International POPs Elimination Project

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

Country Situation Report on POPs in Hungary

János Pál, Gergely Simon
Clean Air Action Group

Hungary
March 2006

About the International POPs Elimination Project

On May 1, 2004, the International POPs Elimination Network (IPEN http://www.ipen.org) began a global 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 country 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 preparation of reports on country 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

IPEN gratefully acknowledges the financial support of the Global Environment Facility, Swiss Agency for Development and Cooperation, Swiss Agency for the Environment Forests and Landscape, the Canada POPs Fund, the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM), Mitchell Kapor Foundation, Sigrid Rausing Trust, New York Community Trust and others.

This report is available in the following languages: English

Table of contents

Country Situation Report on POPs in Hungary

1. What are POPs?

Persistent organic pollutants (POPs) are man-made chemicals which remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel.

The Stockholm Convention covers 12 priority POPs (Picture 1):

A) Pesticides: aldrin, chlordane, dichloro-diphenyl-trichlor-ethane (DDT), dieldrin, endrin, heptachlor, hexachlorobenzene, toxaphene, mirex,
B) Industrial Chemicals: hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs),
C) Unintentionally produced POPs: polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), PCBs and HCB.

(HCH - Hexachlorocyclohexane), – game isomer of HCH is Lindane – this chemical was nominated for inclusion in the Convention at the COP 1 in May 2005. Other substances nominated to the Convention include chlordecone, hexabromobiphenyl, pentabromodiphenyl ether (PBDE), and perfluorooctane sulfonate (PFOS). Other important POPs are the polycyclic aromatic hydrocarbons (PAHs), and/ 2,4,5-trichlorophenoxyacetic acid (2,4,5 T).

2. Sources of POPs

POPs have several sources. Most of the 12 organochlorine chemicals under the Stockholm Convention are pesticides (9 chemicals). The distribution of sales of POPs substance by 10-year periods (1950-2000) is shown in Table 1.

PCBs are a group of industrial chemicals that were commercially produced worldwide on a large scale between the 1930s and 1970s (in some countries for a much longer time). The polychlorinated dioxins and furans - PCDD/F - come into the environment mostly from waste incinerators (including municipal waste incinerators), iron ore sintering plants, production and use of the wood preservative pentachlorophenol, and pulp and paper mills using chlorine for the bleaching process. PCBs are the most significant potential source of furans, a fact that underlies the concern about accidental burning of PCBs.

Most of the pesticides regulated in Stockholm Convention and other dangerous pesticides have been banned for almost 30-40 years in Hungary as presented in Table 2.

Table 1: Distribution of sales of POPs substance sales by 10-year periods, between 1950-2000
(Source: Central Service for Plant Protection and Soil Conservation)

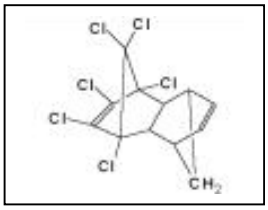
Active substance (t)	1950-1960	1961-1970	1971-1980	1981-1990	1991-2000	Σ
DDT	10 128,3	29 347,6	4,4	-	-	39 480
HCH	2 555,9	4 399,2	-	-	-	6 955
Lindane	2,1	8 787,8	4 315,0	175,7	3,9	13 284
Toxaphene	153,4	1 595,7	1 807,5	75,2	1,0	3 633
Aldrin	0,7	1 893,7	-	-	-	1 894
Dieldrin	4,75	259,4	-	-	-	264
HCB	0,04	5,2	17,1	-	-	22,3
Chlordane	-	0,1	-	-	-	0,1
2,4,5-T	0,05	255,1	601,7	68,9	-	926
Total	12 845,2	46 543,7	6 745,6	319,8	4,9	66 459

Table 2: The date of withdrawal and half-life of the POPs pesticides and other dangerous pesticides
(Source: Central Service for Plant Protection and Soil Conservation)

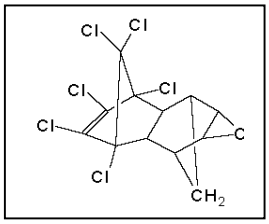
Active substance	Date of withdrawal	Half-life
DDT	1968	5–6 years
HCH	1968	2,5 days
Aldrin	1968	1–5(-10) years
DDT-Lindane combination	1970	
DDT-HCH combination	1970	
HCB	1980	17 – 70 days
Toxaphene	1992	9 days – 14 years
Methoxychlor	1992	
2,4,5 T	1992	
Lindane	1999	7 days – 3 years

Pesticide

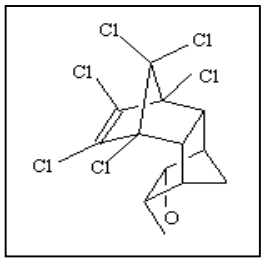
Aldrin



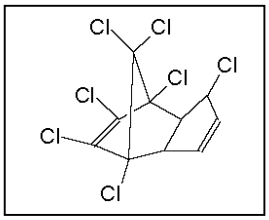
Dieldrin



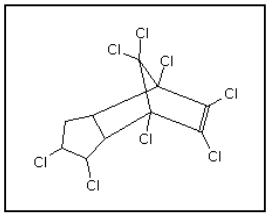
Endrin



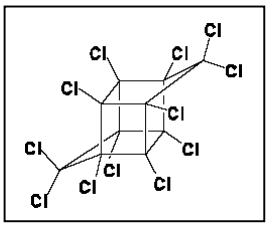
Heptachlor



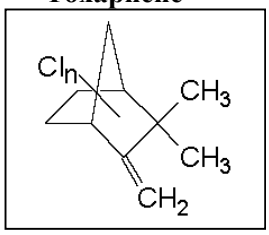
Chlordane



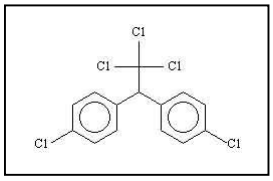
Mirex



Toxaphene

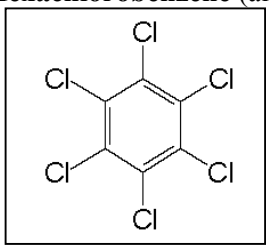


DDT

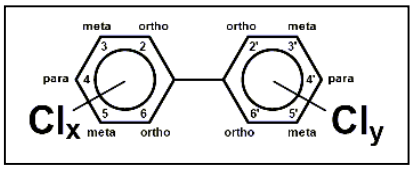


Industrial Chemicals

Hexachlorobenzene (also pesticide)

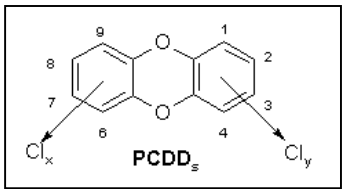


Polychlorinated biphenyls

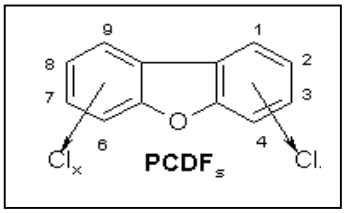


Unintentionally Produced POPs

PCDD



PCDF



Picture 1: The Stockholm Convention 12 priority POPs

2.1 POPs under the Stockholm Convention (PETHŐ – OCSKÓ, 2003)

Aldrin:
Aldrin has never been produced in Hungary, but it was imported in low volume beginning in 1959. It was mainly used with phosphate (aldrin concentration in this product was 2%). The sold volume reached 16 500 t/year in the middle of the 1960s. The use of aldrin was banned at the same time as DDT, in 1967.

