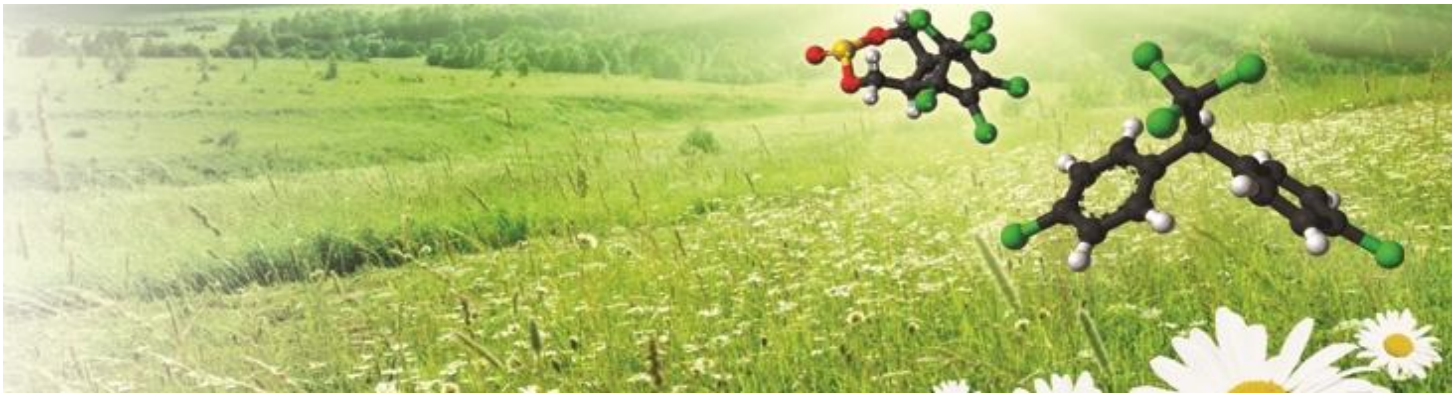


National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants 2013

adopted by the Minister on 28 November 2013

HUNGARY

MINISTRY OF
RURAL DEVELOPMENT

Budapest 2013

CONTENTS

Abbreviations used in the text of the Implementation Plan:

- ÁNTSZ – National Public Health and Medical Officer Service
- BAT – Best Available Techniques
- BEP – Best Environmental Practices
- COP – Conference of the Parties to the Stockholm Convention
- DDT – Dichlorodiphenyltrichloroethane
- EUR – Regulation No 850/2004/EC of the European Parliament and of the Council
- EüM – Ministry of Health (Egészségügyi Minisztérium)
- ETTSZ – Health Toxicological Information Service (Egészségügyi Toxikológiai Tájékoztató Szolgálat)
- FAVI – Environmental Registration System For Groundwater and Geological Medium(Felszín Alatti Víz és Földtani Közeg Nyilvántartási Rendszer)
- FVM – Ministry of Agriculture and Rural Development (Földművelésügyi és Vidékfejlesztési Minisztérium)
- GDP – Gross Domestic Product
- GEF – Global Environment Facility
- GKM – Ministry of Economy and Transport (Gazdasági és Közlekedési Minisztérium)
- HBB – Hexabromobiphenyl
- HCB – Hexachlorobenzene
- HCH – Hexachlorocyclohexane
- HIR –Waste Information System (Hulladék Információs Rendszer)
- HUHA – Municipal Waste Utilisation Company (Fővárosi Hulladékhasznosító Mű)
- IPPC – Integrated Pollution Prevention and Control
- KEOP – Environment and Energy Operational Programme (Környezet és Energia Operatív Program)
- KSH – Hungarian Central Statistical Office (Központi Statisztikai Hivatal)
- Kt. – Act LIII of 1995 on the general rules of environmental protection (1995. évi LIII. törvény a környezet védelmének általános szabályairól)
- KvVM – Ministry for Environment and Water (Környezetvédelmi és Vízügyi Minisztérium)
- LRK – Air Quality Reference Centre (Levegőtisztaság-védelmi Referencia Központ)
- MÉBiH – Hungarian Food Safety Office (Magyar Élelmiszer-biztonsági Hivatal)
- MTA-TAKI – Institute for Soil Sciences of the Hungarian Academy of Sciences (Magyar Tudományos Akadémia Talajtani Kutató Intézet)
- NAV – National Tax and Customs Administration (Nemzeti Adó- és Vámhivatal)
- NÉBIH – National Food Chain Safety Office (Nemzeti Élelmiszer-biztonsági Hivatal)
- NeKI – National Institute for Environment (Nemzeti Környezetügyi Intézet)
- NTAI of NÉBIH – Directorate of Plant Protection and Soil Conservation (NÉBIH Növény-, Talaj- és Agrárkörnyezet-védelmi Igazgatóság)
- NFR – Uniform nomenclature for reporting, determined by UNECE (Nomenclature For Reporting)
- NTKSZ – Central Plant Protection and Soil Conservation Service (Növény- és Talajvédelmi Központi Szolgálat)
- OÉTI – National Institute for Food and Nutrition Science (Országos Élelmezéstudományi Intézet)
- OHT – National Waste Management Plan (Országos Hulladékgazdálkodási Terv)
- OHÜ – National Waste Management Agency Nonprofit Ltd. (Országos Hulladékgazdálkodási Ügynökség Közhasznú Nonprofit Kft.)
- OKBI – National Institute of Chemical Safety (Országos Kémiai Biztonsági Intézet)
- OKI – National Institute of Environmental Health (Országos Környezet-egészségügyi Intézet)
- OKKP – National Environmental Remediation Program (Országos Környezeti Kármentesítési Program)
- OLM – Hungarian Air Quality Network (Országos Légszennyezettségi Mérőhálózat)

