Bulgaria – Serbia IPA Cross-border Programme,
CCI Number 2007CB16IPO006

Best practices and networking in the field of waste management

Development of survey of best practices and networking in the field of waste management under project 2007CB16IPO006-2011-2-198

This project provides resources that will enable research in a field crucial for future initiatives and investments in waste management. The consultant has to review: contemporary tendencies and issues of waste collection and waste disposal activities and spare time with municipal professional and the team; deliver best practices in the field of organization and networking.

Title of the Project:
Optimization of the waste collection and waste transportation system in the CBC region Montana - Pirot

Project №:
2007CB16IPO006-2011-2-198

Program:
Bulgaria – Serbia IPA Cross-border Programme (CCI Number: 2007CB16IPO006)

Primary Financing:
The Instrument for Pre-accession Assistance Fund /IPA Fund/

Beneficients:
Municipality of Montana, Republic of Bulgaria
Municiplaity of Pirot, Republic of Serbia

Date:
September, 2013

This document is financed by the IPA-Fund of the European Union.
The text of the present publication does not reflect the official position of the European Commission.

This survey is typed and printed with ecofont.

(According to the University of Wisconsin-Green Bay, Century Gothic uses about 30% less ink than Arial and Times New Roman.)


ЗАБРАНЕНО
ВЛИЗАНЕТО
В РАЙОНА
НА ДТБО!

ABSTRACT

Two are the main objectives of this Survey under project 2007CB16IPO006- 2011-2 - 198. First one is to review contemporary tendencies and issues of waste collection and waste disposal activities while examining the main elements and principles of waste management in the municipality of Montana. The second major element of this paper is to deliver best practices in the field of organization and networking.

The Survey is based on a detailed questionnaire, which was completed during the work with the team and local experts from the municipality, Regional landfill - Montana, Municipal Wastewater treatment plant – Montana and the municipal company for waste collection and disposal. The data displayed in the tables used in preparing the analysis and conclusions is obtained from the records and database of the landfill and the Regional inspection of environment and waters - Montana, as well as the database and archives of the Department of Ecology at Montana Municipality. Statistic data is also obtained from the National Institute of Statistics, Eurostat and World Bank reports.

In the following survey information is provided and analisys is delivered for the organization of collection, transportation, separation, composting and disposal of municipal waste in Montana. Due attention is paid not only to the new plants built according to the European standards but also to the waste collection containers, the vihacle fleet and the personnel. We examine the legal framework and European requirements as well as the financial side of the matter - as taxes and fees imposed on residents and the responsibility of the manufacturers on the territory of Montana municipality. A revision of the separate watse collection as well as the experience of supporting companies in connection with this activity is done forward in this paper.
The survey is concluded with overview and description of the latest trends and bestpractices in waste management, namely the dream-came-true of "zero waste" and the doctrine of the three "R"s - "Reduce, Recycle, Reuse", all accomplished with examples of foreign municipalities who successfully optimized their waste management.
This Survey is directed to the municipal employees of Montana and Pirot but as well targets all citizens in the cross border region, the business and other interested in the environment protection stakeholders.

We would like to give a special thanks to the Mayor of Montana, Mr. Zlatko Zhivkov, to the chief of municipal department "European integration and economic development",Mr. Deyan Dimitrov, to the manager of "Regional landfill" Ltd – Mrs. Mariela Jivkova and Mariana Krumova manager of WWTP - Montana.

CONTENT

LIST OF ABRIVIATIONS

MSW – Municipal solid waste

EPR – Extended producer responsibility

MWM – Municipal waste management

SOP – Sectoral operational program

WFD – Waste Framework Directive

RO – Recovery organization

MOEW – Ministry of Environment and Waters – Bulgaria

EPA - Environmental Protection Act

LWTP – Local wastewater treatment plant

ISO – International standard organization

WWTP – Wastewater treatment plant

EIA – Environmental impact Assessment

SWM – Spread necessary investments

GHG – Greenhouse gas

IPCC - Intergovernmental Panel on Climate Change

This paper begins with an overview of the activities in waste management at the municipal level in a larger scale. Later on we discuss the threatening indicators on global level regarding the increasing quantities of generated waste in the cities due to urbanization and consumers behaviour of the citizens.

We pay attention to the definition of municipal waste since the very concept of tis term should be clarified considering the variety of interpretations of the given notion. In the following chapter we make an overview of the legal framework of the EU legislation with its requirements and impact on Bulgarian legal norms and by-laws. We go to the peculiarities of the separate collection of waste and the difficulties the organizations and citizens face. In a few paragraphs a revision is made of the way waste collection taxes are determined and waste disposal fees are set, disbursement and collection of related taxes is organized as major prerequsiste for a proper waste management.

We devote a separate chapter to the work structure and technologies used in the treatment of waste in the Landfill for municipal solid waste - Montana, and recently built modern wastewater treatment plant.

A descripton of the global trends and best practices in waste management - the Zero Waste practce. Featured are guidelines for the proper implementation of these practices and examples of successful communities and cities.

We conclude the Survey suggesting possible future trends and recommendations for good networking.

MUNICIPAL WASTE MANAGEMENT – FACT AND TENDENCIES – GLOBAL ASPECT

Solid waste management is the one thing just about every city government provides for its residents. While service levels, environmental impacts and costs vary dramatically, solid waste management is probably the most important municipal service and serves as a prerequisite for other municipal action.

Studies and data from Eurostat show that currently, world cities generate about 1.3 billion tonnes of solid waste per year. This volume is expected to increase to over 2 billion tonnes by 2025[1]. Waste generation rates will

more than double over the next twenty years and this is more like to happen in lower income countries. 151.5 billion to about EUR 277 billion in 2025. Cost increases will be most severe in low income countries (more than 5-fold increases) and lower-middle income countries (more than 4-fold increases).

While the world hurtles toward its urban future, the amount of municipal solid waste (MSW), is growing even faster than the rate of urbanization. Some ten years ago there were 2.9 billion urban residents who generated about 0.64 kg of MSW per person per day (0.68 billion tonnes per year). Reports of the recent couple of years show that today these amounts have increased to about 3 billion residents generating 1.2 kg per person per day (1.3 billion tonnes per year). It is said that by 2025 this will likely increase to 4.3 billion urban residents generating about 1.42 kg/capita/day of municipal solid waste (2.2 billion tonnes per year).

Municipal solid waste management is arguably the most important service a city provides. In low-income

Globally, solid waste management costs will increase from today's annual EUR

countries as well as many middle-income countries, MSW is the largest single budget item for cities and one of the largest employers. A city that cannot manage to effectively organize its waste is rarely able to manage more complex services such as health, education, or transportation.

Poorly managed waste has an enormous impact on health, local and global environment, and economy. Improperly managed waste usually results in down-stream costs higher than what it would have cost to manage the waste properly in the first place as is with other sectors of municipal governence. The global nature of MSW includes its contribution to greenhouse gas emissions, e.g the methane from the organic fraction of the waste stream, and the increasing connections of products, urban practices, and the recycling industry.

Not only in Bulgaria but it is a world wide tendency of quickly increasing

waste volumes - even faster than the rate of urbanization. Municipal planners should manage solid waste in as holistic manner as possible.

There is a strong relation between urban solid waste generation rates and harmful greenhouse gas emissions. This link is likely similar with other urban inputs/ outputs such as waste water and total energy use. Reviewing MSW in an integrated manner with a more holistic approach, focusing on urban form and lifestyle choice may yield broader benefits.

Pollution such as solid waste, GHG emissions and ozone-depleting substances are by-products of urbanization and increasing affluence.

Developing MSW is one of the most effective ways to strengthen overall municipal management and is usually a prerequisite for other, more complicated, municipal services. Waste workers, both formal and informal, have a significant impact on overall MSW programming. While in more affluent countries ageing workers are a growing challenge, the effective integration of waste pickers, particularly in low-income countries, isdefinetily critical.

Municipal solid waste managers are charged with an enormous task: get the waste out from underfoot and do so in the most economically, socially, and environmentally optimal manner possible. Solid waste is one of the most pernicious local pollutants - uncollected solid waste is usually the main reason for local flooding and air and water pollution.

Managing municipal solid waste is an intensive activity. Municipalities need capacities in green procurement, contract management, professional and often unionized labor management, and ongoing expertise in capital and operating budgeting and finance. MSW requires a strong social contract – a networking between the municipality and community. All of these skills are prerequisites for other municipal services as well.

We have to remember that when we talk of solid waste management there is no ‘away’. When ‘throwing away’ waste, system complexities and the integrated nature of materials and pollution are quickly apparent. For example, waste incineration is expensive and poses challenges of air pollution and ash disposal. Incineration requires waste placed outside for collection to be containerized to stay dry, and much of the waste stream is not

combustible. Landfills require certain land availability, and siting is often opposed by potential neighboring residents. Solving one problem often introduces another one, and if not well executed, the new problem is often of greater cost and dificutly.

Uncollected waste can provide breeding areas and food to potentially disease carrying vectors such as insects and rodents, with their associated health and nuisance issues. Waste management cannot be effectively managed without due consideration for issues such as the city's overall GHG emissions, labor market, land use planning, and myriad related concerns.

CONCEPTION AND SCOPE OF SOLID WASTE MANAGEMENT

Definitions of municipal solid waste (MSW) vary between countries, so it is important to establish at the outset just what is being discussed in this paper:

According to the Waste Framework Directive: Waste is any substance or object which the holder discards or is required to discard, and waste management as the collection, transport, recovery, and disposal of waste, including the supervision of such operations and after-care of disposal sites.

The Organisation for Economic Co-operation and Development defines it as follows: Municipal waste is collected and treated by, or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden, street sweepings, contents of litter containers, and market cleansing. Waste from municipal sewage networks and treatment, as well as municipal construction and demolition is excluded.

The Pan American Health Organization supports the following wording: Solid or semi-solid waste generated in population centers including domestic and, commercial wastes, as well as those originated by the small-scale industries and institutions (including hospital and clinics); market street sweeping, and from public cleansing.

According to the Intergovernmental Panel on Climate Change: The IPCC includes the following in MSW: food waste; garden (yard) and park waste; paper and cardboard; wood; textiles; nappies (disposable diapers); rubber and leather; plastics; metal; glass (and pottery and china); and other (e.g., ash, dirt, dust, soil, electronic waste).

The survey you have before you is an important one that provides a screening, an overview of Municipality of Montana's good practices and issues regarding the Waste management. The paper allows us to see the picture and draw a conclusion of the current situation in Montana and deliver best practices in the field of Municipal waste management (MWM) of the state of today's solid waste management practices.

See **Table 1** below which gives detailed description with examples of how the municipal waste is grouped and what are the main waste generators.

LEGAL FRAMEWORK

The European Union sets the policy framework for municipal solid waste management that drives reform initiatives in new EU member states and candidate countries. The EU policies, implementation targets, and grant funding establish the enabling environment that transforms the solid waste management sector in Bulgaria. The directives guide member states towards agreed targets without prescribing in detail how specific measures should be implemented. Various directives establish the legal framework for solid waste management, provide specifics, and an implementation timetable: these include the Waste Framework Directive, the Landfill Directive, and the Waste Incineration Directive.

Back in October 2008, the EU adopted a new and simplified Waste Framework Directive, which at the same time raised the targets for member states. Targets are binding on all member states, but accession negotiations included transition periods for new member states to provide sufficient time for implementation. Whether transition periods were realistic is now in question as the first deadlines arrived and even older, more affluent member states struggle to meet the targets.

Our country has progressed toward meeting EU acquis communautaire requirements is said in a World Bank report from 2011, but substantial investments are still needed to streamline the waste management system to comply fully. Total costs to

meet EU norms according to the World Bank are grossly estimated at EUR 370 million, equivalent to 20 percent of total funding in OP-Environment. Despite generous EU structural funding that covers 85 percent of all investment needed in the waste sector during 2007-2013, national public co-financing of EUR 55 million is still required. Despite recent progress, main issues remain, in particular to close down wild dumpsites in non-compliance with prevailing legislation, meet the European targets on recycling and reducing landfill waste disposal, and ensure long-term financial sustainability for the sector.

The most relevant EU directives in the field of solid waste are the Waste Framework Directive (2008/98/EC)2, the Landfill Directive (1999/31/EC)3, and the Waste Incineration Directive (2000/76/EC)4. Additional directives under the Framework Directive further specify details for specific waste streams. However, there is no single directive dedicated to municipal waste management alone. Still general provisions on waste management apply to municipal waste and almost all waste directives have specific provisions on municipal waste.

The Waste Framework Directive (WFD) provides guiding principles outlining the rules and requirements to be fulfilled by all member countries in solid waste management. The Community adopted a simplified version of the WFD in October 2008. A serious part of the WFD is dedicated to measures used to promote reuse and recycling of waste. The revised WFD streamlines EU waste legislation by repealing the WFD (2006/12/EC), the directive on hazardous waste (91/689/EEC) and part of the directive on waste oils (75/439/EEC). The key Directives laying out

[2] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF

[3] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:182:0001:0019:EN:PDF

[4] Available at http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/Incineration_Directive_2000_76.pdf

requirements for waste management under the Framework Legislation were not revised. They distinguish between waste treatment; and waste streams and are the Landfill Directive and the Waste Incineration Directive. Recycling standards are addressed as part of the EU Recycling Strategy. In fact this is not a directive but a Communication, hence with no legal obligation for the Member States to follow.

The Landfill Directive sets strict requirements for landfills to prevent and reduce negative effects on the environment. The Directive specifies measures for leachate collection, landfill gas management and protection of groundwater. Among other requirements, the Landfill Directive states that waste must be treated before being landfilled and that biodegradable waste going to landfills must be reduced gradually to 35%.

The Waste Incineration Directive aims to reduce the negative effects on the environment caused by incineration or co-incineration of waste as far as possible. In particular, the Directive seeks to reduce pollution caused by emissions into the air, soil, surface water and groundwater, and thus lessen the risks which these pose to human health. This is to be achieved through the application of operational conditions, technical requirements, and emission limit values for waste incineration and co-incineration plants within the Community.

The Recycling Strategy is considered an important tools to reduce environmental impacts and the consumption of valuable resources. The EU Strategy on Prevention and Recycling of Waste, COM (2005)5, defines the objectives as 'limiting waste, and promoting the re-use, recycling and recovery of waste'. Recent recycling targets for municipal and construction and demolition waste have been incorporated in the 2008 revision of the EU Waste Framework Directive, which requires that by 2020, more than 50 percent of materials of such

[5] Available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0013:FIN:EN:PDF

as glass, metal, plastic and glass from households and possibly other sources should be recovered for re-use and recycling. For construction and demolition waste, the target is a 70 percent reduction for the same year. Other than these overall targets, the WFD does not include targets for individual materials in household waste. The WFD refers to separate directives to regulate waste minimization among certain waste categories such as packaging waste and end-of-life vehicles says the World Bank in its report on the matter in 2011.