Chlordane:
Chlordane use in Hungary has been negligible. It was only imported in 1961 at a level of 0,1 tonne.

Dichloro-diphenyl-trichlor-ethane (DDT):
The use of DDT started during the Second World War in Hungary. In the early 1950s it was mainly used in a concentration of 5-10%. The format of powder was quite popular in 1964 and the sold volume reached 8524 tonnes (which means 1276 tonnes active ingredient). The oil emulsion was also popular. It was used in a concentration of 10%. In 1961 almost 1000 tonnes was sold. The commerce of 100% DDT was also important (1849 tonnes sold in 1965). The commerce of most of the DDT products was banned in 1966, but the agricultural use was allowed until 1967. The phase-out of DDT products drove the growing use of combined DDT-Lindane products from 1967 to 1969. These products were banned in 1970.

Dieldrin:
Dieldrin was used in the same period as aldrin. Its usage volume was quite low as compared with the other POP pesticides. The maximum amount used was reached in 1964 (234 t).

Hexachlorobenzene (HCB):
Low amounts of HCB were used in the mid-1950s. Its use has become a little more significant in the 1970s. Maximum use was 32 tonnes in 1972. The HCB phase-out was in 1980. Some products used for timber conservation contain HCB as a pollutant, for e.g. heptachlorophenol and chlorotalonil. HCB is still emitted from incinerators.

Toxaphene (Camphechlor):
Toxaphene use in Hungary started in 1958 (with 10,5 tons). Further on its use as a powder and sprayer product continued until its phase-out in 1992. The largest use of toxaphene was in the period 1961-1977, with almost 0,35 t of the active ingredient used in 1972.

Endrin, heptachlor and mirex have never been used in Hungary.

Polychlorinated biphenyls (PCBs):
The PCBs are partly used in the industry and partly arise in burning. According to the official estimates the 80% of the emissions are caused by fuel use, and about 20% arise from the industry. The emission to the air was about 101 kg in 2001, which is about half of the emission in 1980. The PCBs were mainly used in transformers, capacitors and in hydraulic oils in Hungary (Table 3). The amount of PCBs used in the above industrial equipment is decreasing quite fast (Table 4). The PCBs were not and are not produced in Hungary so the entire used amount was imported mostly from the former German Democratic Republic and Soviet Union. The use of PCBs-containing oils ended in 1983. The amount of PCBs imported in 1997 was 1 kg.

The use of the equipment contaminated by PCB is according to EU legislation permitted until 2010 and its disposal obligatory until the end of that year. The disposal means burning in an incinerator at 1000ºC (HOLÉCZY et al., 2003).

Table 3: The PCBs content in transformers, capacitors and in hydraulic oils in Hungary (Source: Ministry of Water and Environment)

Type of the equipment with PCB oil content	2003			2004		
	Number (pc)	Amount of PCB oil content >0,05 mass%		Number of equipment (pc)	Amount of PCB oil content >0,05 mass%	
		(kg)	(dm^3)		(kg)	(dm^3)
transformer	1 392	211 504	264 379	1 171	158 686	198 358
capacitor	15 103	100 793	125 990	13 594	95 960	114 885
other	26	533	667	26	533	667
total	**16 521**	**312 830**	**391 036**	**14 791**	**255 179**	**313 910**

Table 4: The decrease of the equipment containing / contaminated by PCBs in Hungary (Source: Ministry of Water and Environment)

Changes 2003-2004			
Type of the equipment	Number (pc)	Amount of PCB oil content >0,05 mass%	
		(kg)	(dm^3)
transformer	-221	-52 818	-66 021
capacitor	-1 509	-4 833	-11 105
other	0	0	0
total	**-1 730**	**-57 651**	**-77 126**

The reason for the changes within one year:
- Substitution of equipment for fillings without PCB content.
- Reduction of the amount of equipment with >0,05 mass % PCB oil content can be caused by the wrong reporting of the operators in the previous year because of a lack of measurement. In the meantime – in the case of transformers – the operator probably made the measurement and the result of the PCB concentration could be <0,05 mass %.

- Began the disposal (incineration) of the PCB oil fillings (LOTZ, 2005).

Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs):
The main sources of the PCDD/Fs in Hungary was/is: (lignite) power plants (14,5 g TEQ total and 8,5 g emitted by the lignite power plant at Matra Mountain); citizens heating with brown coal (11,9 g TEQ); the metal-industry (24,4 g TEQ); and the municipal incinerators (1,8 g TEQ) (TAJTHY, 2003). In Hungary there are only measures for incinerators, but the estimates for the other sources are also available. PCDD/Fs emissions were 200 g TEQ in 1985, but later decreased. In 1994 the emissions fell below 100 g TEQ, in 2001 it was only 78 g. The emitted dioxins and furans rate is about 50-50%. The emissions from incinerators are only 5% of the total amount, because of the increasingly strict regulation.

2.2 New POPs

Hexachlorocyclohexane (HCH):
The use of HCH also started in the Second World War. It is used at a similar volume as DDT (several thousand tonnes/year), and its phase-out was also in 1967.

Lindane (Gamma-HCH):
The popularity of Lindane grew mainly because of the phase-out of DDT. A typical property of the usage of Lindane is the usage of active ingredients combination. The Lindane – DDT combination was quite popular in the first period of its use (1966-1969). The highest usage of Lindane was in 1970 in Hungary. The use of a fertiliser (phosphate) and Lindane combination plant protection product (PPP) grew prominently in the period of 1965-75. Its usage in 1971 was higher than 17 thousand tonnes, but this agrochemical's Lindane content was only 1,5%. The usage of Lindane containing powders was the highest in the early years of the 1970s. This products usage decreased only after a decade in 1982. The last Lindane-containing product was the Lindafor which used until 1989. The Lindane in Hungary was banned only in 1999.

2,4,5-trichlorophenoxyacetic acid (2,4,5 T):
Although the 2,4,5 T is not on the Stockholm Convention list, its usage is important because it contains some (about several tens of ppb) tetrachloro-dibenzo-dioxins (TCDD). The 2,4,5 T was a widespread herbicide beginning in the 1960s. The sold amount of 2,3,4 T ingredient was the largest in 1971 more than 100 tonnes of it was sold. The 2,3,4 T usage ended in 1984, but its phase-out was only in 1992.

Polycyclic aromatic hydrocarbons (PAH):
The main source of PAH in Hungary comes from heating with wood (this accounts for 43% of the emissions). The aluminum industry is also an important source of emissions (24%), as well as the emission from the traffic (such as diesel-fueled cars, 19%). The PAH emission in 2001 was 55,5 tonnes.

3. Levels of POPs

3.1 POPs emissions in general

The POPs emissions in Hungary are low compared with the emission rates of other countries in the CEE region (LOTZ, 2005).

The main reason of the low POPs releases might be the extraordinary high rate of natural gas consumption and the proportional decrease of the use of solid and liquid hydrocarbons. Another reason for the low POPs releases is the permanent recession in the domestic metallurgical sector which would otherwise be an important source of POPs emissions.

However, it is fact that partly due to the introduction of more strict regulations forced by the EU legislative harmonisation in the past decade and partly by the early ban of most pesticides controlled by the Stockholm Convention (SC) and Aarhus Protocol (AP), the state of the environment has become much better in the past decade. Also the energy efficiency has been improved by the change of fuels from solid and liquid hydrocarbons to natural gas, by the introduction of energy efficient technologies, by the combined heat and power generation (co-generation), etc. in Hungary.

