

Good Practices Regarding Solid Waste Management and Recycling

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Abstract

Waste is a continually growing problem at global and regional as well as at local levels. Solid wastes arise from human activities that are normally discarded as useless or unwanted. As the result of rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources. Solid wastes have the potential to pollute all the vital components of living environment at local and at global levels. In these conditions, proper management of solid waste is a central pillar of far-sighted sustainable environmental policies. The priority was given to waste minimization, recycle, and reuse followed by the safe disposal of waste to minimize pollution. Inadequate management of municipal waste results in considerable public health hazards and additional costs in both the short and the long term. Therefore the society appeals to solid waste management which brings aspects respecting the optimisation of material flows regarding economic, technical and environmental parameters. The authors aim to highlight some aspects concerning solid waste typology and Management India's present policy based on waste hierarchy, India's place regarding other member states with respect to waste disposal, recycling, recovery and reuse as well as a good practice set, which may contribute to increasing solid waste recycling rate.

Keywords: Solid waste management, topology of waste, recycling, good practices

Introduction

From the early days of civilization, humans have used the earth's resources and disposed of wastes. In ancient times, waste disposal did not pose a significant problem, for the population was small and land available to receive waste materials was abundant. Waste related problems commenced to occur from the time when humans began to congregate in larger communities. The medieval practice of throwing waste into the unpaved streets led to a fast breeding of rats carrying fleas which acted as vectors for the bubonic plague. As a consequence, half of the European population was erased in the fourteenth century. First regulations regarding proper waste collection in Europe date back to the 18th century. Technical standards became implemented in all major cities during the industrial revolution. Recovery - at a significant scale and in an organized way - of waste components suitable for animal feed and further industrial processing (glass, metals, paper, textiles) also dates back to the 18th century and can be found today throughout Europe at all levels. Starting from the last century's mid-eighties, the "3R" Principle: Reduce, Reuse, Recycle became increasingly implemented in many countries. In the decade to follow, this principle became even more relevant through the strong increase of waste quantities due to the significant economic growth (higher living standards, more throw-away-products etc.). This increase leads to a shortage of disposal capacity. This situation was compounded by the rise of the NIMBY (not in my backyard) syndrome which frequently leads to stiff opposition to proposed new waste disposal infrastructure. Concurrently, more and more advanced countries recognized a need to preserve resources and reduce environmental impacts throughout the life cycle of products. Communities developed a growing awareness that significant environmental improvements could be achieved by reducing landfill disposal and

recovering resources from 'waste' streams. Nowadays, proper management of solid waste is a central pillar of far-sighted, sustainable environmental policies. Inadequate management of municipal waste results in considerable public health hazards and additional costs in both the short and the long term. Having regards to these facts, the European Union adopted a set of directives including: Directive 2006/12/EC on waste (which consolidates and replaces Directive 75/442/EEC), Directive 91/689/EEC on hazardous waste, Directive 75/439/EEC on waste oils, Directive 86/278/EEC on sewage sludge, Directive 94/62/EC on packaging and packaging waste, Directive 1999/31/EC on the landfill of waste and Directive 2002/96/EC on waste electrical and electronic equipment. In 1976, a year after the adoption of Council's Directive 75/442/EEC on waste the US Congress adopted the Resource Conservation and Recovery Act.

Categories of solid waste

Solid wastes are all materials arising from human activities that are normally solid and are discarded as unwanted. Solid waste can be categorized based on source as shown in table no. 1. Table no. 1: Solid Waste categories based on source Source Typical facilities, activities, or locations where wastes are generated Types of solid waste Agricultural Field and row crops, orchards, vineyards, farms, etc. Spoiled food wastes, agricultural wastes, hazardous wastes Industrial Light and heavy manufacturing, refineries, chemical plants, power plants, construction, demolition, etc. Industrial process wastes, scrap materials, ashes, demolition and construction wastes, special wastes and hazardous waste, etc. Commercial and Institutional Stores, restaurants, markets, office buildings, hotels, auto repair shops. Paper, cardboard, plastics, wood, food wastes, glass, metal wastes, ashes, special wastes etc. Municipal solid waste Includes residential, commercial

and institutions Special waste, rubbish, general waste, paper, plastics, metals, food waste, hazardous waste etc. Source: Hester, R. E. & Harrison, R. M., Environmental and Health impact of solid waste management activities, 2002, Royal Society of Chemistry, United Kingdom. The term municipal solid waste is normally assumed to include all of the waste generated in a community, with the exception of waste generated by municipal services, treatment plants and industrial and agricultural processes (Tchnobanoglous, G and Kreith, F.,2002). In the urban context the term municipal solid wastes is of special importance. The term refers to all wastes collected and controlled by the municipality and comprises of most diverse categories of wastes. It comprises wastes from several different sources such as, residential wastes, commercial wastes, institutional wastes and some industrial wastes. (Table no. 2). Table no. 2: The sources of municipal solid waste