The costs of waste management must be borne by the waste producer (or the current or previous waste holder), in accordance with the polluter-pays-principle, and Member States should have the appropriate institutional framework in place to ensure that waste is treated by the waste producer (or holder), or by a hired broker or dealer. According to the principles of self-sufficiency and proximity, a network of disposal facilities should be established throughout the country, serving all communities and their respective waste management needs. Furthermore, every country is required to have a waste management plan, and they are expected to establish waste prevention programs no later than four years after the Directive enters into effect. Waste prevention programs can be part of the waste management plan, or they can function separately.

The solid waste management targets set out in the EU Waste Framework Legislation covers landfills, end-of-life vehicles, waste from electrical and electronic equipment, batteries and packaging. By 2020, Member States must reuse or recycle 50 percent of the total by weight of specified categories of household waste, (and possibly from other origins having similar waste streams) and reuse, recycle, or recover 70 percent (by weight) of non-hazardous construction and demolition waste. For a detailed information on the major targets for waste reduction and recycling according to the EU waste legislation

see **Table 2**.

Waste Oil Directive

Directive 75/439/EEC on waste oils amended by Directive 87/101/EEC aims to create a harmonised system for the collection, treatment, storage and disposal of waste oils, such as lubricant oils for vehicles.

Sewage Sludge Directive

Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture sets controls on the use of sewage sludge in agriculture.

Landfill Directive

Directive 1999/31/EC on the landfill of waste sets out detailed rules on waste landfills. It provides that the operators of existing landfill sites must have an approved conditioning plan which indicates how the requirements of the Directive are to be met within the required timeframe. These plans must help prevent the negative effects of landfill on surface water, groundwater, soil and air. The Directive also bans certain types of waste from landfill sites, for example used tyres, and requires member states to reduce the amount of biodegradable waste that they landfill.

Directive 2000/76/EC of 4 December 2000 aims to prevent or limit the negative effects of the incineration of waste. It imposes operational and technical requirements and sets emission limit values for waste incineration and co-incineration plants within the EU.

Packaging Waste Directive

Directive 94/62/EC on packaging and packaging waste sets targets for the recovery and recycling of packaging waste and requires member states to set up collection, recycling and recovery schemes for such waste.

End-of-Life Vehicles Directive

Directive 2000/53/EC on end-of-life vehicles sets out measures which aim to prevent waste from motor vehicles and vehicle components that have reached the end of their life-cycle and to promote vehicle reuse, recycling and other forms of recovery. It requires that collection systems be set up to ensure that end-of-life vehicles are effectively and safely disposed of without damaging

the environment.

Electric and Electronic Waste (WEEE)

Directive 2002/96/EC as amended by Directive 2003/108/EC aims to prevent the generation of electrical and electronic waste and to promote reuse, recycling and other forms of recovery in order to reduce the quantity of such waste to be eliminated through landfilling or incineration. It requires the collection of WEEE, recovery and reuse or recycling.

Directive 2002/95/EC aims to reduce or eliminate certain substances in the manufacture of electrical and electronic equipment in order to facilitate waste management.

National legislation

- Waste management law (Gazette 53/13.07.2012)
- Environment protection law (Gazette 91/25.09.2002)
- Law on ratification of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and its treatment
- Ordinance on management of construction waste and use of recycled building materials, approved by Decree 277 of 5.11.2012, (Gazette 89/13.11.2012)
- Regulation on the treatment and transportation of industrial and hazardous waste (adopted by Decree № 53 of 1999, Gazette 29/1999)
- Ordinance on packaging and packaging waste (Gazette 85/06.11.2012, Amended and supplemented Gazette 76/30.08.2013)
- Ordinance № 3 for the classification of waste (issued by the Minister of Environment and Water and the Minister of Health, Gazette 44/25.05.2004)
- Ordinance № 7 on the requirements that must be met for location of facilities for waste treatment (issued by the Minister of Environment and Water , Ministry of Regional Development and Public Works, the Minister of Agriculture and Forestry and the Minister of Health, Gazette 81/17.09.2004)
- Ordinance № 6 the conditions and requirements for construction

and operation of landfills and other facilities for the recovery and disposal of waste (issued by the Minister of Environment and Water , Gazette 80/13.09.2013)

- Ordinance on end-of-life vehicles (adopted by Decree № 11 of 15.01.2013 , Gazette 7/25.01.2013)
- Ordinance on the manner of utilization of sludge from wastewater treatment through its use in agriculture (adopted by Decree № 339 of 14.12.2004, Gazette 112/23.12.2004)
- Ordinance on batteries and accumulators and waste batteries and accumulators (adopted by Decree № 351 of 27.12.2012, Gazette 2/08.01.2013)
- Ordinance on waste oils and petroleum products (adopted by Decree № 352 of 27.12.2012, Gazette 2/08.01.2013)

In addition to the National program for waste management in Bulgaria (2009-2013), Minister of Environment and Water – Nona Karadzhova has ratified The Strategy for reducing the amount of biodegradable municipal waste going to landfills 2010-2020[6]. According to this strategy, 90% of paper and cardboard packaging will be collected separately in 2020.

Municipal Legislation

- Management program of Montana Municipality
- Municipal plan for waste management
- Ordinance on waste management in the municipality of Montana
- Ordinance for organization and financing of municipal solid waste treatment within the municipality in accordance with the law limiting the harmful effects of waste on the environment

EVOLUTION OF WASTE MANAGEMENT IN MONTANA, BULGARIA

Before 1990 the Bulgarian recycling system was financed and run by the government. After the fall of communism the system collapsed, leaving materials recovery and recycling purely in the hands of the

6 http://www3.moew.government.bg/files/file/Waste/Biowaste/biowaste_strategy_2010.pdf

private sector (formal, informal, legal and illegal). In 2001, with the establishment of extended producer responsibility (EPR)[7], major challenges were faced, including how to re-impose order, introducing a new structure of responsibilities which could meet obligatory targets, whilst retaining flexible and market-oriented recycling systems.

Inevitably, mistakes were made in the design and implementation of the original EPR systems. However, Bulgaria has learned from these mistakes, and is now - with the recent adoption of the Waste Management Law of 2012 putting in place an EPR system which is more robust and consequently able to meet the challenging recycling targets required of any EU Member State.

Bulgaria has a relatively well developed municipal waste collection system and presently about 98% of the population is provided with collection services. By 2010, the share of population covered by municipal waste collection systems reached 98.15 % (ExEA, 2012). The services are financed through the municipal waste tax. The private sector is largely involved in the collection of municipal waste and its market share exceeds 80%. The contracting of services is based on tenders with usual contract duration of 4 - 10 years. Landfilling is still the major disposal option for municipal waste collected. Sorting facilities and MBT plants are presently under construction in some of the biggest municipalities.

The first attempts for establishment of more efficient recycling practices started in 2001 with the implementation of the Bulgarian - German Twinning project on packaging waste.

As a result an Implementation Programme for Directive 94/62/EC was developed and approved by the Bulgarian government in the beginning of 2003. The requirements

[7] In the field of waste management, extended producer responsibility (EPR) is a strategy designed to promote the integration of environmental costs associated with goods throughout their life cycles into the market price of the products. The concept was first formally introduced in Sweden by Thomas Lindhqvist in a 1990 report to the Swedish Ministry of the Environment. the entire life-cycle of the product and especially for the take-back, recycling and final disposal.

of Directive 94/62/EC as amended have been transposed into Bulgarian legislation via Bulgarian *Waste Management Act*8 (WMA) and *Regulation on packaging and packaging waste*9. Within the frame of negotiations for accession to the EU, the Bulgarian Government agreed a transitional period for achievement of recycling and recovery targets until 2014.

The established system for collection of recyclable waste succeeds to achieve the growing recycling and recovery targets over the last years. In 2010, 321,196 tonnes of packaging waste has been generated in Bulgaria, which corresponds to 43 kg. per capita. The country has achieved 62 % material recycling of the total packaging waste generated, while 47 % were required by law.

Nevertheless, the separation at source and collection of recyclable waste from households is not sufficiently developed in comparison to other Central and Western European countries, while the recycling of packaging waste from large industrial and commercial outlets is a well-established practice.

The key characteristics of the EPR system are summarized below:

Recycling and recovery targets for packaging waste are defined in the national legislation.

Every producer or importer whose products are sold in packaging is required to contribute to or provide for achievement of these recycling and recovery targets. The producers or the importers of the packed goods have the possibility to undertake their responsibilities in two ways: i) individually, through the establishment of take back or deposit systems for used packaging in the place of sale of the respective products or ii) collectively, by transferring their responsibility for the achievement of recycling and recovery targets to an approved by the competent authorities Compliance Scheme (Recovery Organization -RO).

- Product taxes on packaging put on the market in Bulgaria have been introduced since March 2004.

The product taxes are defined in BGN

8 Promulgated, SN No. 86/30.09.2003, last amended, SN No. 99/16.12.2011, repealed SNG No 53/13.07.2012

9 Approved with DCM No 41 of 26.02.2004, promulgated SN No 19 of 09.03.2004, last amended SN No 53/10.06.2008

per kilogram of packaging material and are due by producers and importers of packed goods on Bulgarian market.

The companies achieving the recycling and recovery targets individually and the producers and importers of packed goods who sign a contract with a Recovery Organization (RO) are relieved from the obligation to pay product tax to the state. In this sense the product tax shall be considered as a kind of penalty imposed on the obliged companies for non-achievement of recycling and recovery targets for packaging waste.

- The Recovery Organization is the main element for implementing the EPR system. The RO is responsible for the organization of separate collection system and for the achievement of packaging waste recycling and recovery targets on behalf of the producers and importers of packed goods against payment of remuneration/fee. In the implementation of these duties the RO interacts with various stakeholders such as producers and importers of packed goods, state and local authorities, waste management companies, recycling plants and citizens using the separate waste collection services.
- In order to operate on the Bulgarian market, all Recovery organizations shall hold a special permit issued by the MOEW. In order to obtain it, the RO shall submit to MOEW a Program and preliminary contracts signed with municipalities, waste collection

and recycling companies. Presently there are 7 active Recovery Organization competing on the market.

- The major source of financing of EPR schemes are licensing fees charged by the recovery organizations to the producers and importers of packed goods and the revenues from the sold recyclable materials.
- The mechanism for invoicing of fees to the clients is closely linked with the established reporting requirements, including annual forecasts, monthly and annual reports.
- The present licensing fees for packaging placed on the market in

Bulgaria are higher than in the neighbor countries, but still below the levels set in countries like Austria, Belgium and Germany where the recycling of packaging waste is well established.

- The RO submits an annual report for the achievement of recycling and recovery targets to the Ministry of Environment and Water. The report is verified by an independent certified auditor based on the International Auditing Standard and agreed upon procedures.
- The municipal administrations are responsible for organizing the separate collection of recyclable waste from the households on their territory. For that purpose they should sign a contract with a recovery organization or organize the services by themselves. The selection of the system for collection and sorting of the packaging waste is subject of negotiations between the Recovery Organization and the municipality, whereas the municipalities are responsible for taking the final decision.
- At present the ROs cover the full costs for collection of packaging waste and no additional financing is provided from municipalities.
- The recyclable waste collection from households is based on different colour separate collection containers. Container bring systems are established in almost all municipal centres and other large settlements providing services to more than 5,5 million residents at present. In parallel to the separate collection with containers, buy-back (recycling) centres continue to operate in almost all towns with population exceeding 10,000 residents. The recyclable waste is delivered

to buy-back centres sorted and against payment. If in the past buy-back centres were used by almost all residents in the service area, presently the major suppliers of materials are the individual collectors.

- The Ministry of Environment and Water is the national competent institution in charge with packaging waste management. The key responsibilities and functions of the Ministry include: i) development of national legislation and policy in the

field, ii) issuing of permits to Recovery Organizations, implementation of control over their activities, approval of their annual reports; iii) registration, permitting and control of waste collection, sorting, recycling, recovery and disposal activities and control; iv) control over the companies' proper reporting of packaging placed on the market by the producers and importers of packed goods, etc.

Over the last years there is a discussion about the results and the efficiency of the established extended producer responsibility system in Bulgaria. From the formal point of view, the system is achieving its initial objectives and guarantees the recycling of waste to levels that are comparable with other EU countries. Nevertheless, almost eight years after the start of the system significant part of the Bulgarian society does not separate waste at source and is not convinced to regularly use the established separate waste collection infrastructure. The achievements over the last years are mainly as a result of the optimization of the collection practices already existing prior the establishment of the EPR scheme and the demand of Bulgarian recycling industry for raw materials.

Despite the fact that there is a lot of criticism towards the existing system, there are obvious achievements in the field of packaging waste management that can be summarized in the following way:

- The country succeeds to achieve the recycling and recovery targets for packaging waste according to the derogations agreed with the European Commission;
- The quantities of packaging waste collected and recycled in the country are steadily growing. Nevertheless, the increase is not the same for all packaging materials and there are large possibilities for improvement;
- The country has a clearly defined policy objectives and national waste legislation in the field of packaging waste management;
- The implementation of separate collection systems did not result in the increase of municipal waste taxes;
- The costs for the Bulgarian

industry and consumers occurred after establishment of the system are still lower in comparison to the Western European countries;

- Significant amount of funds were generated and invested in the setting of separate waste collection and sorting infrastructure. As an additional effect a significant number of new working places were opened, especially taking into account that a significant part of the new jobs do not require special education or skills;
- The system proved that it can adapt to significant fluctuations in market prices of recyclable materials.
- The system provides valuable resources to the Bulgarian recycling plants and supports their competitiveness;
- The necessary administrative structures are established and gained the necessary experience for the planning and control of packaging waste management.

The real benefits from the system are expected to grow in the future with the increase of waste recycling and recovery targets. The major challenge for the system is to develop an efficient and cost effective system for the household packaging waste collection and significantly increase the quantities of recycled waste in the country.

Considering the existing obstacles in the functioning of the EPR system, the Bulgarian authorities focused their efforts on the revision of national legislation and setting more clear rules for the activities of the recovery organizations and for improving transparency and the efficiency of the packaging waste separate collection and recycling. These legal changes took place in the new Waste Management Act adopted in July 2012.

The establishment of EPR system for packaging waste proved its efficiency in many countries and despite of the difficulties faced, Bulgaria is considered to be one of these examples. Nevertheless there is no unique best solution that can be directly transferred to other countries. The various EPR systems differ significantly from each other and they were gradually developed and adapted to fit with the needs of the individual countries. The EPR system shall take into account the specific

conditions in place, especially geographical conditions, level of economic development, legal system, current level of waste management services, people behavior and standard of living, existence of recyclable waste markets, etc.