Some evaluate the co-incineration of wastes in the cement factories as energy efficient and an environmental improvement (LOTZ 2005), but this practice is doubtful and opposed by public interest NGOs. Most of the Hungarian cement kilns work by the co-incineration of wastes. These type of the cement kilns are in Vác or Hejőcsaba. The inhabitants are fighting against the building of new cement kilns like these in Nyergesújfalú, and they voted against its building. One concern about this practice comes from the Stockholm Convention itself. Annex C lists cement kilns firing hazardous wastes as having the potential, „...for comparitively high formation and release“ of dioxins, furans, PCBs, and HCB.

3.2 POPs pollution of the surface and ground waters:

In the surface waters Lindane concentrations have changed in the range of 0,01- 0,10 µg/l. The benzo(a)pyrene (PAH) concentrations have changed in the range of 0,001-0,018 µg/l, while the PCB concentrations in the range of 0,005-0,06 µg/l. Apart from some pollution arriving from abroad, no detectable POPs concentration has been found in the surface waters. It has to take into account that the collected data related mainly to emission measurements and not to effluents.

In ground waters measurements of certain POP groups revealed that though the POP pollution exceeded the “B” pollution limit value in some cases, it was not to such an extent remediation intervention would be required.

3.3 Soil contamination with POPs

The „B" pollution limit value of soils was exceeded only in few cases, based on the measurements on the TIM points (Soil Information Monitoring) in 3-4 year frequency.
The following POP pesticides were monitored: HCHs, drins (aldrin, endrin, dieldrin), DDT, heptachlor. From these measurements only DDT reached the detection limit (5 µg/m^3).

PCBs were monitored in 33 (in 1996) and 44 (in 1997) points in Hungary, but in both years only one sample contained detectable concentrations (the detection limit was 1 µg/kg in 1996 and 0,05 µg/kg in 1997).

The PCDD/Fs were monitored at 43 points in 1996 and 1997 and the detected concentrations were mostly near 5 ng/kg (ANTON et al., 2003).

3.4 Food contamination with POPs

Some of the measurement results of POP residues in the period 1985-2001 which are characteristic of the plants produced in Hungary are presented below in Table 5:

Table 5: POPs residues in foodstuffs (µg/kg)
(Source: Central Service for Plant Protection and Soil Conservation)

Active substance	Food, fruits							
	Pumpkin seed oil		Pumpkin seed		Potato		Wild strawberry	
	No. of samples	Measurement	No. of samples	Measurement	No. of samples	Measurement	No. of samples	Measurement
Aldrin+dieldrin	28 000	5-20	3 000	1-10				
DDT isomers	16 000	1-10			6 000	7-11		
Lindane	32 000	1-12	6 000	1-5	3 000	2-9	5 000	4
HCH isomers	38 000	1-8	6 000	3-7				
Toxaphene	1 000	320						

The results of the investigations are in the range of the detection limit, or have shown very low contamination, however in the recent past the 0,01 mg/kg limit value of drins (aldrin, dieldrin) has been exceeded and in the lower layers of soil there are still residues of dieldrin absorbed by the longer root-system of marrow.

In the case of PAHs the human "tolerable" daily intake (TDI) is estimated as 0,05 µg/body kg, in order to meet this TDI, it would be important to specify obligatory PAH limit values at least for the good PAH indicators (e.g. big-leaf vegetables, etc.). The task of the service-network of Plant Protection is to control the limit values for the POPs content of foods, vegetables, fruits, crops.

3.5 Assessment of health hazards related to POPs exposure

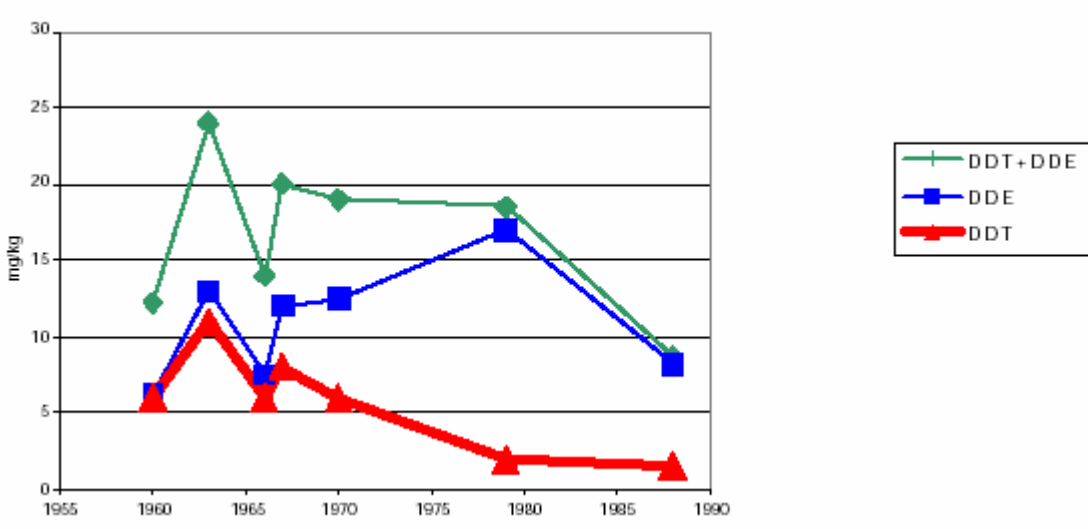
There is some measurement data available on the effects of POP pesticides, PCBs, PAHs, HCB, HCH, and dioxins to health (breast milk, fat tissue) based on the domestic (NEKAP) and international (WHO) measuring programmes. However the amount of data and the frequency of investigations are insufficient and a special problem is that there is a shortage of reliable data on the impacts and exposition of dioxin to the health.

The contamination of breast milk with DDT in the 1970s and 1980s in Hungary was significantly higher than in Germany or Austria. Now the breast milk contamination is more similar in the three countries. The latest measurements show that the DDT concentration in breast milk is 25 µg/kg, which is much lower than in the period from 1976-86 (340 µg/kg). This favourable change is also true of the PCB contamination of the breast milk.

WWF performed blood tests on the women from 3 different generations of selected families in several European countries including Hungary in 2005. They found that the blood of the Hungarian participants contain significantly more (but not the most) organochlorine pesticides (OCP) than the international mean. The daughter's blood contained 1906 pg/g serum OCP (the international mean was: 856 pg/g serum). The mother's blood contained 4920 pg/g serum OCP (international mean = 2150 pg/g serum), while the grandmother's blood contained 8052 pg/g serum OCP (international mean = 4070 pg/g serum).

The measured DDT residues in people in the 1970s in Hungary were quite high compared with other countries.