Sources	Examples
Residential	Houses, mansions, apartments
Commercial	Office buildings, shopping malls, warehouses, hotels, airports, restaurants,
Institutional	Schools, medical facilities, public institutions, prisons
Industrial	Packaging of components, office wastes, lunchroom and restroom wastes (but not industrial process wastes).

Source: Tchnobanoglous, G. & Kreith, F., Handbook of Solid Waste Management, 2nd edition, 2002, McGraw-Hill Handbooks. Solid Waste Management – definition and concepts The management of solid waste is associated with the control of generation, storage, collection, transfer and transport, processing and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations. In its scope, it includes all administrative, financial, legal, planning and engineering functions involved in the whole spectrum of solutions to problems of solid wastes thrust upon the community by its inhabitants (Tchobanaglou, et al, 1997). It gives an indication where solid wastes are generated in our industrialized society. Material flow and solid waste generation in an industrialized society. It is apparent that an optimal approach to reduce the amount of solid wastes requiring disposal is to limit the consumption of raw materials and to increase the rate of recovery and reuse of waste materials. Although the concept is simple, effecting this change in our “modern” society has proved extremely difficult. Therefore, society does waste management which has to optimize the various mass flows under consideration of economic, technical, social and environmental parameters. Raw materials, Manufacturing, Consumer, Final disposal, Incineration Landfill, Processing and recovery, Residual debris, Residual waste material, Raw materials, products, and recovered materials.

Waste materials

There is a number of concepts about waste management which varies in their usage between countries or regions. Some of the most general, widely-used concepts include:

Waste hierarchy- The waste hierarchy refers to the “3 Rs”: reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of the most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste. Some waste management expert have recently incorporated a “fourth R”: “Re-think”, with the implied meaning that the present system may have fundamental flaws, and that a thoroughly effective system of waste management may need an entirely new way of looking at waste. Source reduction involves efforts to reduce hazardous waste and other materials by modifying industrial production. Source reduction methods involve changes in manufacturing technology, raw material inputs and product formulation. ended producer responsibility- Extended producer responsibility is a strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product (OECD, 1999). Extended producer responsibility is meant to impose accountability over the entire lifecycle of products and packaging introduced to the market. This means that firms which manufacture, import and/or sell products are required to be responsible for the products after their useful life as well as during manufacture. Extended producer responsibility promotes that producers (usually brand owners) have the greatest control over product design and marketing and therefore have the greatest ability and responsibility to reduce toxicity and waste. Reuse, Reduce, Re-think, Disposal, Energy recovery, Recycling, Most favorable option, Least favourable option. This can take the form of a reuse, buy-back (act of rebuying something that one previously sold), or recycling program, or in energy production. The producer may also choose to delegate this responsibility to a third party, a so-called producer responsibility organization, which is paid by the producer for spent-product management. In this way, extended producer responsibility shifts responsibility for waste from government to private industry, obliging producers, importers and/or sellers to internalise waste management costs in their product prices. (Hanisch, 2000). The term of “producer responsibility” became an integral part of European Union environment policy, bringing this concept to life, being possible with the help of industry representatives which have implemented an efficient recovery and recycling packaging waste system (international recognized): “Der Grüne Punkt System – The Green Dot System”. The organisations conducting their activity based on the principles of “Der Grüne Punkt” system coordinate the collecting, sorting and recovering of packaging and packaging waste on behalf of their customers. These organisations establish partnerships with local authorities, private or municipal sanitation companies and companies that will recover

or recycle the collected and sorted packages. "Der Grüne Punkt" became a European trademark, as it is used in 30 countries both in Europe and America, over 130.000 of companies being allied to this system.

