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## **International POPs Elimination Project**

*Fostering Active and Efficient Civil Society Participation in  
Preparation for Implementation of the Stockholm Convention*

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# **Zero waste as a Best Environmental Practice to address POPs issues created by waste incineration and/or landfilling of waste: A case study in Hungary**

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## **About the International POPs Elimination Project**

On May 1, 2004, the International POPs Elimination Network (IPEN <http://www.ipen.org>) began a global Non Governmental Organisation (NGO) project called the International POPs Elimination Project (IPEP) in partnership with the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Program (UNEP). The Global Environment Facility (GEF) provided core funding for the project.

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to each country's efforts in preparing for the implementation of the Stockholm Convention;
- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;
- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

IPEP will support the preparation of reports on a country's situation, hotspots, policy briefs, and regional activities. Three principal types of activities will be supported by IPEP: participation in the National Implementation Plan, training and awareness workshops, and public information and awareness campaigns.

For more information, please see <http://www.ipen.org>

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## **Introduction**

After the change of the political and economic regime the waste management of the country is focusing on waste disposal. The amount of waste produced by the industry became less, modern marketing tools influenced our consumption patterns and people generated more and more municipal solid waste. The situation became worse for reuse, hills of packaging waste are growing fast, and there are only a few successful recycling models.

Since Hungary joined the European Union (EU) on 1 May 2004, EU laws have been the most effective driving force of Hungarian environmental legislation. It is really important that these laws and directives give definite direction e.g. to improve recycling of packaging waste year to year.

At this stage there is enough clean waste produced in the manufacturing process of factories which they collect and recycle to meet the binding recycling rate, but since this rate is higher and higher every year, this is not enough anymore and they do need to divert packaging waste from municipal solid waste. as well. There are so-called 'garbage collection islands' in big cities where people can put their separated waste and waste management companies transport them to recycling companies.

But this process is quite slow, and the amount of municipal solid waste (MSW) is growing 1-3 % every year. This waste ends up at landfills and/or is incinerated and quite often also burnt in household stoves. All of these three waste disposal options were marked as potentially significant sources of unintentionally produced POPs listed in Stockholm Convention Annex C.

There is a strong need for good pilot projects to change people's mind and attitude about natural resources, energy and waste. The office building waste recycling project (IPP) of HuMuSz Recycling Ltd. is exactly trying to achieve this.

## **Pilot Project for Recycling**

On the following pages we will describe a pilot project (called IPP) for recycling. HuMuSz Recycling Ltd. is organizing separate waste collection of paper, glass bottles, PET bottles, akkus (battery packs) and batteries, CDs and office hazardous waste in public and office buildings then transports the collected waste to reliable Hungarian recycling companies. From time-to-time HuMuSz Recycling Ltd. informs all the participants of the recycling project on how much paper waste they collected separated, how many trees, how much energy, how much water they could save by using both sides of paper and separating their waste. HuMuSz will introduce the development of the project, analyze the available data on IPP and try to predict its future.

## Need for alternative policy

Although, theoretically everybody agrees that waste prevention is the most important waste management exercise, it seems that nobody has an idea what to do with this theory in practise. No legislation requires waste prevention plans, no short-, mid- or long term strategy exists that describes how to slow the growth of MSW down. Reuse disappears because it is not favoured by industry which wants to produce and sell as many as possible and there is no legislation to save them. Recycling is important to meet the EU recycling rate only – no further development occurs. The recycling of certain waste streams is not possible in Hungary, e.g. we transport our glass waste to the neighbouring countries of Slovakia, Czech Republic or Poland. Incineration and landfilling capacities of the country are growing since there is a lot of EU money available in Cohesion and Structural Funds to support the construction of these disposal facilities. Beside their effects on our environment and health, disposal capacity is not changing the attitude of people to think of their behaviour, and consumption patterns, but it keeps the illusion alive that we can extract all natural resources rapidly, produce short-life products and throw the waste away. Waste will disappear and we will realize later that our lifestyle, behaviour, consumption pattern is not sustainable at all.

We need decision-makers who:

- are open to understand the main problem of waste
- want to develop a sustainable waste management
- are willing to change the current legislation
- are able to deal with strong industrial lobby-groups
- want to save energy, natural resources and prevent pollution,
- understand that we have to start everything with preventing the production of waste, design less toxic products and packaging for longer lifetime, replace more and more hazardous materials and ban their use, reuse everything that is possible and very necessary to produce, repair everything that is possible, recycle everything and finally think about how to dispose the remaining waste in the most safe way. If we act in this priority order, there will be only a small quantity to deal with.

## The separated waste collection program in public and office buildings step-by-step

The separated waste collection program in public and office buildings lead by HuMuSz Recycling Ltd. started in 1998. The Ministry of Environment (MoE) asked HuMuSz to write a study on introduction of separate waste management in the buildings of MoE. The NGO analyzed the content of their wastebins and wrote the study.