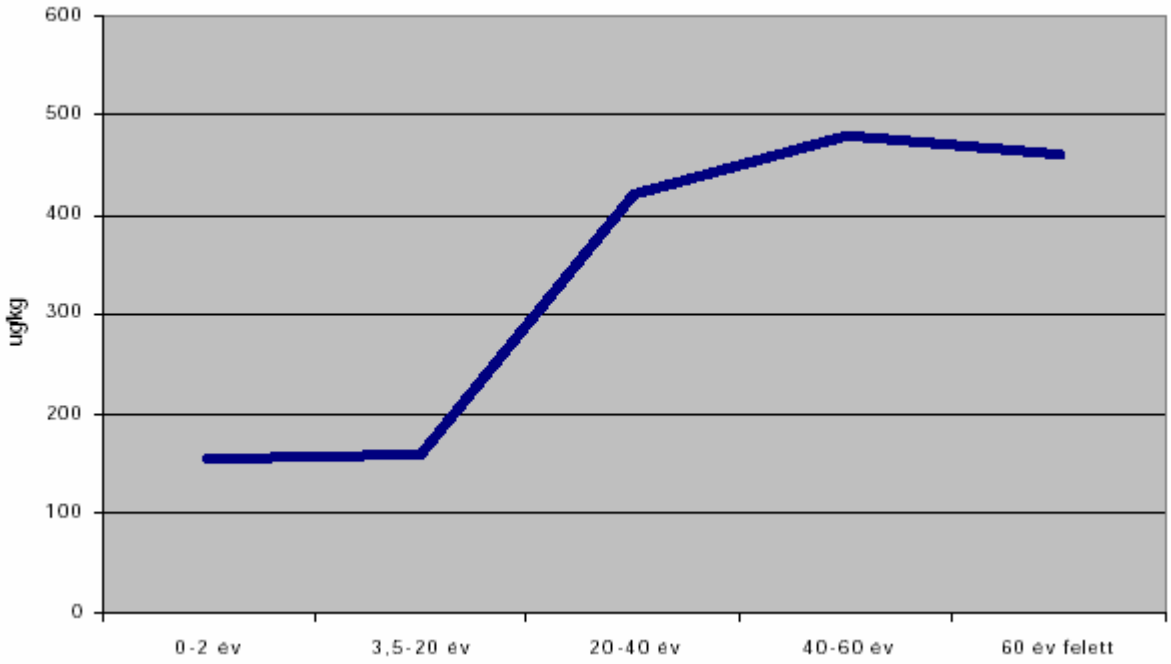
Table 6: The concentration of the DDT residues in fatty tissues of citizens of Budapest (mg/kg) (Source: National Institute For Food Safety and Nutrition)



There were surveys in the period 1996-2002 of the DDT contamination in breast milk. All of the samples contained some DDT and the detected concentrations were between 0,016 and 3,177 mg/kg, these concentrations are about one tenth of the levels in the 1980s.

Table 7 shows the average PCB content of the fatty tissue of each age group of Hungarians.

Table 7: PCB residues in fatty tissues of the each age group (µg/kg)
(Source: National Institute For Food Safety and Nutrition)



The PCDD/Fs content of breast milk samples were about 8 pg/g fat (TEQ), which was the lowest value in the survey, which involved 12 EU countries (European Commission, 2004).

3.6 Meteorological Synthesizing Centre - East

The data presented below are publicly available at
http://www.msceast.org/countries/Hungary/index.html.

3.6.1 Emission data

Emission data on HCB, PCB used in calculations on the regional scale were taken from the POPCYCLING-Baltic project [Pacyna et al., 1999]. For PCDD/Fs (recalculated from the emission value of 6 Borneff PAHs), official emission data submitted to the UN ECE Secretariat were used. Total emissions of the country for 1998 (HCB, PCBs) and 2001 (PCDD/Fs) were used for modeling and are presented in Table 8.

Table 8 Emission data
(Source: http://www.msceast.org/countries/Hungary/index.html)

POPs	Total emissions, t/y (for PCDD/Fs - g TEQ/y)
PCDD/Fs	103.7
HCB	0.3
PCBs	0.6

3.6.2 Mean annual concentrations in main environmental compartments

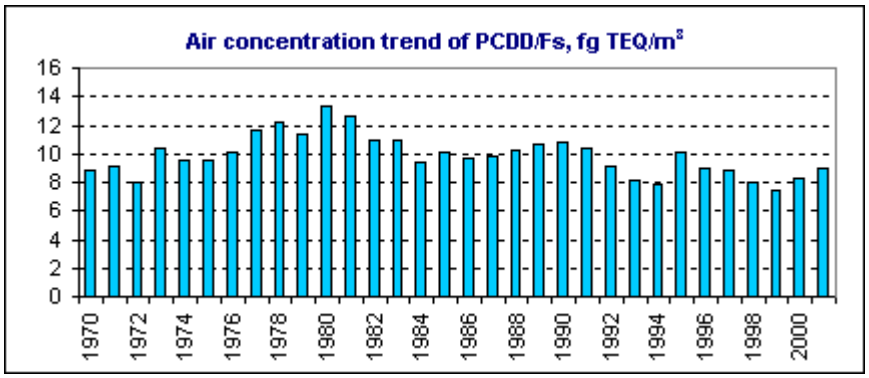
Calculated concentrations in various media including atmosphere (means over the country, minimum and maximum values in the country) are presented in Table 9.

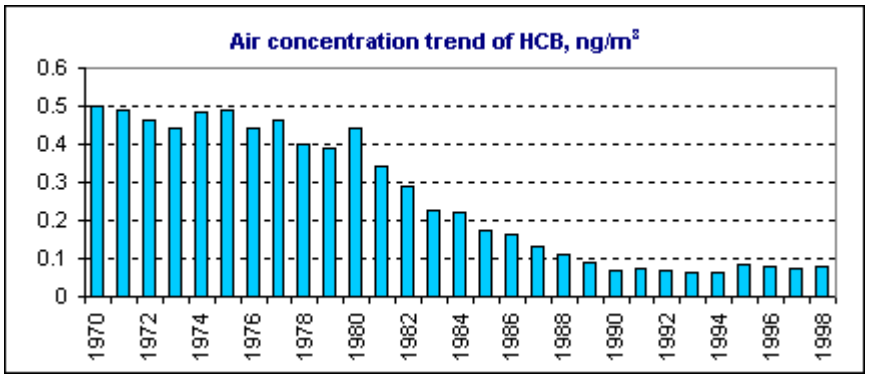
Table 9: Mean annual concentrations in main environmental compartments
(Source: http://www.msceast.org/countries/Hungary/index.html)

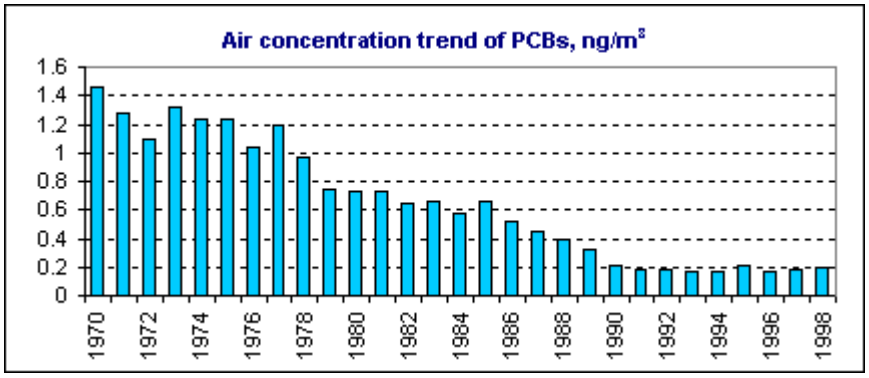
POPs	Mean	Min	Max
Air concentrations, ng/m^3 (for PCDD/Fs - fg TEQ/m^3)			
PCDD/Fs	9.03	3.61	22.26
HCB	$7.15 \cdot 10^{-2}$	$6.20 \cdot 10^{-2}$	$8.09 \cdot 10^{-2}$
PCBs	0.20	0.16	0.36
Soil concentrations, ng/g (for PCDD/Fs - pg TEQ/g)			
PCDD/Fs	0.56	0.37	1.10
HCB	0.36	0.22	0.47
PCBs	12.80	7.83	26.68
Vegetation concentrations, ng/g (for PCDD/Fs - pg TEQ/g)			
PCDD/Fs	0.96	0.45	1.98
HCB	0.42	0.19	1.23
PCBs	35.82	16.83	128.62

