



## **THE ECOPROFIT PROJECT AND THE PROGRAMME ON SEPARATELY COLLECTED WASTE FRACTIONS MANAGEMENT – THE CASE STUDY OF THE CITY MUNICIPALITY OF MARIBOR, SLOVENIA**

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### **ABSTRACT**

In the years 2003 and 2006 the city municipalities of Maribor and Graz (Austria) implemented the project Ecoprofit jointly, the main goal of which was introduction of sustainable development to the enterprise sector as well as achieving savings for companies resulting from the implementation of the environmental measures. One of the aims was reducing the quantity of waste, which was very successful and brought great savings. Then in 2005 the City municipalities of Maribor adopted the Programme on Separately Collected Waste Fractions Management, with the objective to determine the activities related to separated collection of waste at the source for the period 2005 to 2008. The Programme ensures achievement of national objectives, namely: to increase the share of separately collected fractions in the total volume of waste from 27% (2004) to 37% (2008), to collect at least 15 to 20 kilograms of urban packaging waste per capita annually, to introduce the measures aiming at reducing the volume of biodegradable waste by the year 2010, namely, to 75% of the total volume produced in 1995. Proper and regular informing and awareness raising among the waste producers is considered extremely important for the achievement of good results with regard to waste separation at the source.

**Key words:** waste, separate waste collection, awareness raising.

### **INTRODUCTION**

In the last ten years waste become one of the most important areas of environmental protection. Waste volumes continue to grow. Waste is an environmental, social and economic challenge for Europeans. For some, it conjures up negative images, for others, waste is an opportunity. The unsustainable trends in waste generation and the policy issues are causes for concern because the generation of waste can be a symptom of environmentally inefficient use of resources. In the 6th Environment Action Programme "Environment 2010: Our future, our choice", the Commission set out the environmental objectives for the next 10 years (2002-2012). In the field of waste, the major points are increased recycling and waste prevention with the aid of an integrated product policy and

measures targeting specific waste streams such as sludges and biodegradable waste. The Resolution on the National Environmental Protection Programme of the Republic of Slovenia 2005 - 2012 (NPVO) also set out the objectives for the waste management in Slovenia.

Pursuant to legislation in force, municipal waste management is a responsibility of local authorities. Most of the planning in the field of municipal waste collection, pre-treatment of separately collected waste streams, certain technologies for mixed waste treatment before disposal, and the provision of waste disposal sites occurs at the intermunicipal level. Local communities define their objectives and measures concerning waste management in the municipal environmental programmes (MEP). The Municipality of Maribor is preparing its MEP in the most democratic manner by informing and including various target groups with a view to raise the awareness, which will contribute to better outcomes of the implementation of this programme.

## **WASTE MANAGEMENT IN THE MUNICIPALITY OF MARIBOR**

In 2003, the City Municipality of Maribor (MOM) adopted a new Ordinance on Urban Waste Management (MUV - Intermunicipal Official Gazette, No. 15/03, 4/06) determining the manner of urban waste management, obligations of the public service providers in the field of waste management and obligations of the urban waste producers. With this ordinance the MOM ensures the following urban waste management system:

- Separated collection of urban waste at the source of generation, and its processing,
- Return of separately collected fractions to recovery or reprocessing,
- Disposal of the urban waste residue resulting from processing and reprocessing at the non-hazardous waste landfill, and
- Removal of waste from illegal waste landfills.

The Ordinance determines the manner of urban waste management, as follows:

- Separated collection of individual types of waste at the reception points, in separated fractions collection plants, in collection centres, through collection of bulky waste by the »door-to-door« system, and by a mobile hazardous waste collector,
- Transport of separately collected waste fractions,
- Processing of urban waste residue,
- Disposal of urban waste residue after processing.

Based on national and municipal regulations, the MOM adopted Programme on Separately Collected Waste Fractions Management. The Programme was adopted in 2005. Proper and regular informing and awareness raising among the waste producers is considered extremely important for the achievement of good results with regard to waste separation at the source. The awareness raising campaign has to be based on the presentation of legal, environmental and economic effects of appropriate management and separation of urban waste at the source. The contents of informing are focused on the advantages of separated collection of waste at the source, they indicate which fractions should be separated, which types of waste should be considered under individual fractions, and the importance of

purity in individual separately collected fractions. In Maribor, we implemented a three-year project on informing and awareness raising of the public concerning the importance of waste separation at the source, which has shown very good results. We entitled the project by »Mari and Bor« (*Mari in Bor*) - the names of a little she-fox and he-fox instructing the inhabitants of Maribor about the importance of waste separation at the source.



**Picture 2.:** Characters of the Project on Informing and Educating: She-Fox Mari and He-Fox Bor.

The project Ecoschool as the way of life is the programme that initiates the planned and the whole environmental education in the kindergarten, primary and secondary schools, included also waste separate collection and re-us of the waste.