In Bulgaria waste collection tax is determined individually by each municipality. Overall, it is estimated in accordance to the total carrying value of the property. In some cases, it is determined in accordance to the number and volume of the provided waste collection bins. In tables 2 - 4 below you can see the amount of collected tax for waste collection as well as the expenditures made for the provision of this service for the last three years.

The usual practice collection of the municipal waste tax is as follows:

- The payment may be done either in 4 equal installments during the year (by the end of the relevant quarter) or 100% at the time of the payment of the first installment (from 1 February till 31 March) for which the citizens are entitled to 5% discount from the due solid waste fee. This discount is an incentive for the people to pre-pay for the service related to the solid waste management that they are going to use in the course of the year.
- The local authorities are obliged to inform the payers about: the tax evaluation for determining the property tax; the amount of the calculated tax; the amount of the solid waste fee; the terms for payment; the address of the cash desks and the relevant bank accounts for payment of the due amounts.
- If the due amounts are not paid within the preliminary set terms, then the payers are invited to voluntarily pay the due fees with the due interest for the delay. This invitation however does not have any administrative value and cannot be used in a forced collection procedure.

The taxes not paid in time are collected together with the interest set according to the Law for the Interests on Taxes, Fees and Similar State Receivables. The collection by force is done by the Agency for State

Receivables under the procedures of the Tax Insurance Procedures Code.

In compliance with the Local Taxes and Fees Act, the municipalities may exempt certain categories of citizens partially or entirely from the payment of certain types of fees. The law also envisages a procedure for rescheduling of payments to the municipalities.

The financial sustainability of solid waste management systems is one of the greatest challenges being faced in low- and middle-income countries. Cost recovery is an important requirement for sustainably implementing solid waste management systems, but it does not always correspond to political priorities, the willingness of the population or the capacities of the administration to implement it.

However economic instruments include more than fees or taxes. They can be used to cover costs, but also to create incentives for waste reduction, reuse, recycling or particular treatment and disposal options. Extended producer responsibility (EPR), where the manufacturers, importers, packers, fillers and distributors of products take voluntary or mandatory responsibility for the management (including recycling) of the post-consumer waste is one of the most important existing economic instruments. See graphics (table 5 and 6) where a connection and growth rate between the landfilling and the landfill tax are displayed for the last years.

MUNICIPAL SOLID WASTE LANDFILL

Landfill in accordance to the EU standards should have the following minimum engineering infrastructure:

- Bottom liner to stop the penetration of infiltrates into the soil and groundwater;
- System for collection and treatment of leachate;
- Passive or active system for landfill gas, which should include at least burning the collected gas (conversion of methane into less harmful carbon dioxide);
- Surface liner of the landfill areas that are completely filled;
- System for collecting runoff water to protect the landfill from infiltration of surface water and groundwater.

Regarding the operation of these landfills EU requirements should be applied:

- Plan/schedule for daily waste disposal;
- Procedures for acceptance and verification of waste;
- Plan for control and inspection of the environment;
- Plan for security measures.

Regional landfill Montana:

There are opened three new cells for solid waste and one is still underconstruction. The Landfill consists of administrative building, an entrance checkpoint with input/ output balance (truck scale), garage with workshop, car wash containers, leachate treatment plant, shed compactor, monitoring wells, system for control of the inlet, site infrastructure installation for collecting and burning landfill gas, bulldozer with front shovel, compactor and dumper .

The landfill is used by the following municipalities: Montana, Krivodol, Boychinovtsi, Berkovica, Lom, Chiprovtzi, Georgi Damyanovo, Brusartsi, Medkovets Varshetz, Yakimovo and Valchedram with total population of 67,000 people.

The commissioning date of the First stage is 12.01.2005 and 03.08.2006 – Second stage.

On 05.07.2010 , pursuant to Art.120, para.1 of the Environmental Protection Act (EPA) and Art.11, para.1, item 1 of the Ordinance on the conditions and procedures for issuing permits (Decree № 278/20.12.2005) from the Ministry of Environment and water was issued permit № 162-N1/2010 to Montana Municipality for the operation of Regional landfill for non-hazardous waste for municipalities of Montana, Krivodol, Boychinovtsi, Berkovica, Lom, Chiprovtzi, Georgi Damyanovo, Brusartsi, Medkovets Varshetz, Yakimovo and Valchedram including four cells of non-hazardous waste with a maximum capacity of 911,400 tons.

The location of the installation is Krapchene village UCATTU: 39 503,

the village of Krapchene and Nikolovo - "Nedelishte" area.

Montana Landfill for non-hazardous waste, includes four cells for the disposal of non-hazardous waste, of which three have been completed and the fourth is still only profiled. The preparation of a detailed design for the construction of the fourth cell is ongoing. See table 8 for the amount of solid waste disposed on Landfill Montana.

All waste delivered to the landfill is controlled:

- Registration of trucks carrying waste and its origin;
- Weighing and recording of waste;
- Direct visual inspection of the waste according to its type and composition;
- All information is recorded and stored in the data recording system
- Software system serving the scale.

The unloading of garbage cars is routine procedure, carried out strictly according to the instructions of the technology. A monitoring of the dumped waste is performed, then garbage trucks must leave the area but before that they have to run through the carwash to clean their wheels. Twice a month circulating water from the tank is pumped to the combined sewer system in the farmyard and leads to Local wastewater treatment plant. (LWTP)

The technology of waste disposal includes:

- Discharge of the waste into the cell
- Spreading by a bulldozer
- Compaction with a compactor vehicle
- Covering with soil

On the territory of the lndfill is formed the following waste water streams - production/leachate from the cells; wastewater from carwash/domestic wastewater and stormwater collected in LWTP.

Leachate management system includes the following units:

- A system for drainage of leachate;
- Shaft inspection and leachate collection
- Leachate pumps installed in wells to collect leachate
- Pipes for leachate
- Effluent treatment plant

Regularly checks of the system for leachate management are performed in order to guarantee its proper functioning.

Security ditches.

Security ditches are designed to collect and take rainwater fell in and around the landfill. Thus landfill is protected from flooding and overload of the drainage system for infiltrated water. The systems are maintained and serviced regularly. System is cleaned from deposition of dirt and gravel, cleaningthe joints from grass and wild plants, keeping joints filled, keeping the lining of concrete slabs in good condition, cleaning of culverts placed under the operating system.

In cells 1 and 2, where in 2012 have been landfilled non-hazardous waste have been supplied with six gas wells /3 pcs a cell/ for flatulence. The wells were constructed in stages, it wasdone along with the increase in height of the fill.

Biogas from the gas wells is discharged to the incineration plant. Received in consequence of the various microbiological and biochemical processes of organic matter in the waste, biogas changes over time, both in quantity and composition. To lead out the biogas from the landfill and burn it controlled on a torch /when reaching certain levels of methane and oxygen/ gas drainage system is constructed.

Stages of the operation of cells

Individual cells of the landfill will be operated sequentially, upon reaching the level of waste in the cell 1 to interim crown levee an elevation starts at the same time where filling the cells 1 and 2. Landfill continues to shape the final filling of both cells and formation of temporary slope (angle) 1:3 to cell 3. The slope is temporarily covered with soil - thickness 0.50 m.

When you start filling the cells with waste construction of gas wells starts as well. Hight of the gas wells increases proporcioanlly with the dumped waste.

Next step is filling cell 3, while it is running the reclamation of the first two cells - 1 and 2 . At the end of the lifetime of cell 3, cell 4 will be built. The unit of waste in cell 3 ends with temporary slope towards cell 4; m = 1:3 which covers the temporary reclamation layer of soil material with a thickness of 0.50 m.

During the filling of cell 4 will be applied a reclamation layer shaped in box 3.

After construction and reclamation of cell 4, the landfill will be closed .

During the operation of the landfill leachate is pumped from the cells and led for treatment at the wastewater treatment plant.

Reclamation of cells

It was foreseen a gradual filling of the cells corresponding to the serial numbers of cells starting with cell 1. Following the same sequence of filling with waste, rehabilitation activities will be performed. At the end of the first stage of filling of cell 1, its reclamation begins at the end of the second stage of filling cell 2 starts its reclamation, and so on, until the whole landfill is filled.

Side slopes and the upper surface of the body of landfilled waste is covered with layers of reclamation as follows:

- On the aligned surface is laid gas drainage layer of crushed gravel 0.50 m
- Top is packed tight with clay layer - thickness of 1.0 m;
- The surface is layered with humus with thickness 0.30 m, which serves as a basis for biological reclamation.

Biological reclamation consists of grass planting after technical reclamation is performed.

Grassing takes place in three stages:

- I stage - processing of the humus layer and fertilization with nitrogen fertilizers;
- II stage - leveling and seeding the area with suitable for the area mixtures;
- III stage – rolling, fertilizing, watering and mowing lawns.

Along with the technical rehabilitation in stages a gas drainage system is built. The system consists of perforated drainage HDPE pipes Ø 80 mm used to capture biogas. Pipes are arranged forming a net in the drainage layer so that the gas is taken to the gas wells. Vertical gas wells have thick HDPE pipes Ø 315 mm on top.

From gas wells biogas is led to the incineration plant in the yard by tube collectors of solid HDPE pipes Ø 125 mm and Ø 140 mm laid in the soil.

In the final reclamation berms are layed the following facilities:

- Operating path with width 3.60 m paved with exposed sand 0.2 m and a layer of rolled crushed gravel 0.30 m thick;

- Ditches with trapezoidal cross-section m = 1:1, all tiled;
- HDPE pipes Ø 400 mm placed so to lead down the runoff ditch berms to the place of discharge;
- Steel-concrete manholes for discharge of the gutters of berms in the pickup tubes.

For detailed information on the number and make of used trucks as well as the number of family bins see tables 9 and 10 below.

Organizational structure and environmental structure of the landfills of 2013.

Staff list and responsibilities:

- eng. Maria Todorova Jivkova - Manager of "Regional landfill - Montana " LTD .

- Dimitar Ivanov Cekov - Technologist - responsible for operating the RCD. Responsible for prevention and emergency actions. Responsible for changes in the regulr work or termination of one or all processes in the installation.

- eng. Albena Ivanova - ecologist. Involved in the sampling of air emissions, wastewater, and undergroundwater, noise levels and monitoring analysis. She has the responsibility to inform the manager and all stakeholders in excess of the standards, the reasons for their occurrence and creates the plans to overcome the negative variations. Control cleanliness around the cells in RCD. Controls and analyzing the waste within the landfill.

- Tsvetelin Alexiev Zlatev – manager of the transportation and vehicles in the landfill . Mr. Zlatev performs monitorin on the consumption of auxiliary materials and fuels, and keeps accurate datat in a log located in the administration building of the landfill. He is also responsible for the management and maintenance of the water carrier truck, as well as the sites for temporary storage of waste. Part of mr. Zlatkov's responsibility is suppling goods and materials neededfor the proper functioning of the landfill.

- Ivan Petrov Koychev - responsible for maintenance of pumping stations and sewerage and electrical systems and pumping leachate in water treatment plan. He performs

monitoring on the operation of the treatment facilities. Periodically /monthly/ conducts verification of the sewer and water system and keeps record of the results of performed checks in the relevant journals, which are located in the administrative building of the landfill. Another responsibility of the expert is monitoring on the consumption of water and electricity and keeps record on the monthly amounts used.

- Yordanka Vilhemova Mihailova - operator of the electronic scales used to measure the deposited waste and input control.

- Petar Mihaylov Petrov - responsible for maintenance and proper operation of the compactor, bulldozer and loader machies used for compaction of waste disposed in the working cells.

- Peter Yordanov Stankov - responsible for the management and maintenance of service equipment.

- Ivan Bogdanov Ivanov Ivanov Slavtcho Parvanov and Filip Stefanov Iliev - responsible for maintaining cleanliness and sanitation in the landfill.

Mrs Jivkova says in a conversation "The overall objective of EU policy on waste is to reduce the environmental impact of natural resources use. Preventing waste generating and promoting recycling and recovery will increase the resource efficiency of the European economy and reduce the negative environmental impacts of resource use. This objective will lead to new opportunities for waste management other than landfill, such as less waste is deposited in landfill, more compost and energy recovery from waste, more waste is recycled as well."

See table 7 for the organization of waste management activities in Montana.

Considering the principles enshrined in European and national legislation in Municipality of Montana was built in 2012 " Separation and composting plantfor municipal waste - Montana", financed by the state budget of the Republic of Bulgaria and the Environmental Protection Fund .

In 2012, the bilding of the separation plant for mixed municipal waste - Montana have been fully completed. Permission for its operation (No.DK-07-SZR-34/01.06.2012) has been given.

The activities of managing the separation plant including waste treatemnet, separation of recyclable waste and composting have been assigned to "Regional landfill – Montana"Ltd. (Regionalno depo za otpadatzi – Montana EOOD) with citi council decision No. 136/29.05.2012.

On 05.06.2012, the operation of "Separation and composting plant for municipal waste – Montana" have started but only the installation for pre- separation of mixed municipal waste is working in practice as the composting plant is expected to be finished in 2014.

Contract № 00811/07.03.2006 has been signed between "Public works " Ltd. (Komunalni deinosti EOOD) and "Water and Sanitation" Ltd. - Montana (Vodosnabdiavane I kanalizatzia OOD) for use of water for industrial and domestic needs in "Regional landfill - Montana" Ltd. Measuring device has been installed. See table 13 for detailed information.

Consumption of electricity in "Regional landfill - Montana" Ltd. is regulated in contract № 7057/2006 with "Electricity Distribution Pleven" AD. The main consumers of electricity in the landfill are the office buildings, pumping stations, pumps for leachate, water treatment plant and the carwash used for the vehicles' tires. *See table 14.*

In the area of the landfill is kept maximum : -5 m3 diesel fuel in a tank with capacity of 5.2 m3.
- $FeCl_3$ (ferric chloride) in a reservoir (tank) with a capacity of 6m3 .
- $Ca(OH)_2$ (Calcium hydroxide)-1,5 t in factory sealed bags and stored in a designated place .

The gas collection system inspection is performed by a regular chech by experts from Regional Inspectorate of Environment and Water –Montana where a comparison is done between the indexed amount of incinerated gas and the amount collected in the gas wells of the

landfill cells.

GENEAL ENVIRONMENTAL PROBLEMS RELATED TO THE LANDFILL ACTIVITIES

In the paragraphs below are described most common issues realted to landfill activities. The monitoring of Landfill Montana performed by the RegionalInspection of Environment and Waste until 2013 doesn't show any deviations of the norm as well as the set conditions in the issued Complex permit. The described below negative effects on the environment does not represent issues in Landfill Montana but are derived from the world practice and are a potential threat that could occur if installation is not managed properly.

Air, climate factors

Odor complaint is an issue that concerns the inhabitants of areas in close proximity to large regional landfills that are not maintained by the technological requirements: regular backfilling with soil; following a special transport traffic etc.