3.6.3 Trends in emissions and mean annual concentrations in main environmental compartments

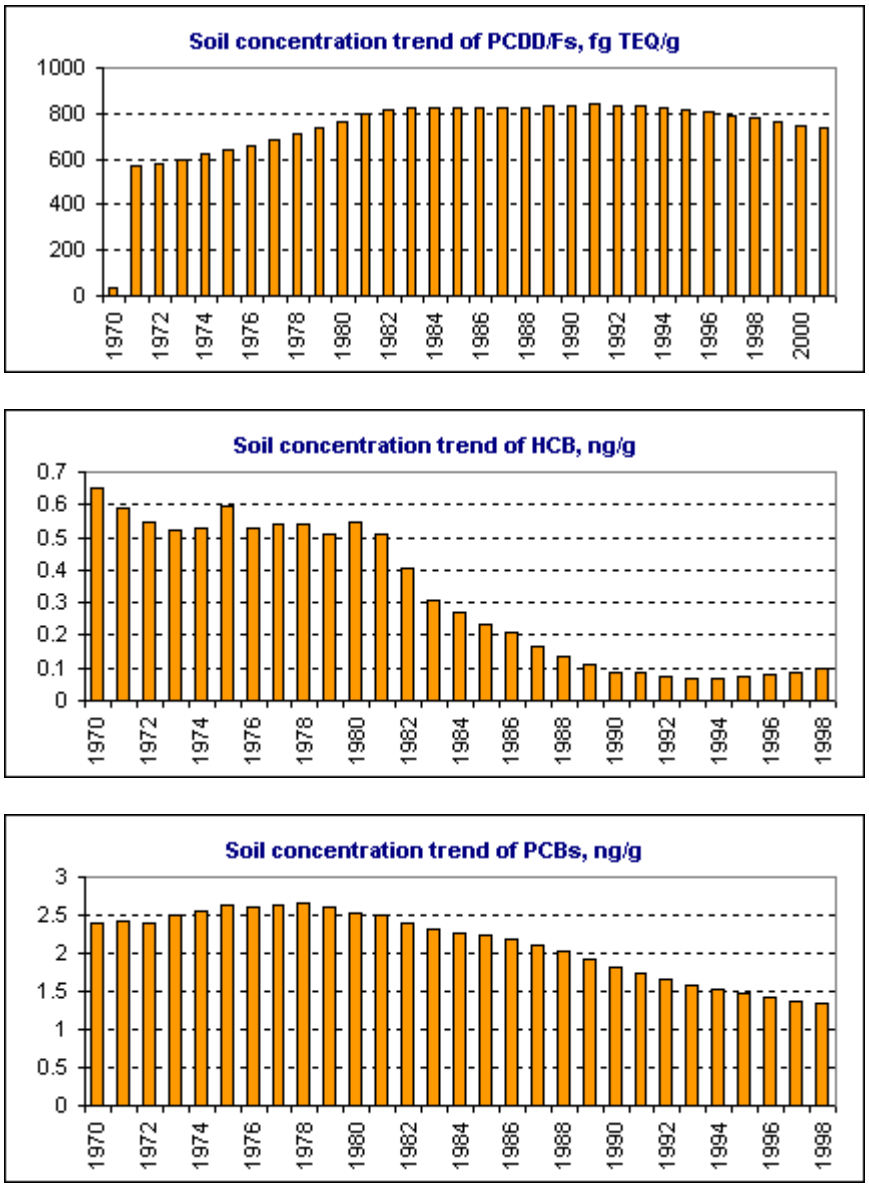
Trends in air, soil and vegetation concentrations of selected POPs over the country are introduced below (Air - Graph: 1- 3; Soil - Graph: 4 – 6 and Vegetation - Graph: 7 - 9).



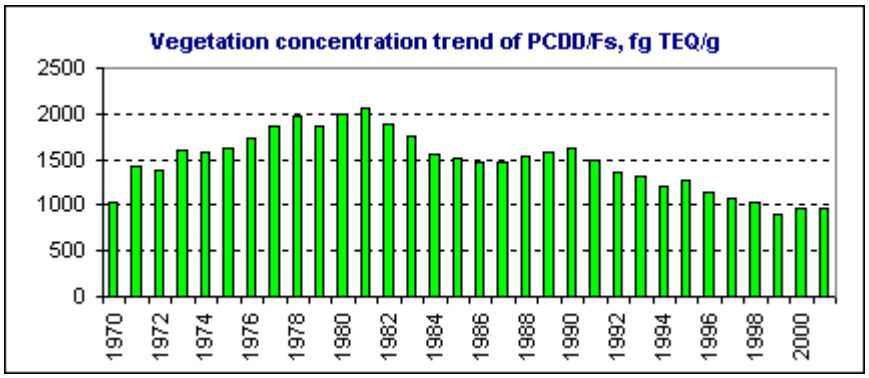


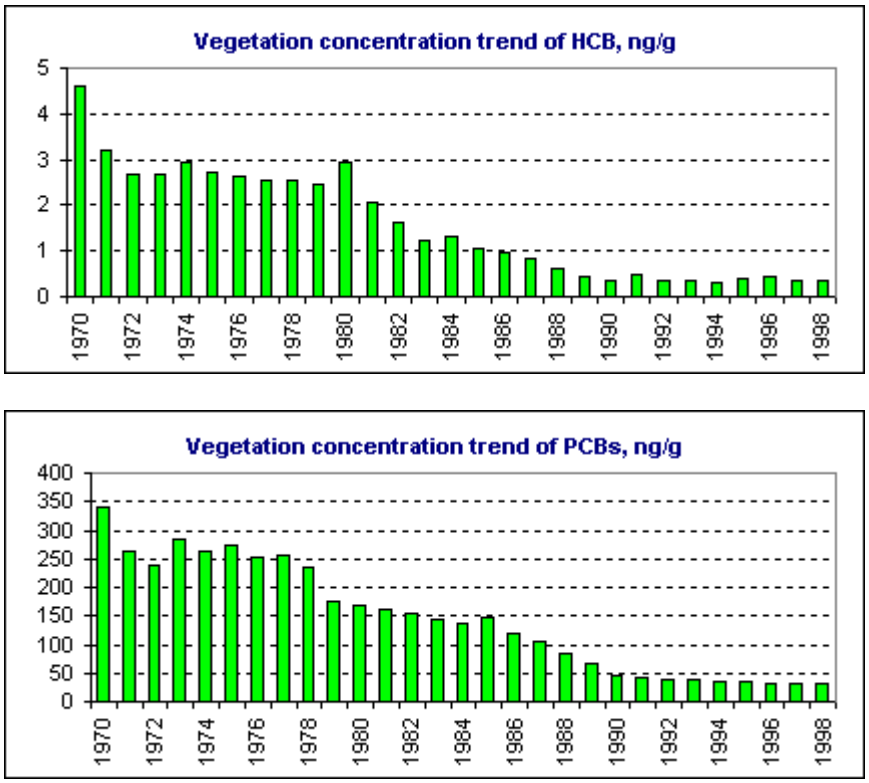


Graph: 1 – 3: Air Concentration trends of PCDD/Fs, HCB and PCBs (Source: http://www.msceast.org/countries/Hungary/index.html)



Graph: 4 – 6: Soil Concentration trends of PCDD/Fs, HCB and PCBs
(Source: http://www.msceast.org/countries/Hungary/index.html)





Graph: 7 – 9: Vegetation Concentration trends of PCDD/Fs, HCB and PCBs (Source: http://www.msceast.org/countries/Hungary/index.html)

4. Damage caused by POPs

Probably the main POPs hot-spot in Hungary is the dangerous waste dumpsite in Garé. The Chemical Factory of Budapest dumped about 15,5 tonnes of its waste there (mainly chlorinated benzene and xylol) in the period 1979-1987. The wastes were stored in barrels, but some of them leaked, so the neighbouring areas became polluted with POPs. This area is the "best" example of irresponsible industrial polluting.