- OMSZ – Hungarian Meteorological Service (Országos Meteorológiai Szolgálat)
- PAH – Policyclic Aromatic Hydrocarbons
- PBDE – Polybrominated diphenyl ethers
- PCB – Polychlorinated biphenyls
- PeCB – Pentachlorobenzene
- PFOS – Perfluorooctane sulfonic acid and its derivatives
- PIC – Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- POPs – Persistent Organic Pollutants
- PRTR – Pollutant Release and Transfer Register
- R&D – Research and development activity
- RoHS – On the restriction of the use of certain hazardous substances in electrical and electronic equipment (Restriction of Hazardous Substances)
- TEQ – Toxic Equivalent Concentration
- TIM – Soil Information and Monitoring System (Talaj Információs Monitoring rendszer)
- UNECE – United Nations Economic Commission for Europe
- UNEP – United Nations Environment Program
- UNIDO – United Nations Industrial Development Organisation
- VAL – Surface water quality protection main reporting sheets (Felszíni vízminőség-védelmi alapbejelentő lapok)
- VÉL – Surface water quality protection annual reporting sheets (Felszíni vízminőség-védelmi éves bejelentő lapok)
- VM – Ministry of Rural Development (Vidékfejlesztési Minisztérium)
- WEEE – Waste Electrical and Electronic Equipment
- WHO – World Health Organisation

Tables

Figures

1 Introduction

The Stockholm Convention on Persistent Organic Pollutants (POPs) was the first international agreement - concluded under the aegis of the UN - that was seeking a global solution to reduce or eliminate the harmful effects of a group of pollutants to the environment and human health. These substances are organic compounds, characteristically containing halogen (chlorine or bromine), produced artificially or generated as undesired by-products in certain industrial or combustion processes, which break down very slowly in the environment and living organisms, accumulate easily in the fatty tissue of certain living organisms and enrich in the members of the food chain. These substances might be detectable in the environment, including humans, for decades, as they resist the biological and chemical degradation induced by light. Compounds are considered persistent, if their half-life is longer than two days in the air, two months in the water and six months in the soil.

In 1995 the Environmental Program of the UN (UNEP) initiated an international agreement for the control of the best known 12 POPs, mainly pesticides.

Following this, first an agreement with all-European effect was developed in the framework of the UNECE for the restriction and elimination of the emission of POPs in the air, in form of a new protocol to the 1979 Geneva Convention on long-range transboundary air pollution. The protocol, which was signed in Aarhus in 1998, covers the control of 4 more substances in addition to the 12 listed by the UNEP. Hungary ratified the Aarhus Protocol in 2003, and it is in effect since 6 April 2004.

The Convention with global effect for the control of POPs, concluded in the framework of the UNEP, was signed in Stockholm in 2001 by the representatives of 92 countries and the European Union. Hungary was among the signatories of the Convention; one of the reasons for the development of the first National Implementation Plan was to ratify the Convention. Hungary ratified the Stockholm Convention by Act V of 2008.

Finally, the EU issued Regulation 850/2004/EC to reduce the impact of POPs on the environment and their industrial emission, which entered into force on 20 May 2004 in all member states of the European Union.

Article 7 of the Stockholm Convention stipulates that each Party shall develop its own National Implementation Plan (hereinafter: "NIP"), which must be reviewed and updated on a periodic basis or in specific cases. The NIP of Hungary elaborated in 2009 (hereinafter: “NIP 1”) was meant to implement the provisions of the Convention, but at the same time it complies with the requirements of the Aarhus Protocol on POPs and those of Regulation 850/2004/EC on POPs as well. According to the decision of the 4th (COP-4; 2009) and the 5th (COP-5; 2011) Conference of the Parties, the Annexes of the Convention were amended, making reviews and updates of the Implementation Plans necessary. In addition to the POPs already regulated by the Convention, COP-4 decided for nine, while COP-5 for one new pollutants to be included in the list.

This revised second National Implementation Plan (hereinafter: “NIP 2”) reviews the inventory and assesses the implementation of measures laid down in NIP 1 on the basis of data and conclusions from NIP 1. NIP 2 updates emission inventories on the basis of new information, evaluates the efficiency of measures laid down in NIP 1 and draws up necessary further steps

and measures. Furthermore, as part of the review process, the new persistent pollutants that were included in the Annexes of the Stockholm Convention at the COP-4 and COP-5 meetings, will also be included in the Implementation Plan.