Landfills are a source of greenhouse gases (methane and carbon monoxide), which are formed by the process of decomposition of biodegradable waste. Gas could lift in the high layers of the atmosphere and cause greenhouse effect.

There are problems with the air quality in big cities in caused by the collection and transportation of municipal waste.

Water

Most common evironmental problems related to water as a result of bad waste management are:

- Pollution of surface and groundwater by leachate from landfills and dumpsites and waste water resulting from waste treatment processes ;
- Free and uncontrolled waste disposal, directly or through atmospheric water results in pollution of surface and groundwater ;

Soils

Environmental problems of soil as a result of unproper municipal waste management could be:

- loss of fertile soils due to the construction of landfills , waste collection and temporary storage of waste and the construction of facilities, transfer stations , etc.

• soil pollution by waste from illegal dumpsites and landfills, pollution of land, water and soil by leachate from landfills and waste water resulting from the treatment of waste.

Landscape

Negative aspects of the landfillcould be:

• disturbance , pollution and changing the landscape components by indiscriminate disposal and accumulation of waste as well as mixing (domestic , industrial, hazardous) waste resulting in the formation of chemical contamination

• negative visual impact of dumpsites and landfills. Unpleasant view of garbage, blown by the wind, burning and smoking fires, lack of fences and signs, access roads, lack of lighting on the sites etc.

Wildlife, flora, fauna

• destruction of individual plants and habitats as a result of soil erosion or activation of landslides near landfills and dumpsites.

• the creation and existence of illegal dumps not only leads to pollution of air, soil , vegetation , water and landscapes , and migration of contaminants in the food chain , and the destruction of individual plants and animals , harassing and chasing away the animals and birds, and occupying territories with their typical habitats , habitats of endangered and rare species , nesting sites and habitats of different species, thus reducing species diversity .

• change in environmental conditions and contamination of the environment on landfill sites is a prerequisite for the apearance of new plant and animal species that are adapted to the specific conditions.The new spices usually have higher tolerance to pollutants and are competition to the local plants and species. This activity is leading to a shift of species and sometimes to the disappearance of some of the local inhabitants..

Some of the problems of waste management could appear as a result of:

• outdated containers and waste collection plants.

• outdated specialized equipment – machines and vihacles for separate collection and transportation of waste(they are usually eighther

outdated or insufficient and needs to buy new ones – modern and more efficient).

• not provided all necessary facilities for pre- treatment of waste prior to disposal ;

• existing facilities and installations for waste disposal are inadequate to the requirements of the modern time, it is therefore necessary to build new ones;

• part of existing facilities and installations for the disposal of waste does not meet the legal requirements .

WASTE SEPARATION PLANT

The separation plant was built with funds from the State Budget /1.8 million euro/ and Entity of the Ministry of environment and waters, responsible for the management of the activities of protection of the environment /1.7 million euro/. Plant's construction was started in September 2010 and became operational with permission for usage on June 1, 2012.

The facility serves the regional landfill (with capacity of about 70,000 tons per year). Currently Regional Landfill - Montana serves 12 municipalities (Montana, Berkovitza, Georgi Damyanovo, Chiprovtzi, Varshetz, Boychinovtsi, Valchedram Yakimovo, Lom, Brusartsi, Medkovets and Krivodol) with their 201 308 citizens. The installation works with all MSW and there is being sorted and separated all recyclable waste, namely metal, plastic, glass and paper. This activity reduces the amount of waste landfilled in Regional Landfill - Montana (built with ISPA funds) and will increase the period of its operation.

With the construction of the plant a part of a bigger project have been completed - project of Municipality of Montana - "Separating installation for waste and composting of biowaste, Montana " totaling 4.6 million euro.

Separate watse collection in Montana is performed in accordance to a contract signed with a service company that is licensed to perform this activity in the area. On 80 sites in the city have been placed sets of three containers for different types of waste - paper, glass, metal / plastic. This waste is

processed by the organization, ie Municipality does not pay for the collection, transportation and processing of this waste. In this sense, if the majority of the waste is collected separately, this will reduce the garbage tax for citizens.

Bulgaria still has a problem with the processing of separately collected waste in terms of paper and certain plastics.

Regarding the separate waste collection a good practice could be delivered in the following paragraphs.

Different separate collection practices for household packaging waste

The first projects for waste separate collection started ten years ago, back in 2004. The initial objective of these projects was to test different collection systems, different types of containers and how the system works in different size and types of settlements.

Kerbside collection systems using individual containers/bins or plastic bags were not actually implemented because of the following reasons:

The major part of the population in the large towns lives in blocks of flats and it was difficult to allocate separate collection containers to individual flats or entrances;

The individual bins provided to family houses gave good results in terms of quantities and quality of waste collected but the implementation costs were very high;

The se implemented were taken the following key arguments prevailed:

It was obvious that the value of the separately collected materials will be several times higher than the one for the same material delivered via other collection channels (e.g. commercial waste, buy-back centres);

The quantities of packaging waste already collected and recycled in the country were higher than the recycling targets for the first years of implementation. It actually meant that the ROs didn't need the separate collection from households for the achievement of recycling targets and that it only increased the costs. It was expected that separate collection will be developed over 10 years period in parallel with the increase of recycling targets

The state authorities wanted to see fast results and insisted on the development of separate collection systems for household packaging;

The ROs started looking for a solution for organizing separate waste collection and sorting at lowest possible costs without giving priority to the quantities of materials to be additionally collected.

Because of this reason container bring systems with low container placement density were implemented by the different organizations.

The results from last years show that separate collection containers provide less than 10% of the collected material but the operation of the system requires significant costs (60 - 70% of the total costs). ROs are trying to reduce the collection costs for the container systems and rely mainly on buying materials collected from the commercial sector or scrap dealers for the achievement of recycling and recovery targets.

Despite the fact that all organizations based their systems on separate collection containers there is no uniform solution regarding the number of containers used and their types and volumes. The two leading recovery organizations have different views on what the optimal collection system is. Ecopack Bulgaria relies on a three-container system:

Blue container for paper and cardboard;

Yellow container for plastics, metals and composite packaging;

Green container for glass.parate collection with plastic bags didn't give the expected results.

The company uses both 1,1 m3 wheeled euro containers made of plastics and metals and Igloo type containers with volume 1,3 - 1,5 m3 metal made of fiber glass or HDPE. The experience of the organization is that Igloo type containers bring better results in terms of quality of collected material but the initial investments and their service is significantly more expensive.

The standard euro containers fit well to the existing municipal waste collection system and allow same collection vehicles to be used. Nevertheless, it's considered that this type of container is not suitable for the collection of glass.

The second largest RO Ecobulpack and Ecocolect promote the implementation of a two container system, where glass is collected separately in the 'green' container and all other packaging materials are placed together in one 'yellow' container.

It can be seen from the above examples that plastic euro containers with wheels are commonly used and preferred for the separate collection of packaging waste because of the low initial investment costs.

All installed separate collection containers are owned by the ROs. Different ROs have different approaches regarding the organization of collection services:

- Most of the ROs organize the lifting of containers based on contracts with municipal waste collection companies;
- EcoBulPack started their activities based on service contracts but gradually replaced them with own collection vehicles and staff.

The following major problems are observed:

- The density of the deployed separate container sets is very low and usually between 500 and 800 residents are served by one set;
- The separate collection containers are usually situated away from the bins for municipal waste and in general there is no common planning with the residual waste collection;
- In many cases containers are dirty, with broken lids or graffiti;
- In some settlements the container collection frequency is not sufficient and waste overflow is observed;
- The discarding of mixed municipal waste in separate collection containers is common;
- The major part of the valuable materials placed in containers are actually taken by scavengers;

■ Despite of the legal requirements, there are no penal¬ties imposed for placement of mixed waste in separate collection containers.

Due to the above reasons, the system is considered difficult to use by the residents and most of them do not see a real benefit to participate. The ROs also do not pay significant attention to the public awareness and communication.

Sorting and pre-treatment of packaging waste

The sorting of separately collected waste is organized by the ROs in almost all regional settlements. The facilities usually include a manual picking station and a baling press.

The different ROs have different policies regarding the sorting of separately collected waste:

EcoPack Bulgaria relies on contracts with sub-contractors. Usually, the existing sites of RWC companies are used. The duration of sorting contracts is usually 2 - 5 years. The services are paid per quantity of input material and minimum sorting efficiency10 is required. Ecopack remains the owner of the waste delivered for sorting and also of the sorted materials. In several cases Ecopack invested in equipment and then rented it to the operator of the respective sorting facility.

EcoBulPack relies completely on its own sorting facilities. For this purpose a specialized company EcoBulSort was registered, 100% owned by EcoBulPack. The organizationpresently operates 6 sorting facilities. The company also invested in a specialized glass treatment plant;

RePack owns and operates one sorting facility and in the rest of the settlements where the organization is involved in collection, sorting is contracted to other companies;

The other small ROs use sub-contractors for the sorting of waste

Considering the available infrastructure, the issue with waste sorting is solved in the biggest settlements in the country. The problems remain with the sorting of separately collected waste in the

10 The sorting efficiency is measured as minimum percentage of valuable materials per tonne of waste entering the facility.

small settlements where the distances to the nearest sorting facilities are high (40 - 80 km) or in case the respective sorting facility is owned/ contracted by a competitive RO it refuses to accept waste of other origin. Sorting in these cases is usually organized in a very primitive way by spreading the waste on the land at the site of the collection company and picking up the valuable materials by hand.

The situation will most probably improve with the construction of new regional sorting facilities for municipal waste.

Recyclable materials markets

Bulgaria has a relatively well developed recycling industry for all major waste commodities. The available capacities are sufficient for all packaging materials collected at present, with some minor exceptions (aluminium cans).

The following key characteristics of recyclable waste markets shall be underlined:

- Paper production in the country dropped significantly over the last years, following the closure of two paper mills with total capacity of 100,000 tonnes. The future development of the sector is uncertain and most probably export to Turkey will play a significant role in the future;
- Bulgaria is in a favourable situation because of the existence of large size glass factories in the country. The quality requirements imposed by the factories allow collection of mixed glass and sorting by colour is not economically justified. Delayed payments for the supplied glass, though, give reason for concern;
- There is significant growth of the plastic recycling capacities in the country. The market is largely influenced by plastic prices at international markets.

Therefore, it can be concluded that the markets for recyclable waste are not a limitation factor for the achievement of the recovery and recycling targets in the country.

Annex 2: Collection mechanisms for municipal waste tax in Bulgaria

COMPOSTING PLANT

Composting plant for organic waste (worth 1,153,163 euro) whose construction was provided in 2013 by then Montana municipality must develop existing schemes and methods for collection and composting of green and bio waste from all 12 municipalities in the region.

Line processing of organic waste into compost (standard method approved by CEN on June 4, 2000).

The line for processing of organic fraction of municipal solid waste "compost" is technological facility aiming to improve the soil structure. The Compost line is located in one part (with lenghth 18m) of the constructed and described in the previous chapter separation and composting plant.

So far there are two types ecoploymers that are environmental friendly and help for protection of the environment–degradable and biopolymers (biodegradable). There is already established scheme in Europe, fo EN 13432 analysis, which defines the ability of the polymer to degrade and defy to composting. The scheme describes methods for determining the desolving of polymers for some time in industrial composting systems. This standard was approved by CEN on 4 June 2000 and was published by the International Standards Organization (ISO).

Biopolymers are produced from renewable sources (biomass) based on protein derived from wheat crops , starch, vegetable oil , potatoes , sugar cane and raw materials from waste (from households, urban waste, dairy industry, paper mills, forestry etc.). Biodegradability is a process that describes the mineralization of organic structures under the action of cellular organisms (micro-organisms, enzymes, fungus, bacteria). These biopolymers converted into carbon dioxide, methane, water, biomass, and the final product is compost (fertilizer).

In the paragraph below is described the method and how the composting is done.

Preparation of a mixture of compost:

Green waste (grass, leaves, shrubs, trees, stems, furniture), food (by households in the kitchens of restaurants, cafeterias, fruits and vegetables markets) and the paper is discharged near the mixer (grinder). To the mixer is a separate area for mixing. On this site is "blended" the green waste, food and paper.

After preparing the necessary waste mixture it is placed in the "mixer". Here, the waste is shredded and mixed to achieve the required consistence for the production of compost. Later the mixture is covered on an inclined conveyor belt, which takes it in to a tunnel with a diameter of 3 m and a length of 15 m, where an aerobical reaction is carried out. The tunnel performes a slow rotation so that the mixture is slowly moving out through the exit hole. The tunnel is loaded once during commissioning of the instalation.

The full loading of the tunnel takes 5 days. For 4 ours every day the tunnel is charged with 15 tons of mixture and so at the end of the 5th day, the instlaltion begins to subtract 15 tons per day ready to use compost. Production capacity of the tunnel for eight hours is 15 tons.

During the 5 days' stay in the tunnel, the mixture was carried out in an aerobic fermentation, under the influence of bacteria. In this biochemical reaction temperature in the tunnel reaches 60-70°C, which temperature favors the development of these bacteria. This is why the tunnel has a thermal insulation.

Compost is poured in concrete tunnel box. From this cell is transferred to temporary storage. Compost is organic material, one of the most natural fertilizers and soil improvers, so after staying in the temporary storage except for use by residents who provide biodegradable waste for composting, compost will be used as a fertilizer and soil improvement in municipal parks and gardens, playgrounds, improve soil structure in local agricultural and forest property, reclamation of the regional landfill for soil capping on the construction site cell, to fertilize the fifth cell of the landfill, which is actually a rehabilitated old landfill and compost fertilizer will be used to fertilize the

other closed and reclaimed dumpsites in disturbed areas etc.

Technological dimension of the Separation and composting plant

Technological line for sorting municipal solid waste - line A.

Technological line for processing organic household waste compost - line B.

The supplier of waste must comply with the capacity (productivity) requirements of the individual elements making up the overall production line with its overall capacity.

Capacity of the waste sorting line is 45,600 tons /year.

Productivity of line B for composting is 8550 tons /year.

Line A

Warehouses for compressed finished products have the following capacity:

• Volume of the warehouse for line A: 30 m × 12 m × 6 m × 0.5 = 1080 m3;

• Size of compressed bales 1000/1000/720 mm;

• Volume of a bale of 0.72 m3;

• Maximum compressed bales that can accommodate storage of up to 3 bales on top of each other - 825 pc. (825 . x 0,72 m3 = 594 m3)

Line B

• Volume of the warehouse of Line B is 18 m × 6 m × 6 m × 0.5 = 324 m3;

• Production of compost 30 m3 per day;

• Store in warehouse 324/30 ≈ 10 days.