There have not been any major known damages caused by POPs, though this has not been really studied in any great detail. The pollution of the water and the soil is often different between places, possibly because of the different earlier pesticide using habits and pollution rates. Probably the highest concentrations of POPs sources are from the places of production and formation. Hungary has major agrochemical factories in Balatonfűzfő, Budapest and Sajóbábony it is possible that these were/are the major POP pesticide polluters. These areas are the most polluted with these pesticides.

Another concern is the presence of old or unused pesticide storage facilities and dumpsites. For the last several decades the insulation at the dumpsites was quite poor.

In Hungary there are several abandoned industrial areas, where PCBs and PCDD/F contamination can be potentially increased or very high.

The PVC factory of the Borsodchem in Kazincbarcika is also an important potential POPs source.

The main PCDD/PCDF polluters are the Mátravidéki Hőerőmű (lignite power plant) in Gyöngyös and the metal factories in Miskolc and Dunaújváros according to the official national PCDD/PCDF inventory.

5. Laws currently regulating POPs

Hungary signed the Stockholm Convention (in 2001), and the Aarhus Protocol (in 1998).

The decree 6/2001. (I. 16.) FVM prohibit the use of more POPs pesticides (namely: aldrin, dieldrin, DDT, endrin, heptachlor, hexachlorobenzene, chlordane and toxaphene, Lindane). There is no production of POPs pesticides in Hungary, but it is not legally banned.

The decree 41/2000. (XII. 20.) EüM-KöM strictly restricts the use of hexabromo-biphenyls and PCBs.

The decree 5/2001. (II. 23.) KöM specifies the handling of PCBs and polychlorinated terphenyls, and the equipment contained them.

The external trade of most of the substances is regulated in the Aarhus Protocol and is strictly restricted in the government decree 112/1990. (XII. 23). External trade has to suit the Prior Informed Consent (PIC) rule, which regulated in the decree 46/2000. (XII. 29.) EüM-FVM-KöM-GM.

The decree 3/2002. (II. 22) KöM specifies the maximum HCB emission from the incinerators.

The law 2000. XXV. (EüM), and the law 2000. XLIII. (KöM) regulate the labeling, waste disposal and register of the products contain dangerous substances.

The decree 3/2002. (II. 22.) KöM specifies the maximum PCDD/F emissions from incinerators.

The decree 41/2000. (XII.20.) EüM-KöM bans the use of halogenated hydrocarbons as an additive in fuels. This law assists the reduction of PCDD/F emissions from exhaust fumes.

We place special attention on the POPs residues of vegetables, crops, fruits, etc. In the next Table 10 we present the MRL (Minimal Risk Level) limit values and examination

results of the most "POPs sensitive" plants and fruits with oil content according to the former and current regulation in Hungary:

Table 10: MRL (Maximum Residue Level) limit values and examination results of the most "POP sensitive" plants and fruits (Source: Central Service for Plant Protection and Soil Conservation)

Chemical	Decree 5/1977 MÉM-EüM (mg/kg) MRL	Decree 59/2003 and the 5/2002 EüM-FVM (mg/kg) MRL
Aldrin+dieldrin	0,01 banned, only import	0,01 banned, still tolerable conc.
DDT and its isomers	0,1 banned, only import	0,05 banned, still tolerable conc.
Lindane	0,5-1 depending on plants	0,01 still tolerable in case of import
HCH isomers	0,2 banned, only import	0,02 banned, still tolerable conc.
Toxaphene	1	0,1 banned, still tolerable in case of import

The monitoring of the limit values of POPs content in plants and fruits is being carried out by the Plant Protection & Soil Conservation Service of each district. In Hungary there are 19 districts. As was to be expected, the residues of active substances of some chlorinated hydrocarbons having high fat-solubility were able to be absorbed from the soil. It concerns mainly foodstuffs, fruits, and berries of plants with high oil content.

6. Efforts to deal with POPs

The Government, mainly the Environmental Ministry largely deals with POPs, because of the signed international conventions. Its charge is the preparation, implementation and check up on the orders of the Stockholm Convention.

These offices also deal with POPs:

- National Inspectorate for Environment, Nature and Water (co-operate with the authorities and NGOs, make provision plans, it is the authority of the first instance),
- Ministry of Health (co-ordinate the role of the health preservation),
    - National Public Health and Medical Officer Service,
    - National Institute of Chemical Safety (analyse the effects of the POPs on health, and collect and analyse data, attend the PIC Convention),
    - National Food Safety and Dietetics Institute (collect and analyse the data showing POPs contamination of foods, and the examination of people),
- Ministry of Agriculture and Rural Development (plant protection, and protection of the soil quality),
    - Central Service of Plant and Soil Protection (authorise the PPPs, register the data of the pesticide residues),
    - Plant and Soil Protection Stations (sampling, analyse the level of the contamination),
- Ministry of Economy and Transport (regulate, the transport and external trade of the dangerous substances),
- Hungarian Central Statistical Office (collect data).

7. State of Stockholm Convention Ratification and the National Implementation Plan

Hungary signed the Stockholm Convention in May of 2001, and signed the Aarhus Protocol in 1998. To ratify the Stockholm Convention, Hungary needs to make its National Implementation Plan (NIP). This requires a POPs inventory. Probably the most work-demanding phase of the NIP has been the preparation of the POPs inventory. The POPs inventory has been made with the coordination of the Department for Air and Noise Pollution Control of the Ministry of Water and Environment. The detailed inventory including studies and reports used in the project are available in the Hungarian language on the homepage of the Ministry of Environment and Water (www.kvvm.hu/dokumentum.php?content_id=758&section_id=1).

These are the main priorities stated in the NIP for Stockholm Convention in Hungary:

1. (High priority) Improvement of the inventories of PCBs, HCB, PCDD/F and PAH emissions from industrial processes by further measurements covered from budgetary sources – except waste incineration /co-incineration where the operators have to carry out and finance the measurements. Reduction of these unintentionally generated POPs (UPOPs) emissions in compliance with the Best Available Techniques (BAT) and Best Environmental Practices (BEP).

2. (High priority) Elimination of obsolete pesticides from the environment (stockpiles, illegally dumps, etc.) based on the experiences of the pilot project of the two mostly affected counties in Hungary. The separation of the obsolete pesticides (with and without POP contents) is unnecessary because all kinds of them should be collected and destroyed. The destruction of all obsolete pesticides has to be finished by the end of 2008 according to the National Waste Management Plan. The required domestic incineration capacity is available.

3. (High priority) Disposal of the PCB-containing equipment currently used or discarded by the end 2010. The collection, transport and incineration costs of the elimination will be covered by the operators. The existing inventory of the transformers and capacitors with PCB content should be improved. Ensure in the NIP that the sufficient domestic incineration capacity will be used more or less likely during the next five years.

