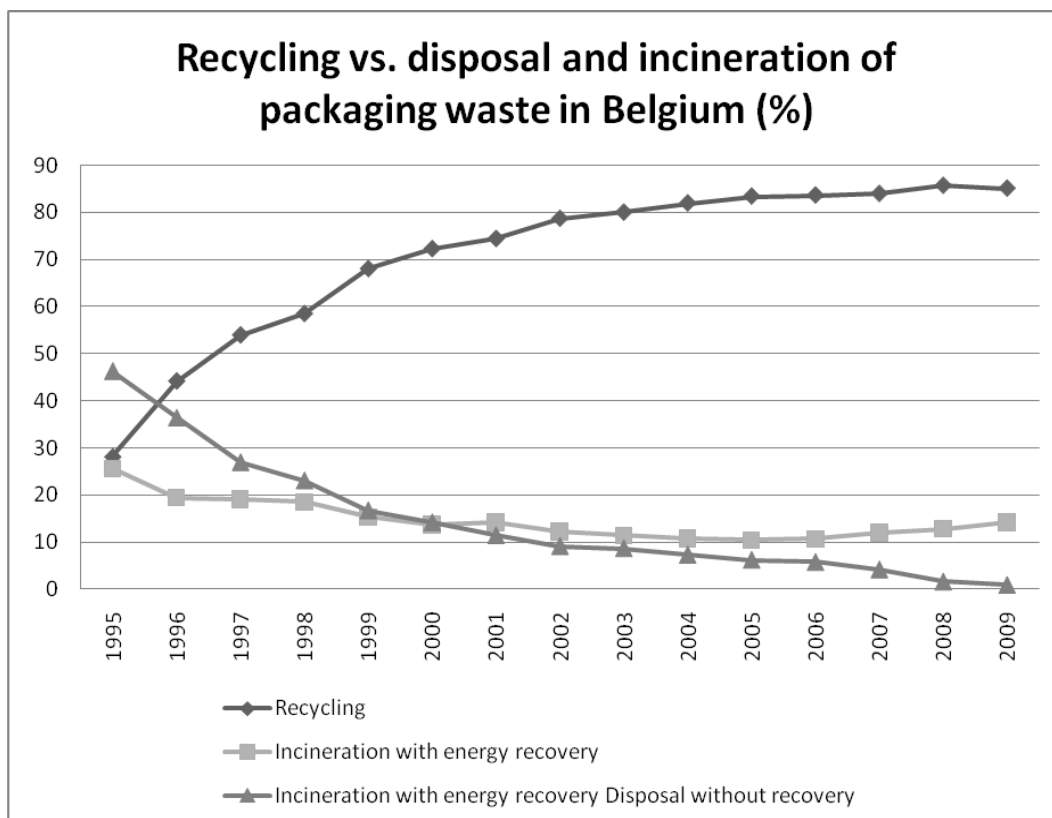
SLIKA 7: proizvodnja CH₄ i električne energije na flamanskim odlagalištima, 1990-2006. (izvor: VMM, 2007.)



SLIKA 8: Proizvodnja energije u spalionicama otpada iz kućanstava (izvor: VMM, 2007.)



SLIKA 9: Ambalažni materijal pušten na tržište nasuprot BDP (Belgija) (izvor: Fost Plus, 2010)



SLIKA 10: Reciklaža, odlaganje i spaljivanje ambalažnog otpada u Belgiji (izvor: Fost Plus, 2010).