WATER TREATMENT PLANT (WASTEWATER TREATMENT WORKS)

In Water treatment plant - Montana (WWTP) wastewater treatment is performed by a mechanical stage and biological treatment with aerobic sludge stabilization. It is envisaged a construction of installation for the reduction of phosphorus content in treated wastewater in a building located on the site of the treatment plant. The installation is part of the project "Rehabilitation and completion of sewer and water mains of Montana."

The capacity of the facility has an average daily flow of 17,840 cubic meters of water and biological waste 5920 kg per day. Treatment plant treats municipal and industrial wastewater throughout Montana municipality. Nine collector of unclean water discharged into the

river Ogosta for years, now flow into a central collector which takes the wastewater in to a purifier. When it settles down water is purified using the latest technology and is being drained clean as tap water into the river.

The facility is designed to serve a town of 98 thousand citizens. Montana currently has about 50,000 inhabitants. The municipality owns, manages and operates this modern facility. Sludge from water passed through the treatment plant can be used for land reclamation, or land revitalization after a landfill is closed.

Removal of pollutants from wastewater of the urban sewerage and industrial waste water is performed by implementation of three main stages. The steps of water treatment are as follows:

Pretreatment - by mechanical treatment of the water(running it through grids) are removed the coarse pollutants - stones, branches of trees, textiles, drowned animals. Then, a special device keeps the sand and other particles with a density greater than that of water and light oils come to the surface;

Secondary treatment – settling down in a tank, wherein the dissolved organic contaminants are degraded by means of a colony of micro-organisms, which helps the reduction of nitrogen and phosphorus;

Tertiary treatment – treatment in the final settling tank, filtration or chemical treatment before entering into a source or use for irrigation. But the basic processes of nitrification and denitrification are each conducted in a separate aerobic zone. Nitrification is biphasic process of transformation of the ammonium salts and nitrates to nitrites, and denitrification is anaerobic oxidation by carbon- containing nitrate as by electron acceptors;

As a result of these processes a purified water stream enters the water supply, while the solid waste in the form of sludge is composted, in the absence of toxic ingredients.

Today in this ultra modern plant operating with only organic products for water purification, work 27 people, 15 of which are highly educated and experienced experts.

Short description of the process

Mechanical stage, including several coarse grids, pumping station for wastewater, several fine grids,

storage tank for rainwater, aerated grit and grease trap.

A stage for full biological treatment, includes a dispenser shaft / chamber, aeration tanks with anoxic and aerobic zones, secondary settling tanks, pumping station for recirculation of sludge (removal of excess sludge).

Stage for sludge treatment, includes pre- compaction by gravity sludge thickener, aerobic stabilization of sludge by thickening sludge storage tank, holding sludge dewatering, sludge pumping station for water, and pumps for the thickened and dewatered sludge.

Description of the stages

Technological scheme of WWTP-Montana includes the following stages of wastewater treatment :

Following the water stream - inlet chamber bypass; Economy - coarse grids (type: automatic, capacity of the line : 3,565 m3/h, the distance between the rods 30 mm, units : 2 pcs.); Inlet pumping station (type of pumps: submersible, number of pumps: 3 pcs. (1x1 , 750 m3/h + 2h915 m3/h); Economy finer grids (type: automatic, capacity of the line : 3,565 m3/h, the distance between the rods 6 mm, units : 2 pcs.) Rainwater collecting tank (volume : 1,065 m3); Aerated grit and grease trap (type : mixed longitudinal aerated sand - oilcatcher , number of tanks: 2 pcs. , number of scraping devices: 2 pcs., aeration : medium strong); Economy (biofilters for air) for the treatment of odors, Chamber for distribution of flow to the aeration tanks, aeration tanks (nitrification and denitrification - corridor type - "Carousel", total volume: 14,950 m3/h, number of compressors: 3+1) Secondary sedimentation (type : radial settlers thyroid rakes, number: 3 pcs.) Holder tank for UV- disinfection (capacity: 932 m3/h, modules: 1 Bank, 12 modules , 8 lamps for module -level disinfection : 1000 coliform bacteria per 100 ml); Pumping station for sewage sludge and compressor station pumps for activated sludge (pump type: dry, centrifugal pumps with frequency converter, Number of pumps: 3+1 pc., pump capacity : 840 m3/h), excess sludge pumps (pump type : dry, centrifugal pumps with frequency converter , Number of pumps: 1+1, pump capacity: 75 m3/h)

Following the stream of sludge pre - compaction (volume of I-st grade sludge: 855 m3); aerobic sludge stabilization (type of tank : rectangular, number: 1pc., volume: 4,150 m3); compaction (volume II-nd grade sludge: 270 m3); storage tank for sludge (Quantity: 1pc., volume: 240 m3); Economy dewatering sludge (type of dewatering equipment: centrifuges, number of machines: 2 pcs.); Field / depot for storage of dewatered sludge (storage volume (prior to shipment): 240 m3); Sludge pumping station (pump type: submersible, centrifugal pumps, Quantity: 1+1).

The above described process steps and facilities are supported and maintained by service water sistem, office building, workshop and laboratory.

Specific objectives achived with the construction and operation of the Water treatment plant:

- Helped Municipality of Montana to implement the provisions of the Directive on urban wastewater.

- Reduction of health risk for people living in the area served by the new WWTP.

- Prevention from pollution in the border area, including the Danube River and Black Sea.

- Reduction of the potential risk of groundwater contamination.

- Reduction of the potential risk of soil contamination.

- Improvement of environmental protection of rivers.

- Improvement of flora and fauna in the river area.

- Developent of efficient environmental infrastructure to facilitate economic activity.

- Improvement of the conditions for development of key sectors of the economy - tourism and agriculture.

- Improvement of the quantity and quality range of services provided to the citizens in the area.

- Created opportunities for new jobs - temporary and permanent and stimulated local and regional economic development.

INTRODUCTION TO ZERO WASTE

Zero Waste Core and Legislation

Zero waste is a philosophy that encourages the redesign of resource life cycles so that all products are reused. No trash is sent to landfills and incinerators. The process recommended is one similar to the way that resources are reused in nature. A working definition of zero waste, often cited by experts in the field originated from a working group of the Zero Waste International Alliance in 2004.

Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health. The term zero waste was first used publicly in the name of a company, Zero Waste Systems Inc, which was founded by PhD chemist Paul Palmer in the mid-1970s in Oakland, California. The mission of this system was to find new homes for most of the chemicals being excessed by the nascent electronics industry.[11]

In their "Citizen's guide to zero waste" Paul Connett and Bill Sheehan set a roadmap to the implementation of the Zero waste systemas follows:

Step 1. Choose a target year. When adopting a Zero Waste goal, it is important for communities to designate a year by which no waste will be delivered to the 'interim' landfill. Most communities have chosen a year some 15 or 20 years ahead. Doing this allows communities to approach an 'idealistic goal' in a realistic time frame. It allows the mind shift from managing waste to eliminating waste and managing resources time to develop.

Step 2. Involve the whole community. During this first step and all subsequent ones it is critical, in our view, that the whole process be overseen and designed by a group of committed people drawn from the community, including people in local government, businesses and private citizens. Without this cooperative effort neither strong laws nor good intentions will go very far.

Step 3. Impose a local ban landfill items. These should include all organic material (that is, compostables, or things that can be composted and

[11] Available at http://en.wikipedia.org/wiki/Zero_waste

safely returned to the Earth), any material that can be currently recycled, and any toxic material that can be dropped off at collection centers or retailers.

Step 4. Place a surcharge on material that is landfilled. This is important for two reasons: a) to provide a disincentive for the generation of this fraction and b) to provide finance for other critical parts of the Zero Waste program.

Step 5. Give recycling incentives . It isimportant to stimulate development of businesses, small or large, that can collect, process and reuse, repair or recycle materials in the community discard stream. Ideally, such businesses will provide jobs for the local community.

Step 6. Organize waste audits. It is critical to provide financial help or professional advice to businesses and institutions to embark on waste audits. Such audits identify where waste is being generated in both industrial processes and office operations, so that it can then be reduced or eliminated. The good news here is that almost invariably when such steps are taken they result in saving money.

Step 7. Stimulate take-back programs. Provide incentives to local retailers and manufacturers to take back their products and packaging after use. Such incentives can range from deposits on such things as beverage and food containers; batteries and automobile tires, to the free publicity that surrounds a community sponsored 'Take It Back' program for hazardous materials like paint, fluorescent bulbs and electronic goods.

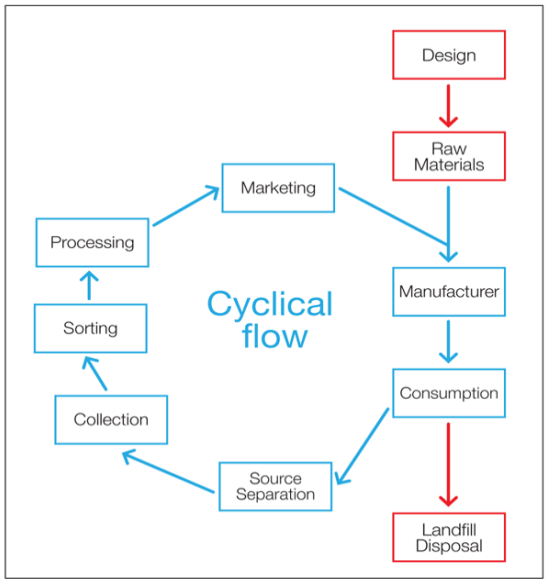
Step 8. Convert old landfill into industrial or ecopark. Set in motion plans to convert the old landfill site into a completely different operation. As conceived and described by Dan Knapp and others, this site will look more like an industrial park. The local government can own and maintain the infrastructure but franchise out different parts of the site to local businesses involved with collecting, processing, recycling, reusing, repairing and remanufacturing source separated materials and objects in the community discard stream.

It is clear that many these policy changes impact community economics. Instead of paying waste companies to get rid of discards, we are suggesting that tax payers' money is better spent recovering resources. Thus the role of local government changes when discarded materials are treated as community enhancing assets rather than as liabilities (waste). Instead of managing liabilities, local government policies instead promote entrepreneurial innovation by maximizing delivery of clean resource streams to local enterprises.

As materials once considered waste gain value,

Zero Waste principles will help local economies become more self-sufficient and create opportunities for increased civic participation and sustainable employment.

To the extent that communities and citizens can pressure industry to reduce the extraction and processing of virgin resources, they not only reduce the demands on local services but they also contribute to solving larger global problems.



PRACTICAL STEPS

The importance of passing legislation in support of a Zero Waste plan is that it puts a large conceptual umbrella over a whole series of practical steps, many of which are familiar to people who have already been involved in discard management. Paul Connett and Bill Sheehan consider those practical steps.

1 There are no magic machines. Frequently, after giving a blistering attack on the idea of burning trash or dumping it into a mega landfill, we are asked, "Well, if we can't burn it and we can't bury it, what can we do with it?" Such questioners are usually seeking an alternative technology, because they have become accustomed to salesmen that offer them 'turnkey' solutions. "Give us this much money and we will solve your trash problem with our state-of-the-art technology," is what they are used to hearing. At the outset, we have to stress that there are no magic machines that can solve the trash problem. Trash is a not a high tech problem. Technology has a role to play but only when judiciously applied to carefully selected components of the discard stream. Zero Waste is not a technology; it is a strategy and that strategy begins with better industrial design and ends with source separation of discarded products.

2 Trash is made by mixing. From the citizens' perspective, trash is made by the ten things at the end of our hands, and if we want a solution that we and the planet can live with, it is those ten things that have to be co-opted from the very beginning say Paul Connett and Bill Sheehan. In short, trash is made by mixing, and it is prevented by keeping discards separated at source.

3 Source separation. Avoiding expensive and potentially dangerous incinerators and huge regional landfills

requires keeping our discarded items in several well defined categories (both mentally and physically). These are:

- avoidables
- reusables
- compostables
- recyclables
- toxic materials, and
- residuals (re-designables)

These separated materials will be discussed under the following headings:

4 Collection systems.

- Avoidables and waste reduction strategies.

- Reusables and reuse & repair centers.

- Compostables and composting facilities.

- Recyclables and recycling economics.

- Resource recovery parks and ecoparks.

- Toxics, household hazardous waste collection, and take-back programs.

- Residuals screening facilities.

- Better industrial design.

In our view the most successful public collection scheme for the urban setting is a three container curbside system. This has been used in pilot projects in San Francisco and throughout Nova Scotia. There are many variations on such scenarios. A key point to remember when a community is embarking on a source separation system is to organize separation around the existing collection system. If the community is used to curbside collection of trash, then it is best to organize the collection of recyclables and compostables at curbside. If, on the other hand, the community is used to taking discards to the landfill (this is often the case in small rural communities) or a transfer station (sometimes the case in suburbia), then it is best to organize collection at these facilities.

As far as the number of containers used at curbside is concerned, if communities opt for only two, then it is critical to put the emphasis on collecting source-separated organic discards. This is critical for two reasons: a) it is the organic material that causes so many of the problems at landfills and b) it is very difficult, if not impossible, to pick out clean compostables from the residual fraction. Unfortunately, most communities that use a blue box system put the emphasis on collecting recyclables and thus dramatically reduce the amount of material that they can divert from landfill and eliminate the chance of getting good clean organic material for composting.

With these problems in mind, Guelph, Ontario, departed from the blue box approach (containers and paper in one bin and everything else in another) and developed a two-container system that put the emphasis on getting clean organics. They use a green bag for source separated organics, and the residuals and recyclables go into a blue bag. This is called a wet/dry system. The green and blue bags go into two different sections of light weight trucks and are delivered to a facility that has two sections: a separation line for recyclables and a screening line for compostables. The recyclables are further processed (crushed or baled) to meet market specifications and the compostables are put through a composting operation enclosed in a large building. This two way division is very simple for the citizen and they have a 98% participation rate. Within a few years the city was achieving a 58% diversion rate from landfill. The city also operates a household hazardous collection depot and a separate collection for bulky yard trimmings.12

According to Paul Connett and Bill Sheehan, if communities are able to increase the number of containers to four, then its best to have two containers for the recyclables, allowing the separate collection of paper products. This minimizes the contamination of paper with glass shards from the other recyclable fraction (bottles, cans, etc).

Garbage lottery. Some communities have come up with novel ideas to encourage people to separate their discards carefully. Rockford, Illinois, increased its recycling rate fourfold by introducing a garbage lottery. Each week one household is selected at random to have its garbage picked up and examined. If no designated recyclables are found in the trash, they win $1,000! If that is not the case, a householder the following week stands to win $2,000, and so on. The participation rate in this community increased by 400% in a few months. This system is illustrated on two videotapes produced by Videoactive Productions entitled Joe Garbario and the Marin Resource Recovery Plant and Millie Zantow: Recycling Pioneer (see Resources section).

5 Avoidables and waste reduction strategies.

Waste audits. When local manufacturers and businesses are required to find out at what points in their processes that they generate waste, they typically find many places where they can make less waste and save money in the process.