4. National legislation has to follow continuously the prescriptions of the Stockholm Convention, the Aarhus POPs Protocol of the UN ECE and the Regulation 850/2004 EC on POPs because they overlap. Maintenance of the existing bans for the production, marketing and use of substances of Annex I. and II. of the SC.

5. Establishment of permanent organisational, technical and legal conditions required to ensure the enforcement and monitoring capacity in order to comply with the provisions of the Stockholm Convention and other internationally binding POPs agreements.

6. Disposal of POPs on legal and illegal waste dumps needs further investigation in the NIP. Pesticide residues and other POPs can be probably explored in the dumps by more accurate sampling and identifying waste landfills containing POPs.

7. Additional examinations and measurement programmes are required for the ground and surface waters, and in the soils, because only few measurement data are available on the POPs content of these compartments.

8. Implementing activities for information exchange, education, communication and public awareness-raising in order to meet the provisions of the Stockholm Convention.

8. Current level of NGO communication and coordination on POPs

8.1 NGOs and POPs in Hungary

According to a list on a non-governmental organization (NGO) website in Hungary there are at least 10-15 thousand foundations and NGOs. There are about 4-5 thousand more or less active NGOs in Hungary by our estimation. Most of the environmental NGOs in Hungary started their work in the area of political change (after the year 1989). These NGOs are organzied quite well in a national network, which makes communication easier (among each other, and with the Hungarian government) and to partition the issues and projects.

The Hungarian Environmental Movement has about 300 organisations. They have a great meeting annually. Only some of these NGOs deal with chemicals (about 10-20), pesticides (for e.g. Reflex, Bakonyalja KTE, MTVSZ), or POPs (for e.g. EMLA, HUMUSZ) constantly, but much more can work on a part of this issue (for e.g. giving information for the people, monitor the sources of POPs, or deal with the impact of the POPs). The importance of this NGO network is growing on the issues of raising public awareness because of people want to know more and more about environmental topics. In Hungary there is no NGO or non-governmental workgroup which only deals with POPs (or chemicals).

The people do not know too much about the effects of the chemicals (including POPs), but most of them have heard about DDT and know something about its harmfulness. Now the society is beginning to awaken to the importance of clean nature, and the potential effects of the chemicals on health, but there are only a small proportion of the people have more or less particular knowledge about POPs.

The major Hungarian NGO's have international connections. From these NGOs the Clean Air Action Group and the EMLA deal with POPs, but several international NGO's in the Hungarian group deal with POPs issues temporarily (for e.g. WWF Hungary – blood tests, Greenpeace Hungary – actions against the main POP polluters).

8.2 NGOs that are involved in the National NIP process

Two of the Hungarian environmental NGOs were involved in NIP process. A group of the REFLEX KE from Győr leading by Tibor Kovács surveyed the obsolete pesticide stockpiles in the Western districts. Their findings had been built to the POP inventory.

The Hajdúsági Civil Központ és Adattár Alapítvány leading by Zoltán Köszörűs took part in the translation and spreading of some IPEN leaflets on rules of the Stockholm Convention.

9. Public awareness activities

In Hungary there are no governmental public awareness activities on POPs issues. The only action is that the Hungarian POPs Inventory is available on the website of the Ministry of Environment and Water, but this detailed report cannot be found for those who do not know the exact URL.

Public awareness-activities are quite poor among NGOs too, because of the number of concerned organizations is low. All of these NGOs deal with other issues too, because resources do not permit a focus only on POPs. But sometimes this issue appears in a smaller part of the brochures, press releases or other activities. The media is only interested in acute environmental problems, accidents and these are not caused by POPs in Hungary.

10. Recommendations on POPs elimination

From the viewpoint of environmental NGOs the following recommendations can be applied in order to solve the POPs problem in Hungary.

Key principles

- Priority preserving the health of the present and future generations from the negative impacts of POPs.
- Application of the precautionary principle should be made in the introduction of new chemicals on the market in order to prevent emergence of another potential source of POPs.
- Prioritize environment and public health issues in taking the political and economic decisions on POPs.

Concrete activities

- To start an informational and educational campaign on the impact of POPs on the environment and public health and about the usage of materials which cause creation of these chemicals.
- To inform the population about the process of implementing the Stockholm Convention.
- Introduction of economic tools leading to prevention of POPs´ emergence and application of the „polluter pays“ (internalization of external costs) principle in the case of the established sources.
- Introduction of the duty of reverse withdrawal of PVC products and settlement of the minimum quota for its recycling under the condition that it cannot be so called toxic recycling; introduction of an environmental tax on PVC products.
- Substitution of halogenated precursors of POPs (PVC, brominated flame retardants, chlorinated paraffines etc.)
- Use the „zero waste“ strategy (prevention of creating waste, systematic separation and recycling) when working out plans on waste management at the municipal, regional and state levels.
- To make create and enforce measures against the burning of cables and other PVC products and the recollection of burned cables by people of low income.
- The effective application of the National Implementation Plan, including prioritisation of non-combustion technologies for waste management.
- The cleaning of the well known hot-spots as much as possible.

We cannot agree with the national essential use of atrazine which is banned by the EU and an organochlorine herbicide. Its persistence in water is well known.

We prefer liquidation of PCBs, dioxins, DDT and other POPs by non-combustion technologies with high destruction efficiency that do not create POPs or other toxic chemicals.

11. Alternatives to POPs

Alternatives to the POP pesticides

Most of these types of pesticides have been banned in Hungary for about 30-40 years. The phase-out of these chemicals has not caused any major problems in agriculture and the active substances can be replaced with newer less dangerous plant protection products, such as pyrethroids. A better solution to the insect problem is the use of Bacillus thuringiensis products against the juveniles. The biggest step to farmers is the prevention of the agricultural damages caused by the insect. Another alternative to POPs and other pesticides is organic agriculture that avoids the use of all chemicals. In this method it is quite important to be aware of growth, adequate nutrient supply, cultivation, crop rotation etc.

12. Resources on POPs

Websites:

A) Governments / IGOs / Institutions

1. Stockholm Convention website - http://www.pops.int/
2. The United Nations in Albania - http://www.un.org.al/
3. UNEPChemicals website – http://www.unep.org/ http://www.unep.org/themes/chemicals/
4. UNDP – POPs - http://www.undp.org/gef/05/portfolio/chemicals.html#pops
5. UNIDO – POPs - http://www.unido.org/doc/46478
6. UNDP / GEF – http://www.undp.org/gef/05/
7. GEF - Small Grants Programme - http://sgp.undp.org/
8. World Health Organisation - http://www.who.int/en/
9. Basel Convention website - http://www.basel.int/
10. EU (European Union) website – POPs - http://www.europa.eu.int/comm/environment/dioxin/index.htm
11. World Bank POPs website - http://lnweb18.worldbank.org/ESSD/envext.nsf/50ParentDoc/PersistentOrganicPollutants?Opendocument
12. Meteorological Synthesizing Centre-East - http://www.msceast.org/about.html
13. U.S. Environmental Protection Agency - http://www.epa.gov/
14. Danish Environmental Protection Agency - http://www.mst.dk/homepage/
15. Food and Agriculture Organization of the United Nations - http://www.fao.org/
16. Protocol on Pollutant Release and Transfer Registers - http://www.unece.org/env/pp/prtr.htm
17. EUNECE (United Nations Economic Commission for Europe - http://www.unece.org/
18. European Environmental Agency - http://www.eea.eu.int/
19. OECD (Organisation for Economic Co-operation and Development) - http://www.oecd.org/
20. Ministry of Water and Environment of Hungary (in Hungarian) - http://www.kvvm.hu/dokumentum.php?content_id=758&section_id=1

B) NGOs / NGOs Networks

21. IPEN (International POPs Elimination Network) website - http://ipen.ecn.cz/
22. IPEP (International POPs Elimination Project) website - http://www.oztoxics.org/ipepweb/
23. Greenpeace website - http://www.greenpeace.org/international_en/
24. WWF website - http://www.panda.org/ http://www.panda.org/about_wwf/what_we_do/toxics/index.cfm
25. GAIA (Global Anti- Incinerator Alliance, Global Alliance for Incinerator Alternatives) - http://www.no-burn.org/
26. PAN (Pesticide Action Network International) website - http://www.pan-international.org/
27. Common thematic website of Clean Air Action Group and FoE Hungary (in Hungarian): www.vegyireakcio.hu.