It is a fact that the waste residue management has become increasingly costly following the requirements of a new environmental legislation. Accordingly, the treatment costs for one tonne of waste residue have amounted already up to € 150, for paper amounts up to € 63 per tonne, the price of glass up to € 58 per tonne, the price of packaging waste up to € 314 per tonne and the costs of separately collected biological waste amount up to € 103 per tonne, but they need to be separated from the waste residue due to the reduction of total organic carbon (TOC) in them. Therefore, under the awareness raising campaign, we prepared an informative poster showing that the container with waste residue, which is becoming increasingly costly, wants to have as small volume of waste as possible, while the containers with separately collected fractions should be filled by useful waste, which can be processed to useful raw materials.

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**Picture 2.:** Informative Poster Prepared under the Project on Informing and Educating.

In Maribor, we have 815 separated fractions collection plants, which are primarily intended for households and smaller service activities. In principle, they are located in such manner that one collection plant covers 140 inhabitants, in average. In these collection plants, we separately collect paper, glass and other packaging waste (plastic, metal and carton packaging waste). In addition, we have three collection centres, to which the waste producers deliver those types of waste that cannot be disposed neither to the reception point nor to the separated fraction collection plant. In Maribor, we collect the following volumes of waste residue and individual separately collected fractions;

**Table 1.:** Volumes of waste residue and individual separately collected fractions.

Year	Waste Residue Volume	Paper	Glass	Waste Packaging	Biodegradable Waste
2003	26,800 tonnes	1,000 tonnes	500 tonnes	0 tonnes	3,000 tonnes
2004	25,500 tonnes	1,500 tonnes	700 tonnes	37 tonnes	3,100 tonnes
2005	24,200 tonnes	1,700 tonnes	900 tonnes	120 tonnes	3,700 tonnes
2006	23,800 tonnes	2,200 tonnes	1,100 tonnes	220 tonnes	5,600 tonnes

In the period 2003 to 2006 there was the decline of the residue waste, but the amount of separate waste (paper, glass, waste packaging and biodegradable waste) increased. From these results we can conclude that our awareness raising campaign was successful.

### **Practical examples of waste management in the Municipality of Maribor**

According to the official records of Slovenia's Environmental Agency, there were 83 hazardous waste landfills in Slovenia at the end of 2005. Of those, 24 are to be closed in compliance with the waste disposal legislation. In the Municipality of Maribor, there are

several disposal sites: municipal waste landfill that has been closed because of failing to comply with the law, a landfill for baled waste, and a hazardous waste landfill. Technical characteristics of individual landfills are described in the continuation.

### ***Landfill Pobrežje***

The municipal waste landfill was in operation from 1978 till 2004. It had to be closed because it failed to comply with the Rules on waste disposal (Official Gazette of the Republic of Slovenia No. 5/00). The said Rules provide for an aftercare period of 10 years or for as long as measurement results show environmental impacts. During this period, the operator of the closed landfill is obliged to provide maintenance of the facilities and drainage surfaces, landfill sealing, grass mowing, maintenance of gas piping and the active gas collection system, manufacture of bio filters for pre-treated landfill gas, maintenance of the vegetation belt and perimeter ditch, 24-hour technical security of the landfill, continuous and discontinuous measurements in the manner and scope determined for operational monitoring, regular inspections of the landfill body in the scope required, preparation of the report on the state of the landfill and performed measurements for individual calendar years, controlled pumping, collection and operation of the gas power plant fuelled by landfill gas, final cap to prevent escape of landfill gas into the surroundings and infiltration of air into the landfill body, stormwater control to limit infiltration of excess stormwater into the landfill body and thus limit leachate quantities, and discharge of excess stormwater.

### ***Dogoše balefill***

Consequently, in 2004, the storage of balled waste in Dogoše started its operation. In accordance with a new definition provided by the new Ordinance on Waste Disposal adopted in 2007 we restructured this storage into a permanent landfill, which will be able to operate until the end of 2008.

The total balefill area consists of 6.2 ha. Cells are constructed so that the bottom is covered by an impermeable membrane, equipped with a leachate collection system and discharge to the collection basin and sewerage, and the system for the collection of air from piles and its treatment with bio filters. Waste handling consists of sorting and crushing, baling (wrapping waste into wire mesh and wrapping of bales with PE film). The diameter of individual bales is 1.2 to 1.3 m and their height 1.2 m. The average mass is 850 kg. Bales are placed into stacks up to 12 m high, covered with plasticized canvas preventing free emission of polluted air and mixing of relatively small quantities of leachate with much larger quantities of stormwater. Covered stacks enable discharge of waste air and gas generated in stacks through the venting system and their cleaning with a bio filter. Leachate is collected in a collection basin, pumped into the main collector and discharged to the main treatment plant. There is monitoring equipment in the storage, consisting of three piezometers for groundwater control and a meteorological station. Monitoring includes measurements of meteorological parameters, groundwater and wastewater measurements, noise monitoring, measurements of dust deposits, and air monitoring.