Volume-based trash charging systems for households and institutions. Simply put, the more waste you generate, the more you have pay. There are a number of different ways of applying this kind of system. The city of Seattle

has a monthly garbage fee that is based upon the size of container used for the residual fraction of the discard stream. Households that opt for a large container for their residuals pay a larger monthly fee than household that opts for a small one. Other communities require a pre-paid coupon to be used on every bag of residuals put out at the curb.

These are often referred to as 'Pay-by-bag' or 'Pay- as-You Throw' systems. In some communities in the Netherlands there is an electronic microchip in the residuals container and when the can is picked up it is weighed and the household is automatically charged according to how much residual material they have put out.

6 Reusables and reuse & repair centers.

Paul Connett and Bill Sheehan say that many householders and communities around the world have developed both formal and informal means of getting reusable objects moving from one owner to the next. These include garage sales, yard sales, jumble sales, flea markets, and thrift shops run by charities like the Salvation Army and Goodwill Industries. Some of these are run for profit and others as a community service.

While reusables represent a small fraction of the discard stream, it is the most valuable one. Some reuse and repair programs not only recover materials but they also recover people (through job training etc). A municipal official given the responsibility of diverting material from the local landfill needs to investigate how comprehensive the existing services are in his or her community. Such an official should support them in any way possible, including finding ways to bring different reuse and repair functions together in a Community Reuse and Repair Center (the last thing you want to happen is to introduce a facility that puts existing operations out of business).

The important thing about the reuse and repair center is that it can be the springboard for many other community activities. It can be used for education, especially youngsters, who can be taught how to repair things at an early age. It can provide a venue for senior citizens, many of whom have important repair skills that they are eager to share with the community. It can act as an incubator for small repair businesses by providing affordable overhead. It can be used to teach people how to compost in their backyards and even to build their own composting units out of materials collected at the center. It can also be used to collect potentially hazardous materials like paints, varnishes and cleaners. Paint can either be used in renovation of items for resale or be made available to the public in a 'paint exchange.' The center may also become a meeting place for the community.

7 Compostables and composting facilities.

Composting can be run on almost any scale say Paul Connett and Bill Sheehan. It can be done in the backyard, in the basement with worm bins (vermiculture), in the community or in a centralized facility. However, a key principle is to maintain tight control over what materials enter the composting operation, because the ability to use the material can easily be compromised if unsuitable materials are composted.

In our view, after source separation, composting is the most important step in the community part of the Zero Waste strategy, because it is the organic material in landfills that cause so many problems. When organic material rots underground it generates methane, which contributes to global warming (molecule for molecule methane traps over 20 times more heat than carbon dioxide), (2) organic acids, which are capable of dissolving the metals in the waste load and getting them into surface and ground water, and (3) awful odors, which make landfills so unpopular with the public. Thus a key objective of composting is to keep organic materials out of the landfill.

Backyard composting is the single most cost effective treatment of a large fraction of the domestic discard stream. Seattle has subsidized backyard composting kits and a Master Composters' program, in which citizens are taught all the ins and outs of composting and are then make themselves available to help other citizens troubleshoot their backyard composting problems.

Mulching lawnmowers. A simple and cost effective way of reducing one type of organic waste is to encourage both householders and institutions to use mulching lawnmowers. This one step saved the New York City's Parks Department over $1 million in avoided disposal costs.

Community gardens. Many citizens who might not be interested in community composting may become excited about a community garden. The latter would be ideally supported with a community composting operation. It makes economic sense for municipalities to support such operations, because every pound of organic material composted means one pound of waste that does not have to be picked up, transported and disposed. It is also a very positive way of integrating discard management with the local community. Such gardens have become havens of delight in New York City and other large cities.

According to Paul Connett and Bill Sheehan in the United States there are over 3,000 yard trimmings composting operations. When handling leaves and brush, the technology does not need to be very sophisticated. Composting yard trimmings usually involves a static

pile or windrow system. Such windrows are long rows that have a triangular cross section. They need to be turned regularly to make sure that they get a plentiful supply of air and thus maintain aerobic conditions. They can be turned in one long sweep using mobile turning devices.

Around the world, many facilities are composting special organic materials, such as food scraps, agricultural waste, fishery waste, sewage sludge and mixtures of these products. To serve these ends, a variety of in-vessel and indoor systems are designed to speed up the composting process and minimize odors. Such systems are either aerobic (plentiful supply of air) or anaerobic (starved of air). The latter are used to generate methane to be used as a fuel or chemical feedstock. Many of these systems are described in articles that appear in the bible for composting: the monthly journal, BioCycle.15 This journal is an essential resource for any official who wants to include an aggressive composting component in a Zero Waste program.

Vermiculture is the use of worms to degrade organic material. These remarkable creatures provide yeoman service for those prepared to put them to work. The place where vermiculture has received its largest municipal support is in the area around Bombay, India. There they have a variety of vermiculture sites located in backyards, hospital grounds and near local food markets.

8 Recyclables and recycling economics.

According to professional recyclers, the three golden rules to secure markets for recyclables are 'quantity, quality and regularity.' The industries that will use these materials must be confident that they will get a regular supply of material free from contaminants that can ruin their process, e.g. ceramics in glass, plastics in paper, PVC plastic comingled with polyethylene or PET. Source separation schemes have helped to meet some of these demands. The materials recovery facility with human picking lines and along with some mechanical equipment, which can separate steel (magnets), aluminum cans (eddy currents) and plastic cans, helps to complete the process. Hundreds of such facilities are operating around the world.

The enemy of recycling is cheap landfills. Those in favor of recycling need to argue that cheap landfilling is artificially cheap because the long term costs of future damage to the environment, both locally (toxic emissions to air and ground water) and globally (waste of finite resources), are being ignored. The web page of the GrassRoots Recycling Network provides more details of the artificial economics of landfilling.

Shortage of markets for recyclables is often offered as a reason to limit recycling. However, the markets for

certain recyclables are an highly cyclic phenomenon, and certainly should not be used as an argument for building a trash incinerator or mega landfill, which represent a long term (at least a 20-years for an incinerator) capital investment. Communities that desire to maximize the price they get for separated recyclables would be advised to secure plenty of space for above ground storage while waiting for the best price for these commodities. For materials that currently have little secondary value, like certain plastics and composite materials, another possibility is selective burial in landfill cells. The location of these burial sites for separated and non-toxic materials should be carefully recorded so that future generations can mine this material safely and efficiently. Again, the principle is simple and sound: rather than bury (and store) materials in a totally uncontrollable fashion in raw mixed waste landfills, it makes more sense to store separated materials in a controlled fashion so that they can be reclaimed in the future. However, it shouldn't be forgotten when these materials are buried that it lets industry of the hook, a case of 'out of sight, out of mind.'

9 Resource recovery parks and ecoparks.

Resource Recovery Parks and Ecoparks as the community replacement facilities for landfills and incinerators could be developed. These facilities locate reuse, recycling and composting businesses close together and can be the core of a comprehensive strategy for local resource management. Local collection entrepreneurs and the public can deposit all recoverable materials at one processing facility, get paid for some of them and buy other items at bargain prices. Some designs place the recovery park together with a waste facility or transfer station, arranged so that traffic passes recovery businesses before coming to the waste facility. When combined with incentives for recycling, disincentives for wasting, and a commitment to gradually phase out the waste facility, such an arrangement can be the centerpiece of a Zero Waste community.

Resource recovery parks can be privately financed, or local government can create an authority whose role is to secure the land, build the core facility and lease space to private entrepreneurs, as is frequently done for airports. When located close to appropriate industries, resource recovery parks can provide feedstocks for Eco-industrial parks, where the byproducts of one industry become inputs for the next.

Serial resource recovery systems, are a variation of resource recovery parks where a critical mass of resource conservation businesses are located in a neighborhood, but not necessarily on the same property. Repair shops and secondhand shops are good examples of existing businesses that need only to

bring their services into greater synergy and prominence in a Zero Waste system.

10 Residuals screening facilities. After source separation has kicked in and materials like reusables, recyclables, compostables and hazardous materials have been sent to different facilities for processing, there will still be a fraction left over: the residuals. This fraction consists largely of the items that are deemed to be currently non-reusable, non-recyclable or non-compostable. To this we have to add materials that individuals or institutions have not bothered to put into the correct container.

Ultimately, in the Zero Waste strategy we have to develop creative and forceful ways of telling manufacturers that if the community cannot reuse, repair, recycle or compost these objects or this material, they should not be making them.

INDUSTRIAL RESPONSIBILITY

According to Paul Connett and Bill Sheehan two major reasons we have become a toxic, throwaway society are that (1) taxpayers subsidize the extraction of virgin materials that compete with recovered (or secondary) materials, and (2) taxpayers assume the burden of disposing whatever products and packaging industry chooses to market. Hitherto, however, taxpayers and local government have had little say in the production of things that become waste. The Zero Waste strategy requires that this connection be made.

Producer Take Back

The principle of Producer Take Back, or Extended Producer Responsibility (EPR) for waste, holds manufacturers, and specifically brand owners, responsible for managing their products and packaging at the end of their useful life. EPR policies in Europe have led to company recycling rates close to 90% and high recycled content, as well as an emphasis on reusable and returnable packaging.

Environmentally Preferable Purchasing

Any organization, business or individual can promote Zero Waste by altering buying habits. Many government agencies and companies have already adopted preferences for recycled content products. Many are now

moving to broader, environmentally preferable purchasing programs seeking to reduce resource use, cut air and water emissions, or achieve other environmental goals. Purchasing practices can target:

- materials purchased for manufacturing products and packaging;
- products purchased for use within the organization;
- packaging for products and materials delivered to the organization; or
- products specified through contractors, such as direct mailers, billing agents, printers, copier companies, office products retailers, architecture and construction companies.

Product and Packaging Design

Many companies have been innovative in redesigning products, whether to reduce costs or to meet government incentives or requirements say Paul Connett and Bill Sheehan. Some have redesigned packaging to minimize materials. Others have redesigned products for ease of reuse and recycling. Still more have transformed the concept of their products to eliminate waste. Extended Producer Responsibility encourages manufacturers to design products for easy disassembly, to minimize the cost of manufacturer responsibility for recycling.

Comprehensive Zero Waste Business Approaches

Businesses pursue Zero Waste, in addition to redesigning products, by:

- Re-evaluating products and services to create the greatest consumer and environmental value, within economic feasibility;
- Minimizing excess materials and maximizing recycled content in products and packaging;
- Finding productive uses for, reuse, recycling or composting over 90% of their solid waste;
- Reducing procurement needs, then specifying products that meet Zero Waste criteria;
- Establishing easily accessible repair systems, as well as recovery processes for packaging and products.

FUTURE POSSIBLE TRENDS

According to Tamas Kallay from regional Environmental Center considering the current level of material and organic recycling of MSW in Bulgaria, exceptional efforts will be required for fulfilling the 50 % recycling target by 2020. A certain proportion of

the recycled packaging waste from MSW sources could be reported as recycled MSW.

The landfill tax, introduced in 2011, is envisaged to gradually increase from the entry level of 1.5 EUR/t to 17.9 EUR/t by end of 2014.

The recycling sector is rapidly expanding in Bulgaria. The European funds are planned to be complemented by state and municipal budget as well as from loan funding from the World Bank, EBRD, and EIB. Funds for home composting will be provided by the Environmental Protection Fund.

The Bulgarian Ministry of Environment and Water has adopted a National Strategic Plan for diversion of biodegradable waste going to landfill during the period of 2010-2020, to facilitate a gradual reduction of the amount of municipal biodegradable waste going to landfill. In addition, the development of the entire legal framework on bio-waste management is planned under an international project in cooperation with Austria.

It is likely that some recent initiatives taken after 2010 by the Bulgarian government (the Waste Management Act, adopted in July 2012; the National Waste Management Programme for the period 2013 and now 2020; the National Strategic Plan for diversion of the biodegradable waste going to landfills 2020, and Decree no 207/16.09.2010 on landfill tax, adopted in January 2011) will contribute to an improvement in the recycling rate in the country. However, it must be stressed that Bulgaria will need to make an exceptional effort in order to fulfil the 50 % target of the Waste Framework Directive by 2020.

CONCLUSIONS

Improving waste management is often associated with investment projects, such as regional landfills and wastewater treatment plants. However , the success of individual project usually requires improving the overall sector. A very important aspect is the understanding and support of the population (eg, to pay fees for the separation of recyclable waste, or simply not be released indiscriminately). Framework conditions for reimbursement should be improved, as the effectiveness of the collection of the fee is very low.

In the most common services for waste management are primarily provided by public companies. Effectiveness of service delivery in many cases is low, tracking its effectiveness is rarely done. The participation of private providers in the service waste management can benefit the system as a whole.

The introduction of national standards for waste is crucial for achieving compliance with applicable regulations. Both enforcement capacity and willingness to impose sanctions and fines need to be improved. At the same time,

municipalities take steps to improve the management of landfills should take advantage of incentive programs .

Although most of the waste in the region of the scope of the project is still disposed of illegal dumps, there are almost no measures to reduce the negative impact of many of these landfills on human health and the environment. Even without a very large investment situation regarding these dumps can be significantly improved by improving existing practices.

Citizen participation is critical to the successful planning and implementation of policies. Citizens need to be informed and to participate actively in the planning process to support the implementation of such plans .

Summary of recommendations to improve the management of landfills

• Develop (and review) national regulations, plans and strategies based on realistic assumptions for reimbursement.

• Focus on sectoral reforms, not the performance of individual investment projects.

• Law enforcement, incentives and mechanisms for support.

• Improve conditions for participation of private sector. (green procurement)

• Develop and implement plans to improve the management of existing landfills / dumps in the process of transformation.

• Good communication with citizens, building a " supportive " community.

Improve institutional arrangements (networking)

Build strong enforcement capacities. Compliance with the prevailing environmental legislation is usually best enforced through legally independent bodies that may act on their own initiative, and take appropriate enforcement actions through fees and other sanctions, including prosecution. Enforcement aims to avoid potentially high fines linked to EU infringement procedures for non-compliance; but in addition, effective enforcement is essential to establish incentives for authorities and their contracted operators to plan, implement, and maintain an integrated solid waste management system. Enforcement systems also provide a public mechanism to respond to user complaints, and increase acceptance for final disposal and other waste treatment solutions over the longer term.

Increase local ownership. Ambitious national waste management plans have yet to be translated into regional and local plans. Local authorities, the main drivers for implementation, have not yet assumed sufficient ownership to embark on ambitious plans that include significant infrastructure investments, plus landfill siting and tariff increases

that are often unpopular among the local population. Building municipal-level momentum will require additional incentives for good performers, increasing sanctions for non-compliance and worse performers, and improved public communication and outreach campaigns to engage the local population.