Polluter pays principle. In environmental law, the polluter pays principle is enacted to make the polluting party responsible for paying for the damage done to the natural environment. It is regarded as a regional custom because of the strong support it has received in most of the Organization for Economic Co-operation and Development (OECD) and European Community (EC) countries. In international environmental law it is mentioned in Principle 16 of the Rio Declaration on Environment and Development. (United Nations, 1992) Polluter pays is also known as extended polluter responsibility. This is a concept that was probably first described by the Swedish government in 1975. Extended polluter responsibility seeks to shift the responsibility dealing with waste from governments (and thus, taxpayers and society at large) to the entities producing it. In effect, it internalises the cost of waste disposal into the cost of the product, theoretically meaning that the producers will improve the waste profile of their products, thus decreasing waste and increasing possibilities for reuse and recycling. The polluter pays principle underpins environmental policy such as an ecotax, which, if enacted by government, deters and essentially reduces the emitting of greenhouse gas emissions. OECD defines extended polluter responsibility as: "a concept where manufacturers and importers of products should bear a significant degree of responsibility for the environmental impacts of their products throughout the product life-cycle, including upstream impacts inherent in the selection of materials for the products, impacts from .The Green Dot" trademark manufacturers' production process itself, and downstream impacts from the use and disposal of the products. Producers accept their responsibility when designing their products to minimise life-cycle environmental impacts, and when accepting legal, physical or socio-economic responsibility for environmental impacts that cannot be eliminated by design." (OECD, 2006)

Objectives of the survey study are:

1. To study the current situation and major problems in member countries in the generation, reduction, reuse, recycling, handling, collection, transfer and transport, transformation (e.g., recovery and treatment), and disposal of solid waste;
2. To gain information on the prevailing technologies and practices of solid-waste management collection, transformation, and disposal;
3. To study ways and means to manage solid waste for reduction, reuse, recycling, and recovery; and
4. To explore policy measures and industrial actions to minimize the undesirable impacts generated by solid waste.

SOLID-WASTE MANAGEMENT POLICY AND LEGISLATION

The 11 participating member countries in this project have established legislation for environmental protection. Most of these countries have also set up different ministries to handle the environmental issues. The legislation for water- and air-pollution control are comprehensive and well established, but not for solid-waste management. Solid-waste management is still very much a municipal government responsibility. A long-term strategy on solid-waste management is still lacking in the developing Asian countries. Like many other developing countries in the world, concerns in the region are growing in both the governmental and public sectors for an effective and economic management of solid waste. The lack of awareness, technical knowledge, legislation, policies, and long-term strategy are major issues for solid-waste management in Asian developing countries.

SOURCES AND QUANTITIES OF SOLID-WASTE MANAGEMENT

In the purview of management and legal aspects, solid waste in Asian countries can be broadly defined as waste other than liquid or gaseous waste. The sources and quantities of solid waste depend on various factors such as economics, culture, heritage, industrialization, and season. The sources of solid waste include: domestic waste, commercial waste, hospital waste, and hazardous waste. The amount of solid waste generated in the cities is much higher than in rural areas. The generation rate in rural areas can be as low as 0.15 kg/cap/day, while in the urban areas the rate can be above 1.0 kg/cap/day. The generation rates of major cities reported by the participating member countries are listed in Table. The composition of solid waste varies significantly in the different cities in the region. Even within a city the composition varies with location and time. In general, the solid waste contains more organic components than other materials. The average percentages of organic matter in the solid waste in major cities in Asian countries ranged from 50% to 70%.

Table : Solid-Waste Generation Rates of Major Asian Cities

Generation rate, City Country (kg/cap/day)

Delhi	India	0.47
Dhaka	Bangladesh	0.50
Urban Islamic Republic of Iran		0.80
Penang	Malaysia	0.98
Katmandu	Nepal	0.30
Manila	Philippines	0.66
Singapore	Singapore	0.94
Colombo	Sri Lanka	0.62
Taipei	Republic of China	0.95
Bangkok	Thailand	0.88
Hanoi	Vietnam	0.63