Few months later, the MoE asked HuMuSz to help to realize the project. According to Hungarian laws only companies can get permits to transport and handle waste, NGOs can not get the necessary permits. So, HuMuSz became the coordinator of the recycling project of MoE. After accepting the request, they decided to implement the project step-by-step and to start with separated paper waste as a good first step of the recycling project. The members of the NGO chosen the type of wastebins, good places for their location in every floor of the office buildings, and the containers for larger volumes of separated waste as well.

We educated and checked the cleaning staff regularly. We got enough space to store some waste and had regular contact with recycling companies. We called them to come when there was a lot of separated waste available, making the transport more cost-effective.

Every 3<sup>rd</sup> month all the officers get information on how much waste they collected separately; how much energy, natural resources they saved.

Seeing that it was a serious project of a credible NGO, waste was transported and further separated by credible recyclers. All the officers and cleaning staff cooperated a lot. It was time to come up with separate waste collection of other waste streams.

The successful pilot project was named in a government decree written to state institutes and offices on the importance of showing a good example to the public. This was the good example that HuMuSz is running a separate waste collection program in the buildings of MoE.

Most probably thanks to this government decree – since HuMuSz did not advertise - state owned institutes and the business sector started to be interested in this service and HuMuSz had to think about how to move further.

We had to find a company to get permission for handling and transporting waste, so HuMuSz Recycling Ltd. was founded. We got a van and colleagues prepared a small hydraulic jack to lift heavy containers onto the van.

Currently, HuMuSz Recycling is organizing a separate waste collection programme in the buildings of 11 government or business offices including the MoE, National Park headquarters, Office building of the Hungarian Parliament, Hungarian Meteorological Service, Allianz Hungary insurance company and others (see Table 1). All these public buildings, state institutes and companies are located in Budapest, except for the Regional Environmental Centre of CEE which is in Szentendre, 25 kms from the capital. That makes the logistics easier and more economical to organize.

There is a strong demand from new offices as well.

## **Brief description of practice**

The IPP of HuMuSz Recycling Ltd has several phases:

### **I. Preparation:**

1. Study the office and its streams and amount of waste
2. Finding the places of collection points on every floor of the building, find the waste bins, and find a suitable place preferably on the groundfloor level where large amounts of separated waste streams can be stored
3. Educate the cleaning staff and the employees of the office by giving lectures, advertising it through posters, spreading a leaflet and answering practical questions.

**Table 1.** Brief overview about IPP project

	Name of office where the IPP of HuMuSz Recycling Ltd. is introduced	People involved (number of persons)	Start of project	Waste streams collected separated					
				Paper	PET bottle	Glass bottles	Batteries	Office hazardous	CD
1	Allianz Hungary (insurance company)	362	1999-08-05	yes	yes	-	yes	yes	yes
2	Regional Environmental Centre of CEE	113	2000-12-12	yes	yes	yes	yes	yes	-
3	Ministry of Environment and Water	710	2001-08-01	yes	yes	yes	yes	yes	-
4	Headquarters of Duna-Ipoly National Park	45	2001-11-23	yes	yes	yes	yes	yes	-
5	Northern Hungarian Environmental Inspectorate	118	2002-04-01	yes	yes	-	yes	yes	-
6	Publicis Kft. (marketing and PR company)	77	2002-05-07	yes	yes	-	-	-	-
7	Közép-Duna-völgyi Environmental Inspectorate	169	2003-06-01	yes	yes	yes	yes	yes	-
8	Hungarian Meteorological Service	195	2004-01-01	yes	-	-	yes	yes	-
9	Office building of the Hungarian Parliament	763	2004-05-01	yes	yes	yes	yes	yes	-

			<b>Waste streams collected separated</b>						
10	ZSIGMOND HÁZ real estate company	51	2005-06-01	yes	yes	-	yes	yes	-
11	Office building of the Prime Minister's Office (for providing services)	588	2005-12-01	yes	yes	yes	-	yes	-
Total number of participants:		3191							

## II. Running the program:

1. monitoring the cleaning staff
2. regular feedback to each and every participant of the program on the approximate amount of waste she/he collected and the primary resources saved by this activity
3. replacing bins and information material if needed
4. when the storage at every office is full of separated waste HuMuSz Recycling Ltd is organizing logistics; collecting the same waste streams from more office buildings and transporting it to recyclers.

## Specific outcomes from the IPP recycling project

Before these offices started to collect their waste streams (listed above) separately, the waste ended up in disposal facilities. Approximately 60% of it went to Rákospalota waste incinerator, the rest to the waste landfill of Pusztazámor.