Allocate more time and resources for landfill siting procedures. Good practice suggests the importance of consultative landfill siting grounded in solid technical assessments in an iterative process that incorporates public participation at each stage. Technical studies should be sequenced and assess landfill siting options in conjunction with robust environmental impact assessments (EIAs), strong public involvement, and alternative analysis of short-listed sites. Ultimately, the site-specific EIA should be linked with the environmental permitting process in a transparent manner with complete public involvement. This can involve higher up-front costs and time, but it ensures that the process keeps moving forward, without surprise reversals.

Operationalize national waste management plans

Increase central-level implementation capacity. Dramatic improvements required by EU targets need a strong top-down push through adequate program management, planning procedures, and incentive mechanisms, but the central level lacks capacity to operationalize national strategies. Central ministries require enough staff to operate effectively, with realistic plans, monitorable targets, and intermediate deadlines. However, building central-level capacity does not mean a return to old-style central planning. For example, in Bulgaria, during the first phase of implementing the national waste management plan, fund absorption was slow, so during the second phase, Government opted to allocate funds for regional sanitary landfills through decisions at the national level and the Ministry of Environment even participated in landfill site selection. While this may assist municipalities during the preparation phase, lack of local ownership will likely delay implementation and may cause future issues with the local population, whose support will be needed when landfills begin to accept larger waste volumes from other regions.

Strengthen inter-municipal entities for regional waste management. Integrated solid waste management depends on effective regional-level implementation and coordination. International experience demonstrates that strong inter-municipal entities are crucial for regional planning and service administration. They require a solid institutional, technical, and financial operational base, and often operate through a regional public company that has sufficient autonomy and resources, supervised by the

founding municipalities. Assistance is needed to establish strong, negotiated intermunicipal agreements as the 'institutional backbone' of regional integrated solid waste management systems. These agreements need to specify responsibilities, distribute risks, and share benefits among signing parties.

Provide support for project preparation. Lack of financial, technical, and organizational assistance for project preparation impedes using available investment funding and implementing existing policy. Grant and technical assistance programs should emphasize this up-front bottleneck. Local and inter-municipal level administrative units are expected to make integrated solid waste management systems functional. These units apply for funds based on the project proposals they develop and submit for approval to the funding authority administrator, however, they lack capacity and resources to submit project proposals, commission feasibility studies and technical designs, prepare bidding documents, and contract for goods, works, and services

Progress towards medium-term economic and financial sustainability

Increase the share and improve the conditions of private sector participation. Participation of private providers in waste management services can benefit the system as a whole. Public budgets are spared necessary investments in SWM systems, private enterprises can bring innovations and good management expertise into play, they decrease the possibility of patronage politics, and they make the provider directly accountable to the clients—especially in situations in which the government offers no subsidies for service provision. Well written contracts with adequate risk apportionment that are tendered through transparent mechanisms, can also greatly contribute to improving the cost-efficiency of the system as a whole.

Where possible, link service level improvements to tariffs increase. Governments often opt for low tariffs to ensure access to affordable services for low income groups. However, insufficient tariffs do not cover recurring costs and make waste management less attractive to private operators, or can reduce accountability to clients. If fees remain low for short-term political gain, service provider dependent on government grants to cover the financing gap, or cut back on service quality. At the same time, tariff increases are more difficult to justify later without parallel improvements in service quality. More recycling can bring additional revenues for private operators, but despite a vibrant recycling sector in all four countries, improving recycling requires stronger public education and outreach.

Define clear affordability limits but improve access to services. In many countries, low income groups bear a

disproportionate share of inefficient services, and often must pay higher prices than more affluent households. Households with low income, for example, in rural areas, rarely benefit from economies of scale and network externalities, and often are taken advantage of by individual providers, especially by area monopolies. As a result, low income groups tend to spend a higher share of their budget on lower quality services. Central or regional governments can help poorer jurisdictions by bringing them together to negotiate as a group with individual providers.

REFERENCES

UN-Habitat. 2010. Solid Waste Management in the World's Cities. (Available at http://www.wsscc.org/sites/default/files/publications/unhabitat-solidwaste-urbanwatersanitation_2010.pdf Accessed on 10.08.2013)

OECD. 2008. OECD Environmental Data - Waste. *OECD*

ISWA. 2009. Waste and Climate Change. White Paper. International Solid Waste Association. Vienna, Austria. December 2009. (Available at http://www.iswa.org/nc/en/110/news_detail/article/iswa-white-paper-on-waste-and-climate-change-released Accessed on 03.07.2013)

EPA. 2006a. "Waste." Global Mitigation of Non-CO2 Greenhouse Gases. U.S. Environmental Protection Agency. Washington, DC. EPA 430-R-06-005. June 2006. (Available at http://www.epa.gov/osw/nonhaz/municipal/pubs/msw07-rpt.pdf Accessed on 03.07.2013)

EPA. 2006b. Solid waste management and greenhouse gases - A life-cycle assessment of emission and sinks. 3rd Edition. U.S. Environmental Protection Agency. Washington, DC. September 2006. (Available at http://epa.gov/climatechange/wycd/waste/downloads/execsum.pdf Accessed on 01.03.2013)

Paul Connett and Bill Sheehan .2001.Citizens's guide to Zero waste.

European Environment Agency. 2008. Municipal waste generation per capita. European data set. Available at: http://www.eea.europa.eu/data-and-maps/indicators/municipal-waste-generation Accessed on 09.07.2013).

Hristovski, K. L. Olson, N. Hild, D. Peterson, S. Burge. 2007. "The municipal solid waste system and solid waste characterization at the municipality of Veles, Macedonia." Waste Management 27:1680-1689.

The World Bank March 2012, No. 15 D. Hoornweg and P. Bhada-Tata, "What a Waste" - A Global Review of Solid Waste Management

Hill, J., Bégin, A-E. and Shaw, B. (2002) Creative policy packages for waste: lessons for the UK. Green Alliance, London.
(Available at http://www.green-alliance.org.uk/grea_p.aspx?id=380 *Accessed on 01.07..2013*

BIPRO, 2012: Annex 7 Background information (country factsheets) PDF. Bipro (2012). Support to Member States in improving waste management based on assessment of Member States' performance-Annex 7 (Draft), report made by Bipro on behalf of the European Commission under contract ENV.C.2/SER/2011/0034.

Kallay T. (2013) Municipal waste management in Bulgaria, European environment agency

Kolev A. (2007)Municipal solid waste management in Bulgaria froma systems perspective, Royal institute of technology

Bulgaria, 2012: The Bulgarian answer of 12 June 2012 to 'the Eionet review of assumptions in the EEA and ETC/SCP model on municipal waste' submitted to

member countries on 27th April 2012.
Bulgarian National Waste Management Programme 2003-2007 (NWMP 2003-2007), 2002.
http://www2.moew.government.bg/recent doc/waste/NWMP 2003-2007EN fin.doc
Bulgarian National Waste Management Programme 2009-2013 (NWMP 2009-2013), 2009
http://www3.moew.government.bg/files/file/Waste/Legislation/Zakoni/ZUO.pdf
Commission 2012: 'Member States reporting to the Commission according to the Landfill Directive'. Data received from Commission.
EC, 2011: Commission Decision of 18 November 2011 establishing rules and calculation methods for verifying compliance with the targets set in Article 11(2) of Directive 2008/98/EC of the European Parliament and the Council.
EC, 2012: Member States' reporting to the Commission according to Council Directive 1999/31 of 26 April 1999 Landfill Directive and Commission Decision 2000/738/EC concerning a questionnaire for Member States reports on the implementation of Directive 1999/31/EC on the landfill of waste. . Email from the Commission to the EEA on 16 February, 2012.
EEA, 2010: 'State of the Environment 2010 - Material resources and waste" http://www.eea.europa.eu/soer/europe/material-resources-and-waste
ENDS, 2011: 'ENDS Europe 17 May 2011'.
Ernst & Young, 2011. 'Key issues in municipal waste management in EU-11 countries' http://www.ey.com/Publication/vwLUAssets/Key issues in municipal waste management in EU- 11 countries/$FILE/Raport eng.pdf
ETC/SCP, 2011: Bakas, I., Sieck, M., Hermann, T., Andersen, F. M., Larsen, H. and Reichel, A. (2011). 'Projections of Municipal Waste Management and Greenhouse Gases'. ETC/SCP working paper 4/2011. Copenhagen, Denmark, 89 pp. http://scp.eionet.europa.eu/publications/2011WP4
European Commission (EC). 2012. Use of economic instruments and waste management performances. The final report from 15 February 2012. http://ec.europa.eu/environment/waste/pdf/final report 10042012.pdf
Eurostat, 2012: 'Waste database municipal waste'
http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/database - Accessed May 2012
ETC/SCP, 2012: Christian Fischer, Mathias Lehner and David Lindsay McKinnon 'Overview of the use of landfill taxes in Europe'. ETC/SCP Working paper 1, 2012. http://scp.eionet.europa.eu/publications/WP2012 1
Executive Environmental Agency (ExEA), Bulgaria, 2012. Emails from Rositsa Karamfilova, Executive Environmental Agency on 1 and 10 August 2012.
NSI, 2012: Bulgarian National Statistical Institute data, 2012: 'Generated packaging waste', 'Recycled packaging waste'. http: //www .nsi.bg/otrasalen.php?otr=38
REC, 2001. Waste management policies in Central and Eastern European countries: Current policies and trends. October, 2001.
http://archive.rec.org/REC/Programs/SofiaInitiatives/SI waste management.pdf
Executive Environmental Agency (ExEA), Bulgaria, 2012. Email from Camellia Dikova, Executive Environmental Agency on 15 October 2012

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QUESTIONARY

Part 1. Municipal budget revenues and expenditures for waste management

1.1. Income from fee-waste divided by user groups. Please fill in the following table according to the information of your municipality

	2010	2011	2012	2013
Total income from waste taxes (lev):				
Households				
Entities				

1.2. Costs of waste management. Please fill in the following table according to the information of your municipality

	2010	2011	2012	2013
Total cest of waste management lev.)				
Purchase of waste containers				
Waste collection and disposal				
Research, design, construction, maintenance, operation, closure and monitoring of landfills				
Sanitation and remediation of old waste				
Seasonal cleaning of streets, squares, alleys, parks and other areas of the settlements for public use				

Part 2. Administrative structure for waste management

2.1. Please fill in the following table according to the information of your municipality
(Note: This table does not contain information about staff engaged in control and management functios.. Information concerning waste-reltaed control units comes next in Part 3 of the questionnaire)

Name of the administrative structure responsible for management policy	Total number of employees responsible for waste management only	Total number of employees responsible for waste management s well as other polices

2.2. Please indicate, in the last 5 years, how many courses on the subject of waste management employees from Your municipality have run through (according to latest waste management demands)

……

Part 3 . Control under the Waste Management

3.1. Please fill in the following table according to the information of your municipality

	2010	2011	2012	2013
Number of supervisors only in the waste management field				
Number of employees exercising control over waste management and responsible over the implementation of other law requirements and municipal regulations				
Number of sites within the municipality that are subject of control by Waste Management Law				

	2010	2011	2012	2013
Total fines and penalties for non-compliance imposed by the municipal authorities				
Incuding:				
Individuals				
Entities				

3.2. <u>Please answer the questions by circling the answers, according to the situation in your municipality :</u>

3.2.1. What is the control and structural organization of waste management in your municipality according to administrational rules

1. Executed by specialists in waste matter department

2. Executed by specialists responsible for environmental issues and waste

3. Executed by employees in the department responsible for environmental issues, waste and other municipal policies

4. Executed by the municipality inspectorate in which rules of operation are included as well as control requirements for waste management.

3.2.2. Is detailed information published on the website of the municipality anout the results of control exercised by the municipality in waste management?

1. Yes

2. No

3.2.3. If answer of questin 3.2.2. is YES,how often is it published?

1. Annually

2. Every six months

3. Monthly

4. Sometimes, on occasion

5. Else, please fill in …….

3.2.4. Which are the most important factors for improving waste management control in your community?

1. Increasing the number of employees responsible for waste control at least with..... /number

2. Providing way of transportaton for better control management

3. Providing relevant training with respect to the requirements of waste management control activities law

4. Providing trainings according to the requirements for establishing statement of findings and penalty protocols

3.2.5. Has your municipality established a register of sites which are to be inspected by the municipality under the Law of waste management and municipal regulations for waste management?

1. Yes
2. No

3.2.6. Has your municipality general requirements for maintaining official records, which shall contain prescriptions for offenders and deadlines as well as a record for fulfilled prescriptions?

1. Yes
2. No

3.2.7. Does your municipality make an annual plan to implement control activities in waste management?

1. Yes
2. No

3.2.8. Does your municipality support a "green line" or other means by which people can report violations of environmental and waste management ?

1. Yes

2. No

Part 4. Regional associations for Waste Management - RSUO

Part 4 is filled in by members of RSUO. Please circle the answers which best represent the situation in your municipality

4.1. Does your minicipality regularly participate in your city council sessions of the General Assembly RSUO?
1. Yes

2. No

4.2. On which issues differences are found in decisions of the General Assembly?

1. In choosing the Chairman of RSUO

2. In determining the prices and charges for common facilities usage by RSUO municipalities

3. In making decisions about future projects and facilities in favour of RSUO

4. In procedures for making public contracts for joint activities and facilities RSUO

5. Upon acceptance of new municipalities in RSUO

6 In ways of administrative support activities of RSUO and of the General Assembly

7. In determining operators of common facilities for waste management

8. In taking into account the quantities of waste that municipalities pay for

9. On other issues, please fill in ……..

10. There are none disagreements or they appear very rarely in the discussion and decision of the general meeting of RSUO

4.3. How do you rate the performance of RSUO?

1.Excellent

2. Very Good

4. Good

5. Sufficient

6. Bad

4.4. Please fill in any suggestions for change in business organization in order to improve the performance of RSUO:

……
……
……

Part 5. Programs and regulations in the field of waste management

Please circle the answers which best represent the situation in your municipality

5.1.Has your municipality approved regulation on waste management?

1. Yes
2. No

5.2. Are there approved Municipal regulations for waste management in accordance with Article 22 of the new Law on Waste Management adopted in 2012?

1. Yes
2. No
3. Such is in progress

5.3. Has your municipality adopted Municipal programof waste management?

1. Yes
2. No

5.4. Is there an approved and up to date Municipal program for waste management in accordance with the Law on Waste Management adopted in 2012?

1. Yes
2. No
3. Such is in progress

Part 6. Separate collection, recycling and recovery of waste

Please answer the questions by circling the answers, according to the situation in your municipality:

6.1 The Law on Waste Management demands that municipalities provide sites for free transmission of separately collected household waste, including bulky waste, household hazardous waste and repair household and more up to mid 2014, in all citiess with a population greater than 10 000 people. Did your municipality take the necessary actions to ensure such grounds?