STORAGE, COLLECTION/TRANSPORTATION, TREATMENT, AND DISPOSAL

Since dumping waste on the roadside or in other public places is a common practice in Asian developing countries, street sweeping is one of the important activities in the waste-management system. The municipalities employ sweepers to sweep the city streets and public areas by using simple tools and facilities. Major streets are generally swept on a daily basis, sometimes more than once a day, while other streets are swept less frequently. The wealthier cities in Asia use fully automatic sweeping machines. Sweeping-waste, together with other household waste, is commonly placed in plastic bags or other containers and stored at the collection centers. Community containers are placed at the roadsides to be collected by vehicles or hand-operated carts. Generally, Asian cities collect their household waste once a day. The frequency can be lower in some certain cities because of budget constraints. The lowest collection frequency is twice weekly. However, the collection area coverage in a city can be as low as 50%. The frequency and area coverage for solid-waste collection are limited by the municipal budget. The frequency can range from twice a day for the wealthy neighborhoods to twice a week for the poor neighborhoods—the wealthy neighborhoods are provided with adequate collection systems, but poor neighborhoods do not enjoy the same treatment. Once collected, domestic solid waste is transported to disposal sites by open trucks and/or compactor trucks. As for industrial solid waste, most major cities in Asian countries contract out to private sectors for the collection and transportation to the appropriate disposal sites.

Solid-Waste Management INFRASTRUCTURES FOR SOLID-WASTE MANAGEMENT

The main disposal methods for municipal solid waste in Asian developing countries are open dumping and sanitary landfill. Overall the environmental condition of the uncontrolled dump-sites is extremely vulnerable, with severe environmental pollution. On open dumping grounds, foul odors and air pollution are dangerously affecting the surroundings. Rodents are spreading pathogens in the surrounding areas and the workers are highly exposed to disease and hazardous waste. Some cities dispose of their waste in sanitary landfills. The landfills are generally well operated and maintained. However, leachate treatment may not be commonly practiced in some cities due to resource constraints. Leachate from open dumping or sanitary landfill may cause serious water pollution if no proper treatment is provided. Financially-capable cities with land scarcity have opted for incineration for municipal solid-waste disposal. Extensive air-pollution-control facilities are installed in the incinerators. The issue of dioxin, however, is not handled adequately. After incineration

about 10% of the residue has to be disposed of in a secure landfill.

GREEN PRODUCTIVITY PRACTICES FOR SOLID-WASTE MANAGEMENT

Asian countries are concerned with the ever increasing amount of solid waste in their municipalities. The increase of solid waste in every Asian city is mainly attributed to population increase, industrialization, and the improvement of living standards. The governments have realized that Green Productivity (GP) measures such as reduction, recycling, reuse, and recovery are essential elements in solid-waste management as a form of checking the rapid growth rate of waste in the cities. National awareness campaigns on GP measures are held regularly to promote recycling activities. Waste segregation is the initial stage for GP practices. Residents are encouraged to separate their waste and bring it to the appropriate locations for collection. Paper, scrap metal, glass, and plastic are the common items segregated and collected by the waste pickers. Waste pickers play a significant role in recycling activities. They individuals or groups collect saleable items from the waste-collection bins, households, and dumpsites. Organic waste is converted into compost in several cities as a part of their recycling activities. However, the rate of recycling in Asian developing countries is far from satisfactory. The low recycling rate can be attributed to poor strategic planning and to the implementation and enforcement of the policies. Lack of good incentives can also be a main factor in the poor waste recycling rate.

GP measures for solid-waste management not only reduce waste, but recover useful re-sources as well. Some Asian cities have long-term plans for zero-waste generation. Even though it may be a difficult task to achieve in the near future, measures and policies are being developed to move toward the target of zero-waste generation.

SUMMARY

Solid-waste management is a major challenge in Asian cities. Significant amounts of the municipal operating budgets are allocated for solid-waste management in every city. The amount of solid-waste generated in Asian cities has increased tremendously in the last decade, mainly due to the improvement of living standards, rapid economic growth, and industrialization in the cities. Resources in urbanized cities cannot meet the ever increasing quantity of waste. Overview generated by human activities. Enhancing the effort has to be the focus of managing the waste appropriately. Based on the APO survey study on solid-waste management in 11 member countries, it is obvious that every member country has put in a great deal of effort toward handling the solid-waste problems encountered. However, a lack of awareness, technical knowledge, legislation, policies, and strategies are major issues for solid-waste