Contacts for NGOs:

REFLEX Környezetvédő Egyesület
Address: 9024 Győr, Bartók Béla u. 7.
Contact person: Mr. József LAJTMANN
Tel: +36-96-316-192
Fax: +36-96-310-988
Email: reflex@c3.hu
Website: www.reflex.gyor.hu

Bakonyalja Környezetvédelmi és Turisztikai Egyesület
Address: 2888 Csatka, Szabadság tér 86.
Contact person: Mr. Tibor KOVÁCS
Tel: +36-34-388-918
Email: bakonyaljakte@bakonyalja-kte.koznet.hu
Website: gportal.hu/gindex.php?prt=65005

Environmental Management and Law Association (EMLA)
Address: 1076 Budapest, Garay u. 29-31.
Contact person: Mr. Csaba SÁNDOR
Tel: +36-1-322-8462
Fax: +36-1- 352-9925
Email: emla@emla.hu
Website: www.emla.hu

Hajdúsági Civil Központ és Adattár Alapítvány
Address: 4220 Hajdúböszörmény, Bocskai tér 2.
Contact person: Mr. Zoltán KÖSZÖRŰS
Tel: +36- 52-280-039
Email: hckaa@t-online.hu
Website: www.hajduboszormeny.koznet.hu

HUMUSZ
Address: 1111 Budapest, Saru u. 11.
Contact person: Mr. László SZILÁGYI
Tel: +36-1-386-2648
Fax: +36-1- 352-9925
Email: humusz@humusz.hu
Website: www.humusz.hu

Contacts for authorities:

Competent Authority:

Department for Air and Noise Pollution Control of the Ministry of Water and Environment
Address: 1394 Budapest, Pf.: 351
Contact person: Mr. Gábor Attila KOVÁCS
Counsellor, Secretary of the Interministerial POP Committee
Tel: +36-1-4573434
Fax: +36-1-2013056
Email: kovacsg@mail.kvvm.hu

Competent Authority:
Department for Air and Noise Pollution Control Directorate of Environment National Directorate for Environment, Nature and Water
Address: 1369 Budapest, Pf.: 352
Contact person: Mr. Tamás LOTZ
Senior Counsellor, POP project leader
Tel: +36-1-4573563
Fax: 36-1-2013056
Email: lotz@mail.kvvm.hu

Restriction of use of POP pesticides:
Central Service for Plant Protection and Soil Conservation (CSPPS)
Address: 1518 Budapest, Pf.: 127
Contact person: Mr. Zoltán OCSKÓ
Director
Tel: +36-1-3091040
Fax: +36-1-2462942
E-mail: ocsko.zoltan@ntksz.ontsz.hu

Central Service for Plant Protection and Soil Conservation (CSPPS)
Address: 1518 Budapest, Pf.: 127
Contact person: Ms. Ágnes PETHŐ
Expert
Tel: +36-1-3091085
Fax: +36-1-2462942
E-mail: petho.agnes@ntksz.ontsz.hu

Restriction of industiral use of POP chemical substances and preparations:
National Institute of Chemical Safety 'Fodor József' National Center for Public Health
Address: 1450 Budapest, Pf.: 36
Contact person: Ms. Anna TOMPA
Director
Tel: +36-1-4761195
Fax: +36-1-4761227
Email: tompa.okbi@okk.antsz.hu

Management and disposal of hazardous waste containing POPs:
Department for Waste Management and Technology Ministry of Water and Environment
Address: 1394 Budapest, Pf.: 351
Contact person: Mr. Kristóf KOZÁK
Senior Counsellor
Tel: +36-1-4573503
Fax: +36-1-2012491
Email: kozak@mail.kvvm.hu

Decrease of POPs emissions into the air:
Department for Air and Noise Pollution Control Directorate of Environment
National Directorate for Environment, Nature and Water
Address: 1369 Budapest, Pf.: 352
Contact person: Mr. József KUTAS
Head of Department
Tel: +36-1-2091000/260
Fax: +36-1-2091001
Email: kutas.jozsef@kgi.ktm.hu

Decrease of POPs emissions into the waters and soils:
Institute for Water Quality Protection
Research Institute for Environment and Water (VITUKI)
Address: 1095 Budapest, Kvassay Jenő út 1.
Contact person: Mr. Ferenc LÁSZLÓ
Director
Tel: +36-1-2159045
Fax: +36-1-2168140
Email: LaszloFerenc@vituki.hu

13. Abbreviations:

CSPPS: Central Service for Plant Protection and Soil Conservation
DDT: dichloro-diphenyl-trichloroethane
FJNCPH: Fodor József National Center for Public Health
HAS-PPI: Hungarian Academy of Science, Plant Protection Institute
HCH: hexachlorocyclohexane
NGO: non-governmental organization
NIP: national implementation plan
OÉTI: National Institute for Food Safety and Nutrition
PIC: prior informed consent
POP: persistent organic pollutant
PPP: plant protection product
TEQ: Toxic Equivalence

VITUKI: Research Institute for Environment and Water

14. References

ANTON A., CHIKÁN A., GYETVAI G., MARTH P. (2003): Talajok szennyezõdése POP-okkal és ezek toxikológiai jellemzõi, szennyezett területek és hulladéklerakók felmérése, kármentesítés*

EUROPEAN COMMISSION (2004): Dioxins & PCBs: Environmental Levels and Human Exposure in Candidate Countries.

HOLÉCZY G., KELEMEN J., KOVÁCS L., KOVÁCS T., SZABÓ L., TAJTHY T. (2003): Hulladékok POP szennyezése, PCB tartalmú hulladékok és lejárt szavatosságú növényvédõszer maradványok (összefoglaló)*

PETHŐ Á., OCSKÓ Z. (2003): POP hatóanyagot tartalmazó növényvédőszerek hazai felhasználása 1950-2000. Növény és Talajvédelmi Központ, Budapest*

LOTZ T. (2005): Summary of the Hungarian POP Inventory and the preliminary priorities of the National Implementation Plan. Ministry of Environment and Waters.

TAJTHY T. (2003): Környezetben tartósan megmaradó szerves vegyületek (POP-ok) kibocsátása az atmoszférába*

* available in Hungarian language in this website of the Ministry of Water and Environment: www.kvvm.hu/dokumentum.php?content_id=758&section_id=1

CONTACT:

Clean Air Action Group (Levegő Munkacsoport)
1465 Budapest, Pf. 1676
tel.: (36-1) 411 0509
fax: +36-1-266-0150
e-mail: levego@levego.hu
http://www.levego.hu