1. Yes
2. No

6.2. Did the actions of your municipality separate collection of municipal biodegradable waste including to determine the locations for the deployment of the necessary elements for separate collection of these wastes and their delivery for composting or other recovery / as well as to achieve the targets for reducing biodegradable municipal waste landfills and achieving the recovery of biowaste ?

1. Yes
2. No

6.3. Did the actions your municipality to collect waste in the municipality with the following waste streams: paper and cardboard, metals, plastics and glass / unless already established system for packaging waste paper and cardboard, plastic, metal and glass / and the gradual attainment of the objectives of the municipality for reuse and recycling of this waste?

1. Yes
2. No

6.4. In municipal regulations for waste management regulated Are the obligations of commercial establishments, businesses and public buildings to separate waste paper and cardboard, plastic, metal and glass in accordance with the requirements of the Waste Management?

1. Yes

2. No

6.5. In your community there been separate collection of hazardous waste from households and sending them for recycling and / or disposal?

1. Yes

2. No

6.6. Does your municipality have defined special sites for waste paper and cardboard, plastics and glass / known as points of scrap transmission /?

1. Yes

2. No

6.7. Does your municipality conducts regular awareness campaigns for individuals and businesses associated with the separate collection of waste?

1. Yes

2. No

6.8. What forms apply your municipality to perform collection activities, incl. separate disposal and subsequent recovery or disposal of waste?

1. Чрез избран Изпълнител по реда на Закона за обществените поръчки

2. By municipal enterprise established under Article 52 of the Law on Municipal Property

3. Through public - private partnership organizations for recovery of packaging

4. By "In House" award under the amendments to the Law on Public Procurement, effective February 2012

5. concession

6. Other, please specify .....

Part 7. Organizational form for implementing activities in waste management

Please fill in the following table data associated with the form of the activities of waste management for your organization:

Activities that the municipality is assigned (in the column are recorded tasks assigned to each of the persons who carry out waste management activities: collection, transportation, sorting, pre-treatment, temporary storage, disposal, waste disposal)	**Organizational form of execution of the activities (a private company, a municipal company, joint venture companies, municipal enterprise department, other)**	**Form of award (Law on Public Procurement Law on Concessions; Municipal Council decision establishing a municipal enterprise, Rules for the structure of municipal administration)**
1.		
2.		
3.		
4.		
5.		

Part 8. Waste streams and practices in their treatment

8.1. Please fill in the following table data for your community:

Amount of municipal waste collected (tons per year)

Type of waste	**2010**	**2011**	**2012**	**2013**
Mixed municipal waste, including:				

Type of waste	2010	2011	2012	2013
households				
from businesses and shops				
Separately collected green waste				
Separately collected fractions of waste for recycling, [12].:				
Waste paper and cardboard				
Plastics				
Metals				
Glass				
Other separately collected fractions of waste (specify which)				
Total for municipality				

8.2. Morphological composition of household waste

lease to the completed questionnaire to the attached report (data) from studies of morphological composition of household waste by the municipality or individual settlements in the municipality, if any.

Part 9. Containers and vehicles for waste collection

9.1. Please provide us with all relevant information regarding number, type, model,

[12] Please indicate the source of information on the quantities separately collected household waste recycling

TABLES AND FIGURES

Table 1

Source Generators and Types of Solid Waste Typical Waste Generators Types of Solid Wastes		
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants (excluding specific process wastes if the municipality does not oversee their collection)	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes, e-wastes
Institutional	Schools, hospitals (non-medical waste), prisons, government buildings, airports	Same as commercial
Construction and Demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, bricks, tiles
Municipal Services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas, sludge
All of the above should be included as municipal solid waste. Industrial, commercial, and institutional wastes are often grouped together and usually represent more than 50% of MSW. C&D waste is often treated separately: if well managed it can be disposed separately. The items below are usually considered MSW if the municipality oversees their collection and disposal.		
Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off-specification products, slag, tailings
Medical waste	Hospitals, nursing homes, clinics	Infectious wastes (bandages, gloves, cultures, swabs, blood and body fluids), hazardous wastes (sharps, instruments, chemicals), radioactive waste from cancer therapies, pharmaceutical waste
Agricultural	Crops, orchards, vineyards, dairies, feedlots, farms	Spoiled food wastes, agricultural wastes (e.g., rice husks, cotton stalks, coconut shells, coffee waste), hazardous wastes (e.g., pesticides)

Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes (e.g., paints, aerosols, gas tanks, waste containing mercury, motor oil, cleaning agents), e-wastes (e.g., computers, phones, TVs)

Table 2

Major targets for waste reduction and recycling according to the EU waste legislation

		minimum recovery	minimum recycling collection
Packaging	200	60%	55%-80% (material specific rates)
Cars	200	85%	80%
	2015	95%	85% 100%
Electronics	200	70%	50% min 4 kg per inhabitant
Batteries	2010	50% to 75% (efficiency)	
	201		45%
Tires	200		0 landfilling of tires
Biodegradable	2010		reduction of landfilling to 75% of the 1995
waste	201		reduction of landfilling to 50% of the 1995
	2020		reduction of landfilling to 35% of the 1995
Household	2020		50% recycling
Landfills	2009		Conformity with legal requirements for

Source: Based on presentation of DG Environment, European Commission at World Bank Brussels workshop, May 2009;

Table 3

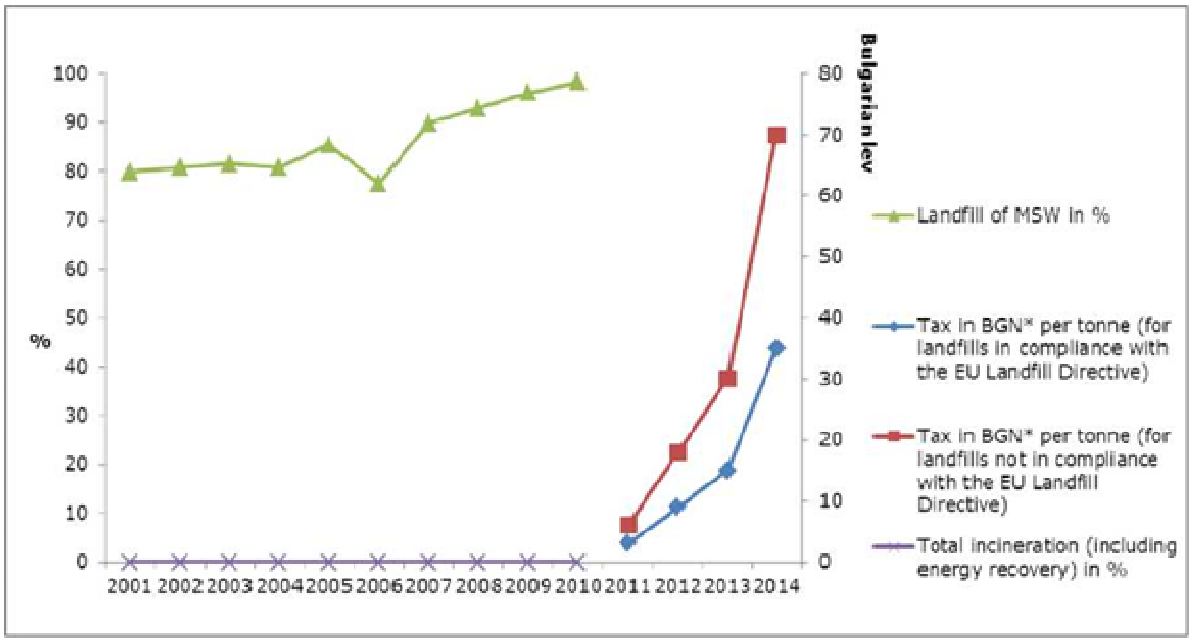
Montana Municipality	2011	2012	2013
Total income from waste tax (in BGN) including households and legal entities:	3 679 951	2 738 591	3 131 959

Table 4

Montana Municipality	2011	2012	2013
Expenditures for MWM (in BGN)			
Purchase of containers for waste		115 212	**238 608**
Waste collection and disposal of municipal waste	1 619 986	1 708 263	**1 991 776**
Research, design, construction, maintenance, operation, closure and monitoring of landfills	256 825	231 873	**121 192**
Treatment and closing of polluted areas	66 152		
Winter and summer cleaning of streets, squares, alleys, parks and other areas of the settlements for public use	**1 131 662**	**1 303 048**	**1 329 624**

Table 5

Development of landfilling and incineration of MSW and landfill tax in Bulgaria



* 1 € = 1,9558 Bulgarian lev (2011 annual average currency exchange rate) Source: ETC/SCP, 2012 and Eurostat, 2012

Table 6

Development of MSW recycling and landfill tax in Bulgaria

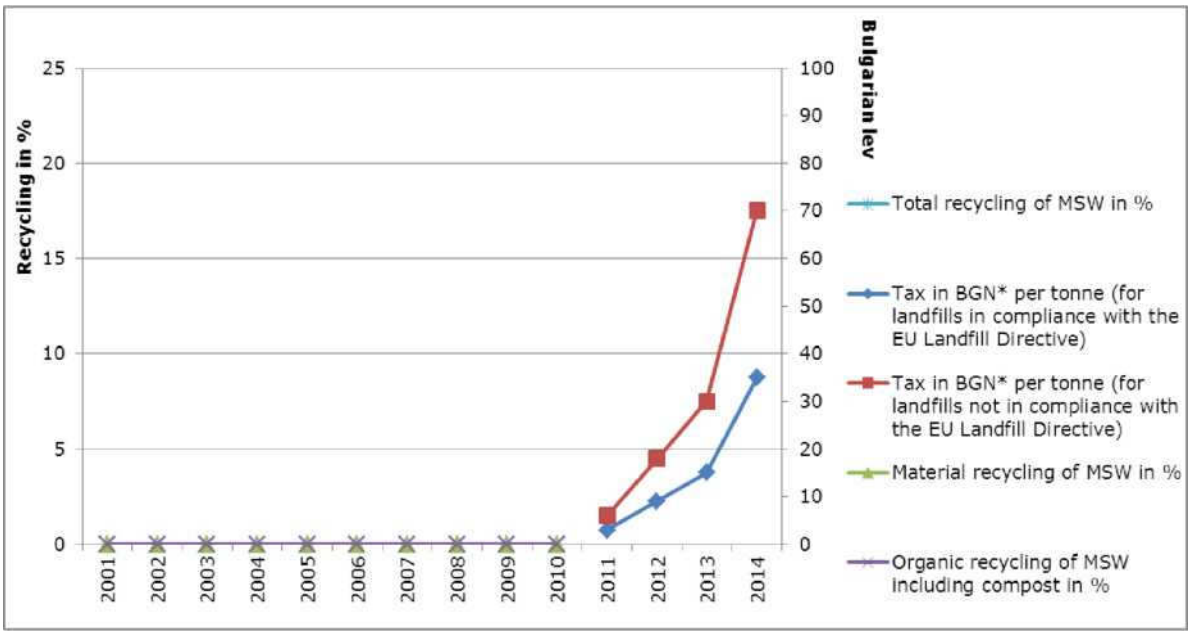


Table 7

Oragnization and responsibilities of the Waste Management Activities in Montana Municipality

Activities commissioned by the Municipality	Organizational form of execution of the activities	Form of the task assignment
1. Waste collection and transportation	Municipal legal entity	Decision of City Council
2. Collection and transportation of waste from areas for public use	Private company	Public procurement law procedure
3. Sorting and Disposal	**Municipal legal entity**	**Decision of City Council**

Table 8

Amount of municipal waste collected (tons per year)

Type of waste	2011	2012	2013
Mixed municipal waste including:	22 776	20 527	16 081
Household	18 134	16 775	15 170
Street cleaning	3 904	3 373	649
Trade and manufacturing generated	468	379	262
Separately collected fractions of waste including:		145	365
Paper and cardboard		75	144
Plastics		53	158
Metals		17	38
Glass			25
Sludge from the water treatment plant	1 848	1 485	1 492
In total for the Municipality	24 624	22 157	17 938

Source: Municipality of Montana and Landfill Montana

Table 9

List of vehicles involved in waste collection in Municipality of Montana

Source: Municipality of Montana

Technical specifications	Vehicle №								
	1	2	3	4	5	6	7	8	9
Year of manufacture/ registration	1986	1990	1990	1991	2008	2001	2001	2001	1999
Type of vehicle	Container carrying truck 2 m3	Container carrying truck 4 m3	Container carrying truck 4 m3	Container carrying truck 4 m3	Waste collecting truck	Waste collecting truck	Waste collecting truck	Waste collecting truck	Waste collecting truck
Make of vehicle	GAZ-53	GAZ-53	GAZ-53	GAZ-53	Mercedes	Skoda	DAF	DAF	Dennis

Quantity available	1	1	1	1	1	1	1	1	1
Owner	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity	Municipal legal entity
Load in m3	2	4	4	4	18	10	8	8	10

Table 10

Waste collection containers available and in use - Municipality of Montana

Source: Municipality of Montana

№	Type of container	Material	Owner	Volume (m3)	Quantity	Frequency of container service defined by their type
1	Container „Bobar"	Metal	Municipal legal entity	1,100	1 393	**3 times a week**
2	Container	Metal	Municipal legal entity	2,000	172	**Once a week**

3	Container	Metal	Municipal entity	legal	4,000	96	**Once a week**
4	Family container	Metal	Municipal entity	legal	0,110	2 550	**Once a week**
5	Family container	Plastic	Municipal entity	legal	0,120	300	**Once a week**

Table 11

Quantities of construction waste accepted for treatment / disposal in municipal facilities

Year	2011	2012	2013
	m3	m3	m3
Construction work	4 129	2 904	11 571

Source : RIEW - Montana

Table 12

Capacity of the installation

№	Instalation	Maximum capacity, [t/24h]	Maximum capacity, [t]	Volume of dumped waste[t]
1.	Regional landfill for non-hazardous waste for municipalities Montana, Krivodol Boychinovtsi, Berkovica, Lom, Chiprovtzi, Georgi Damyanovo, Brusartsi, Medkovets, Varshetz, Yakimovo and Valchedram	121	911 400	21 089,190 /05.07.2010 - 31.12.2010 / 48 623,570 /01.01.2011 - 31.12.2011 / 44 160,900 /01.01.2012 - 31.12.2012 /

Source : RIEW - Montana

Table 13

Water supply	Amount of water per unit /allowed by the issued permit	Annual consumption for the peridod 01.01.12-31.12.12	Amount used annually per ton deposited waste on the landfill
Urban network conduit (ViK OOD)	0,083 m^3 /t	2 730 m^3	0,0618 m^3 /t

Source : RIEW - Montana

Table 14

Electricity/heat	Amount per unit /allowed by the issued permit	Annual consumption per unit in MWh./t deposited waste for the period 01.01.2012- 31.12.2012
Electricity	0,0139	0,00197