The offices do not stop producing waste which is not recycled, but the total amount of waste disposed is reduced significantly.

**Table 2.** Overview about outcomes of the project for year 2005.

Waste stream	Waste collected, 2005	What is happening with it?
Paper	76 265 kg	Preparation in Budapest then recycling in Csepel (H)
PET	2 949 kg	Preparation in Budapest then recycling in China
Glass bottle	14 740 kg	Preparation in Budapest then recycling in Czech Republic
Battery, akku	187 kg	Preparation in Budapest then landfilling in Aszód (H)
Office hazardous	281 kg	Preparation in Budapest then incineration in Dorog (H)
Electronic	5 040 kg	Preparation in Budapest then recycling in various metal recycling companies (H)
Fluorescent lamps	92 kg	Preparation in Budapest then landfilling in Aszód (H)
Furniture	1000 kg	reuse

**Table 3.** IPP project costs sum up in EUROS.

Item	Sum per annum
Salary of the two coordinators	14 000
Cost of the operation of the transporter van	1 200
Cost of different wastebins	2000 – 8000
Ammortization of wastebins	400
Operation of the office and costs of communication	600
<b>TOTAL</b>	<b>18 200 - 24 200 EUROS a year</b>



## Some other options for separated waste collection and waste reduction tools in Hungary

There are different types of collection points in Hungary.

- The container islands are on the streets, they are open all day and night and everybody can throw their waste into them. Normally, a container island consists of five different waste bins for: paper, PET bottles, aluminum cans, white glass, and colored glass. That service seems to be free, but this is financed by local waste management companies from the waste-fees households pay – so they are not motivated financially to collect waste separated. It is co-financed by the Hungarian member of Grüne Punkt-system, ÖkoPannon Kht. as well. People do not have to pay, and they do not get money for their waste.
- The waste yards collect these as well, plus electronic and electric waste, used oil, battery and akku. There are 14 of them in Budapest. This is financed by the local waste management company as well. People do not have to pay, and they do not get money for their waste.
- Some districts and local governments are willing to start with door-to-door separate waste collection. Those projects are in preparation phase.
- Waste recyclers' yard: Small enterprises can pay a small amount of money to people who transport their waste to their yards. It is working with metal waste very well, and with paper.

Collecting places obtain money from the so-called Recycling fund – e.g. in some counties the packing companies have to pay into a special fund when they sell the packing material to the other companies (e.g. to food company, etc.) or these packing companies establish special companies which pay money to villages, cities, etc. for the separated waste (special containers for paper, plastic bottles, glass).

Money from this special recycling fund is used for paying for the separated waste.

Collection points in general are financed partly by local waste management company + Grüne Punk member ÖkoPannon and the second biggest (after ÖkoPannon) coordinating body for packaging waste recycling, ÖkoPack. They are not interested in real reuse of waste, and incinerate their waste if they do not have to meet EU packaging directive which indicates that 50 % of collected waste must be recycled. There are government applications available to buy bins or other equipment to start a recycling program, but the amount of money is not significant.

Local waste management companies, most often owned by local governments are responsible for the collecting points. The price of waste differs from one collecting point to another. They are not regulated. It can be very different from each other.

Hungary has a government decree on a deposit-fee. It is basically useless as it is just about how a company should behave when it is selling returnable packaging, or producing such products but not forcing anybody to produce or sell those products. By now only beer and some wine is sold in a refillable glass on the market.

The law on product-fees is much better for reuse. It is introducing a fee for one way packaging if the producer or the shop is not producing or selling a certain amount of drinks in refillable packaging. This amount is very low at this moment (1% for mineral water, but 65% for beer) as well as the product fee, but it is growing and will be higher and higher till 2010.

That is the reason why the industrial lobby is attacking this law in Brussels since it could help refillables in the mid-term. Their argument is that the law is discriminating against producers of beverages, producers and traders of certain products.

## Zero Waste practices and prevention of unintentional POPs releases

In this study we presented a zero waste case study designed to prevent the flow of wastes to waste landfills and municipal solid waste incinerators. It also prevents generation of unintentional POPs releases from some of their significant sources, which include waste incinerators and/or fires at landfills. Table 4 shows for example dioxin (PCDD/Fs) releases per 1 ton of disposed municipal solid waste according to the UNEP Dioxin Toolkit 2005 edition.<sup>1</sup> Other figures can be received when we use some other default emission factors. Some of them per 1 ton of municipal solid waste for Central and East European countries are presented in Table 5.

**Table 4.** PCDD/Fs releases by burning 1 ton of municipal solid waste under different conditions / source categories according to UNEP Dioxin Toolkit, 2005 edition.