management in Asian developing countries. The regional governments have to strengthen their efforts to control the rapid growth rate of solid-waste generation and to allocate adequate resources for solid-waste management. GP measures including reduction, recycling, reuse, and recovery should be enhanced immediately. Governments may also have to enhance the appropriate legislation to promote GP measures with financial incentives. European issues regarding solid waste landfilling, incineration and recycling At present in the European Union municipal waste is disposed of through landfill (49%), incineration (18%), recycling and composting (33%). In the new member states, where major efforts and investments have been made to align with the European Union acquis, the situation is evolving rapidly but still dominated by landfill. There are wide discrepancies between member states, ranging from those which recycle least (90% landfill, 10% recycling and energy recovery) to those which are more environmentally friendly (10% landfill, 25% energy recovery and 65% recycling). The current European Union waste policy is based on the waste hierarchy management concept. As stated above, ideally, waste should be prevented and what cannot be prevented should be re-used, recycled and recovered as much as feasible, with landfill being used as little as possible. Landfill is the worst option for the environment as it signifies a loss of resources and could turn into a future environmental liability. The waste hierarchy should not be seen as a hard-and-fast rule, particularly since different waste treatment methods can have different environmental impact. However, the aim of moving towards a recycling and recovery society means moving up the hierarchy, away from landfill and more and more to recycling and recovery. The legal framework underpinning this strategic approach includes horizontal legislation on waste management, e.g. the Waste Framework Directive, the Hazardous Waste Directive, as well as the Waste Shipment Regulation. These are complemented by more detailed legislation concerning waste treatment and disposal operations, such as the Landfill and Incineration Directives and legislation to regulate the management of specific waste streams (waste oils, printed circuit boards and batteries). Recycling and recovery targets have been set for some key waste flows, i.e. packaging, end-of-life vehicles and waste electrical and electronic equipment. Despite the considerable progress which has been made, overall waste volumes are growing and the absolute amount of waste going into landfill is not decreasing. Between 1990 and 1995 total waste generation in the European Union and European Free Trade Association increased by 10% whilst GDP increased by 6.5%. Municipal solid waste generation has been contributing significantly to this increase and is coupled to the level of economic activity as both municipal solid waste generation and GDP in EU-25 increased by 19% between 1995 and 2006. Smaller but important waste streams are also growing: hazardous waste generation increased by 13% between

1998 and 2006 whilst GDP grew by 10%. With higher levels of economic growth anticipated, overall volume growth is predicted to continue and will concern most wastes. For example, the European Environment Agency predicts that paperboard, glass and plastic waste will increase by 40% by 2020 compared to 1990 levels. The OECD predicts that municipal solid waste generation will continue to grow until 2020 but at a slightly slower rate. The Joint Research Centre predicts an increase in municipal solid waste generation of 42,5% by 2020 compared to 1995 levels. Relatively faster municipal solid waste growth is predicted in the new EU-12 Member States. While recycling and incineration are increasing, the absolute amounts of waste landfilled are not decreasing because of the growth in waste generation. For example, the amount of plastic waste going to landfill increased by 21,7% between 1990 and 2006 yet the percentage of plastic waste being landfilled dropped from 77% to 62%. These unsustainable trends are due in part to unsatisfactory implementation of waste laws which, in turn, is due in part to certain elements of the policy and legal framework that could be improved. There are a number of implementation problems, ranging from dumping of waste at mismanaged landfills to shipments of hazardous waste in violation of international conventions. Unclear definitions and differing views on how to implement the laws have not helped to improve implementation and have resulted in litigation. Despite rulings by the European Court of Justice, certain aspects, such as when waste ceases to be waste, are still not clear. Although waste prevention has been the paramount objective of both national and European Union waste management policies for many years, limited progress has been made so far in transforming this objective into practical action. Neither the Community nor the national targets set in the past have been satisfactorily met. Recycling and recovery are increasing. However, they cover only a limited proportion of waste. Recycling Directives have so far targeted individual waste streams and have enabled Community waste policy to reduce environmental impact by promoting source separation and recycling of waste streams such as batteries, packaging, vehicles and waste electrical and electronic equipment. These fast-growing waste flows are of particular importance due to their hazardous nature and complexity. However, they account for only a limited proportion of all waste generated. Furthermore, while the amount of waste being recycled is increasing, treatment standards exist only for landfills and incinerators and, partially, for recycling. This poses an environmental problem as some recycling facilities can cause pollution if badly operated. Standards are needed not only for environmental protection but also for business reasons – to promote a level playing field for recycled material. 4. Romania's current position regarding high priority directions for waste recycling and reuse Romania's accession to the European Union conducts to the need to evaluate our country position regarding other member

states. This is the first step on the way of settling a National Action Plan for waste recycling and reuse. Table presents the quantities of municipal waste disposed in 2007 in some European countries through landfill and through incineration