**Picture 3.:** Balled Waste Landfill in Dogošë

### *Hazardous waste landfill in Metava*

The hazardous waste landfill in Metava is a result of concerted action of Maribor industry and the municipal administration. Being the first facility of this type in the 1980s it served as a pilot facility for pre-treatment of hazardous waste by waste generators in industry, control of entrance to the landfill, recorded waste disposal, leachate treatment, and other environmental criteria with regard to environmental legislation in force at that time. Practically all industrial operators depositing waste in this landfill at the beginning of the 1990s, when Slovenia gained independence, ceased to exist as a result of either bankruptcy or change in ownership. The landfill in Metava is owned by the Municipality of Maribor and has been in operation since 1984. In the first years of its operation over 2000 m<sup>3</sup> of waste were deposited each year, while in recent years the quantity of waste deposited has been reduced as a consequence of decreased industrial production in Maribor. Waste is deposited in barrels or in bulk into clay-lined cells. The following types of waste are deposited at the landfill: asbestos roofing, foundry sand and other foundry wastes, furnace lining, dust from dust cleaning of flue gas, varnishing wastes, waste paint, varnish and glue, galvanic sludge, household hazardous waste (paint, varnish, and medicinal products). Stringent monitoring of leachate, groundwater and surface water is performed in the framework of the Metava landfill monitoring.

The current condition of the landfill for hazardous waste in Metava fails to meet legislative requirements concerning hazardous waste landfills. For this reason, the landfill will be



closed on 31 October 2007. Landfill aftercare and post-operation will have to be provided, which will be technically and financially highly demanding task.

## **PROJECT ECOPROFIT**

MOM is cooperating with Municipality of Graz for several years. The mutual exchange of experience led to the idea that the Ecoprofit project in Maribor should be implemented jointly. The main goal of the project Ecoprofit is cooperation established between local authorities and industry, as anticipated in the Local Agenda 21, and the purpose of the cooperation is to improve the quality of life in the city. Izvajanje zahtev okoljske zakonodaje lahko prinese tudi visoke ekonomske učinke.

In 2002 and 2003, under the leadership of the Environmental Protection Agency of the city of Graz, we implemented the ECOPROFIT MARIBOR 2002 project – basic programme. The project was funded by the Municipality of Graz (25%), the state of Styria (25%), and INTERREG IIIA (50%). An Ecoprofit academy was held for consultants and public servants from Maribor. Thus, there was a successful transfer of knowledge from Graz to Maribor and the ECoprofit idea was realised in the 20 companies from the Maribor area that participated in the project.

In the years 2004 to 2006 we implemented the “Ecoprofit International”. The project was co-finance from INTERREG IIIC programme. In addition to the Municipality of Maribor, the municipalities of Graz (Austria) and Pécs (Hungary), and the province of Modena (Italy) also participated in the project. Scientific support for the project was provided by the universities of Graz, Maribor, Modena and Pécs, the Dresden Institute for Environmental and Regional Development (Germany), and the Technological University of Częstochowi (Poland). In Maribor, the Basic and Follow-up Programmes were implemented for a total of 21 companies from Maribor region. Based on the experience of the city of Graz, we included most public utility companies responsible for drinking water, waste management, waste water drainage, gas distribution, funerary services and city market services. The Maribor General Hospital participated in both projects.

The companies that participated in the Ecoprofit projects differ both in size and production. The number of the companies' employees ranged from 23 to 2,500. All participating companies formed environmental guidelines and an environmental programme and compiled or upgraded their waste management plans. Companies have also taken measures in waste handling because of a possibility to obtain important economic gains with small input. Companies introduced waste separation, reuse and sale on the market into their production processes. Such measures reduce transport costs for disposal of residual waste and generate income by the sale of separated waste fractions.

The results of the environmental guidelines, programmes and implemented and planned measures in individual companies were reviewed by technical consultants, and at the conclusion of the project by a technical commission. Companies that demonstrated progress in environmental management received the “ECOPROFIT COMPANY” award.

**Table 3.:** Fields in which measures have been implemented, and expected annual savings for 41 companies participating in all Ecoprofit projects.

<b>Field</b>	<b>Estimated annual savings in €</b>
waste	404.800
energy	426.000
water	188.000
environmental purchases	12.500
process optimisation	461.000
fuel	8.300
reductions of emissions into the air	12.500
<b>TOTAL</b>	<b>1.513.100</b>

## CONCLUSIONS

For a successful implementation of all requirements stated in EU, national and local regulations concerning waste minimisation and waste separation, it is most important to inform and raise awareness of various target groups and environmental NGOs. In Maribor, information is disseminated to children and youth from preschool up to secondary school in the framework of the project Eco School as a Way of Life, employees in businesses in the framework of the Ecoprofit project, and other citizens through information brochures, media and the action Mar in Bor. Only well informed citizens will understand the importance of waste separation and will also know how to properly separate waste. Those measures are additionally supported by the municipal waste collection company setting up the infrastructure and regularly collecting waste. One of the key steps is also the preparation of the framework strategic document for sustainable development of the municipality and the implementation of its provisions. This is the Municipal Environmental Programme, prepared in the most democratic manner. Various target groups such as professional and other interested public, environmental NGOs, businesses, and politicians participate in the process. This will increase the document's visibility and the probability of its successful implementation.

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