Source Categories	Potential Release Route (µg TEQ/t)			
	Air	Water	Residues	Total
Low technol. combustion, no APC system	3,500	-	75	3,575
Controlled comb., minimal APC	350	-	515	865
Controlled comb., good APC	30	-	207	237
High tech. combustion, sophisticated APCS	0.5	-	16.5	17
Landfill fires	1,000	-		1,000
Uncontrolled domestic waste burning	300	-	600	900

**Table 5.** PCDD/Fs releases by burning 1 ton of municipal solid waste under different conditions / source categories according to data from CEE region and EU.

Source Categories	Potential Release Route (µg TEQ/t)			
	Air	Water	Residues	Total
Modern MWI, Czech Republic <sup>2</sup>	0.93			
MWI Termizo Liberec, dioxin filter, Czech Republic <sup>3</sup>		-		50
MWI Termizo Liberec, dioxin filter, Czech Republic <sup>4</sup>	0.9	-	29 - 90.2	29.9 - 91.1
MWI in Bratislava, data for 2003, (meets the EU limit for air emissions 0.1 ngTEQ/m <sup>3</sup> ), Slovakia <sup>5</sup>	0.4			
MWI in Košice, data for 2003, (does not meet an EU standard 0.1 ngTEQ/m <sup>3</sup> ), Slovakia <sup>6</sup>	60			
Older MWI, Europe <sup>7</sup>	25-1,000			
Up-to-date equipped MWI, Europe <sup>8</sup>	0.5			
Modern MWI in England and Wales, data for 2002 <sup>9,10</sup>			10.1 - 183.7	
Landfill fires				No data

Note: MWI = Municipal Waste Incinerator

For calculation of emission default factors for landfill fires, less data available with a wider range of results. In a landfill fire simulation, Hirai et al. (2005)<sup>11</sup> burned refuse derived fuel (RDF) in a steel bowl filled with soil. The RDF was comprised of paper and textiles, 51.8 percent; plastics and leather, 32 percent; wood and grass, 5.3 percent; garbage, 9.5 percent;

non-combustibles, 0.4 percent; and others, 1 percent. They reported emission factors for releases to air of 23-46 ng TEQ/kg and for releases to residues, 120-170 ng TEQ/kg, with 70-90 percent of the dioxins partitioned to the residues. The Hirai et al. report shows that landfill fires can emit less dioxin than UNEP Dioxin Toolkit estimates. Therefore it is always better to make calculations within some range.

Table 6 shows potentially saved dioxin releases by the presented zero waste practice from several CEE countries. The pilot calculation is based on amount of recycled waste per one year as described above which was 85.2 t/year. This amount of waste that was counted into the calculation does not include wastes that can not be burned (glass) that ended at landfills (hazardous waste) and/or were burned (wood, part of hazardous waste).

**Table 6.** On UNEP Dioxin Toolkit-based calculation of prevented dioxin releases because of waste taken away from waste flows to waste incineration and/or landfilling.

Dioxin source category / subcategory	Case study Budapest
	g TEQ
Low technol. combustion, no APC system	0.304
Controlled comb., minimal APC	0.073
Controlled comb., good APC	0.020
High tech. combustion, sophisticated APCS	0.002
Landfill fires	0.085
Uncontrolled domestic waste burning	0.077

Total savings of dioxin releases can vary from 2 mg up to 304 mg per year by only this relatively small demonstration project using pieces of a zero waste strategy in Budapest. By using different emission factors than those of the UNEP Toolkit we can get different figures. These differences can be estimated from comparison of emission factors demonstrated in Table 5 with those set up in UNEP Dioxin Toolkit. There are differences in estimations of releases through waste incineration residues for example, but this is not a major matter of this study.

In reality savings are much greater when we include energy and raw materials input into products that were saved. Energy generation and different products production also generates also some amounts of unintentionally produced POPs. These savings are not easy to calculate.

## Conclusion

In this report we presented a zero waste practice case study that shows how a citizen-based initiative can significantly contribute to improvement of waste management. We hope that this case study can be used as pilot project replicated elsewhere in the world. It is based on a simple thing: collecting the wastes separately.

Total savings of dioxin releases can vary from 2 mg up to 304 mg per year by only this relatively small demonstration project using pieces of a zero waste strategy in Budapest. This is a lot when we look at figures of total dioxin releases estimates and compare them with the scale of the projects. It provides even greater justification for the need to broadly introduce zero waste strategies as a Best Environmental Practice and as one of important tools to minimize and finally eliminate unintentional POPs releases.

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<sup>4</sup> Petrлік, J., Ryder, R. A. 2005: After Incineration: The Toxic Ash Problem. "Keep the Promise, Eliminate POPs!" Campaign and Dioxin, PCBs and Waste WG of IPEN Report. Prague - Manchester, April 2005. Also available at: <http://ipen.ecn.cz/index.php?l=en&k=download&r=default&id=113>.

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