Municipal waste by type of treatment in some European countries in 2007

Country	Landfilled waste (kg per capita per year)	Country	Incinerated waste (kg per capita per year)
Germany	3	Bulgaria	0
Netherlands	14	Romania	0
Belgium	21	Poland	1
Sweden	21	Czech Republic	36
Austria	86	Hungary	38
France	185	Great Britain	53
Poland	239	Italy	67
Czech Republic	243	Belgium	162
Romania	284	Austria	180
Italy	286	Germany	192
Great Britain	324	France	194
Hungary	341	Netherlands	200
Bulgaria	388	Sweden	240

Source: Eurostat, 2009 [Online], Available at: <http://epp.eurostat.ec.europa.eu>

Although Romania is better placed than other old and new member states like: United Kingdom, Italy, Hungary, Bulgaria, etc. at municipal waste landfilled indicator, our country main problem is the lack of conformity with the European legal framework for landfills.

Nonetheless that new environmental friendly landfills was opened, the majority of Romania's landfills is old, poorly-designated or poorly-managed, with an adverse environmental impact. As shown in table, incineration carried out on a large scale by industry is not seen as a solution for waste disposal in Romania. This fact could be an advantage because incineration is a controversial method due to issues such as emission of gaseous pollutants. But then combustion of waste material generates heat, steam and/or electricity and therefore incineration is the preferred solution by some European Union developed countries like: Germany, Sweden, Belgium. Central and East European countries stands on a landfill solution rather than incineration one. The European Commission has prioritised improvement in recycling and disposal for the following priority waste streams:

- packaging;
- end of life vehicles;
- batteries;
- waste electrical and electronic equipment.

Table below presents recycling and recovery rates for packaging waste in 2007. Romania's values for this indicator are the worst from all European countries. The lack of national policies and strategies are the main reason for the poor results to this indicator. Romania's recycling rate for 2007 is better than the target for 2001 (25%), but far away from the target for 2008 (55%). The

recovery rate for 2007 is below both from the target for 2001 (50%) and from the target for 2008 (60%).

Recycling and recovery rates for packaging waste in 2007

Country	Recycling rate (%)	Country	Recovery rate (%)
Target for 2001	25,0	Target for 2001	25,0
Target for 2008	55,0	Target for 2008	55,0
Belgium	81,1	Germany	95,4
Austria	68,7	Belgium	95,3
Germany	68,3	Netherlands	92,1
Czech Republic	67,6	Austria	90,3
Netherlands	61,1	Sweden	82,3
Great Britain	60,7	Czech Republic	72,3
Sweden	59,8	France	68,3
France	57,6	Italy	66,5
Italy	57,3	Great Britain	64,3
Bulgaria	55,2	Poland	60,1
Poland	48,5	Bulgaria	55,4
Hungary	48,2	Hungary	54,3
Romania	30,2	Romania	36,7

Source: Eurostat, 2009, [Online], Available at: <http://epp.eurostat.ec.europa.eu> [Accessed 5 September 2009]

Table below shows the rates for reuse, recovery and recycling of end-of-life vehicles. From this point of view, Romania is better placed than United Kingdom and than other Central and Eastern Europe countries like: Czech Republic, Poland and Hungary. A contribution has "Rabla"- "Jalopy" programme, designated to replace cars older than 10 years.

Reuse, recovery and recycling of end-of-life vehicles in 2007

Country	Reuse and recycling rate (%)	Country	Reuse and recovery rate (%)
Bulgaria	89,45	Bulgaria	92,67
Germany	88,1	Germany	90,4
Belgium	87,4	Sweden	90
Romania	83,69	Belgium	89,57
Netherlands	83,1	Austria	86
Sweden	83	Romania	85,69
Italy	82,3	Netherlands	85,3
Hungary	81,6	Czech Republic	85,1
Great Britain	81,82	Italy	83,1
Austria	80	Great Britain	83,08
France	79,8	Hungary	82,8
Czech Republic	79	France	81,5
Poland	72,79	Poland	76,99

Source: Eurostat, 2009, [Online], Available at: <http://epp.eurostat.ec.europa.eu>, [Accessed 5

Table below shows the quantity of battery and accumulator wastes collected in 2006. Our country occupies the penultimate place on this indicator, before Bulgaria.

Battery and accumulator wastes collected in 2006

Country c, in kg per capita

Belgium 5,94

Sweden 4,96

France 4,07

Germany 3,66

Italy 3,34

Netherlands 3,03

Great Britain 2,81

Austria 2,34

Hungary 2,21

Czech Republic 1,19

Poland 0,26

Romania 0,24

Bulgaria 0,14

Source: Eurostat, 2009, [Online], Available at:
<http://epp.eurostat.ec.europa.eu>, [Accessed 5
September 2009]

Table below shows the quantities of electrical and electronic wastes collected in 2006 in some member countries. As we can see, this indicator was lately inputted. So, it is explained the fact that old member countries like Italy and Great Britain could not offer data.

Our country occupies the last place on this indicator.

Electrical and electronic wastes collected in 2006

Country Collected quantities, in tonnes

Germany 719986

Sweden 121500

Netherlands 87626

Belgium 72472

Austria 59207

Hungary 23297

France 13608

Poland 7459

Romania 891

Bulgaria Date indisponibile

Italy Date indisponibile

Great Britain Date indisponibile

Czech Republic Date indisponibile

Source: Eurostat, 2009, [Online],
<http://epp.eurostat.ec.europa.eu>, [Accessed 5
September 2009].

Good practice rules for waste recycling in India

Recycling and developing programs have to take into consideration the markets for recovered materials, collection infrastructure and overhead. In most cases, recovered materials are of inferior quality as opposed to the initial ones, so the market price should be attractive to potential buyers. Starting from the concept of extended producer responsibility, the activity of collection and recycling of packaging waste must be financed mainly by manufacturers and / or importers. However, considering the fact that by recycling some objectives of common interest are met, such as natural resource conservation, environmental protection and quality of life insurance, recycling programs must have

the economic support of the state. In some localities sanitation agents selectively collect waste plastic, metal and paper/cardboard, in particular from the economic agents and less from the population. This selective collection must be extended to the population level, as a very large amount of recyclable waste can be recovered from this sector. Educating the population in this regard can be done through a "bonus-malus" system where those who contribute to selective collection of waste are rewarded by receiving a discount on their sanitation fee and those who do not follow the rules of selective collection are penalized. In the activity of selective waste collection traders must also be involved, both in what concerns the selective collection of their own packaging waste, but also in the collection

from consumers. Manufacturer – retailer partnerships through which a discount is offered if at the purchase of a new product the old manufacturer packaging is returned are to be encouraged. Development of the collection infrastructure should follow market requirements, so that the value of recovered materials could cover the costs of processing and transportation. When establishing the location and size of deposits a primary objective should be the maximization of the storehouse's lifetime and the minimization of the quantities stored. Recycling processing units should place their processing plants in densely populated areas where large amounts of reusable and recyclable wastes are generated, like: București, Constanța, Cluj, Iași, Timișoara etc. which will become local processing units. In what concerns the collection of batteries and other electrochemical power sources we come across two situations. Collection of car accumulators is made according to law by traders and by specialized centers, the infrastructure being well developed. The compulsoriness of handing over old car accumulators at the acquisition of new products led to a high rate of collection of such waste. Instead, the collection of batteries is done occasionally, very few traders taking initiatives for the purpose of recycling these products. From this point of view it would be recommended that the law applicable at this time only to car accumulators be extended to all electrochemical power sources. In the case of electrical and electronic equipment waste, few companies have organized a waste reception system of electrical and electronic household waste, and generally, of bulky equipment. Due to the high content of hazardous material and substances in these types of waste, the potential for contamination of household waste, and of the storage where they go if they are collected mixed with domestic waste is high. Therefore, the separate collection of these types of waste is absolutely necessary and at the same time the creation of a centralized system for the collection of such indicated waste.

Conclusion

The problem of urban waste management is of vital importance for our country's sustainable development.

Although it constitutes a major objective both at national level and at the level of the European Union, the progress registered by our country is being far from satisfactory. If in certain areas like the recycling of obsolete vehicles there aren't large discrepancies from the results obtained by other countries, in the field of packaging, batteries and electrical and electronic household waste recycling we have serious backlogs to the targets imposed on a European level. The set of proposed measures seeks to provide solutions to problems that have generated these backlogs, but ultimately whatever measures will be adopted, the most important thing is for each citizen to realize that by respecting a minimal set of rules he can contribute to a cleaner environment.

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