1.1 The purpose and elaboration of the National Implementation Plan

The purpose of the NIP is to set up a homogenous framework for all tasks and activities necessary to fulfil the obligations stipulated by the international POP agreements, , and to determine the measures, which

- minimize the amount of POPs in the environment, followed by ban, restriction and emission reduction,
- minimize the harmful health impacts through the reduction of POPs in the foods.

The structure of NIP complies with the UNEP and World Bank guidelines for the preparation of implementation plans for the execution of the Stockholm Convention, and its table of contents.

Elaboration of the National Implementation Plan of Hungary

The preparation of NIP 1 and NIP 2 took and takes place in the framework of the UNIDO project, financed by the Global Environment Facility (GEF); reference number of the Hungarian project: GF/HUN/01/05. The NIP 1 and NIP 2 have been prepared taking into consideration the requirements of the Aarhus Protocol, the Stockholm Convention and EU Regulation 850/2004/EC, and they cover every currently regulated compound included therein. The NIP 2 was realized using the remaining funds from the GEF project financing, however, the available funds were not sufficient for measurements to be made. NIP 2 is the revision of NIP 1 by processing the data stored and available in the current information systems, and by assessing the progress of implementation of the necessary measures laid down in NIP 1 through a review of events that have taken place since the adoption of NIP 1.

Specifics of the elaboration of Hungary's NIP

NIP 2 contains the measures related to POPs to be taken in the following years.
One of the most important foundations is the stable regulatory background. Not only the regulation of the emission of POPs into the air, surface and ground waters, soil and waste, but also the regulation of the tasks, which belong to the competencies of other ministries (e.g. POP content of industrial products, pesticides, adverse health effects etc.) had to be evaluated. In Hungary, which is a member state of the European Union, Regulation 850/2004/EC on POPs is directly applicable.

On the basis of the analysis and connections of the above mentioned legislation it can be concluded, that the **national legislative background necessary for the ban, restriction and reduction of emission of POPs is ensured**; it has to be mentioned, however, that the amendments of international agreements have not yet been fully transferred into the Hungarian law.

The other important foundation of the preparation of NIP 2 is drawing up a **reliable national POP inventory**. The NIP 1 was based on a similar national POP inventory, and therefore the same would have been necessary for NIP 2 as well; however, in lack of measurements, it was not possible to make a detailed and accurate inventory on the basis of the available data alone.

1.2 Geographic and economic profile of Hungary

Geographic location and population

The territory of Hungary covers 93,036 km^2 and its population in 2013 is 9.909 million people. Although about 85% of the territory is arable land, the structure of economy is basically characterized by industrial activity.

The geographic position of the country with respect to possible water pollution is specific, because the Danube and the rivers having their sources in the Carpathians are flowing through the middle of the country, actually 94% of the waters leaving the country have their sources outside the country, therefore Hungary is directly interested in minimal pollution of the rivers. As a consequence of this situation we participate in a number of international programs, which serve the regu1ar monitoring the quality of surface waters.

Political and economic profile

In the early nineties, when the basic change of the structure of the economy from a planned system to market economy took place, the output of the country's economy has drastically dropped and at the same time the rate of inflation has risen to 20-30%. It was however a positive consequence of the collapse of the former socialist industrial structure that the state of the environment has significantly improved, because quite a number of heavily polluting industrial companies went bankrupt. Growth of the economy started in the second half of the nineties, however without a proportional of emission of pollutants. This was first of all the effect of more strict environmental regu1ations.

Connections between environmental protection and economy

Compliance with new legal regulations or joining to international agreements have in most cases also economic and social consequences. Elimination and/or restriction of emissions requires investment the cost of which the companies try to enforce in the price of their products, and this may have economic, financial (inflationary) and social effects. Reduction of POP emissions, if the regulation bans the sale and use of certain formerly produced/used products may have direct social effects because of 1oss of job opportunities.

The use of certain compounds is explicitly necessary to prevent certain diseases (e.g. DDT against the pathogen of malaria), but this is not typical for Europe, European countries store at most small quantities of such compounds as sanitary reserves for case of emergency. International POP agreements coming domestically in force have little economic effects, because the active ingredients of the pesticides controlled by these agreements were long ago banned in Hungary, control measures to reduce emissions were partly regulated by earlier legislation and last but not least significant investments executed in last fifteen years to reduce the emission of pollutants (e.g. flue gas desulphurization and filtering of dust at power stations) contributed additionally to the reduction of POP emissions. At the same time the development of adequate infrastructure (measuring instruments, monitoring, expert personnel, etc.) has and will have funding requirements. Application of Best Available Techniques (BATs) for new activities is in Hungary since 2001 obligatory, for existing equipment since 31 0ctober 2007.

Banning or restricting the use of POP chemicals might have such consequences in the application of pesticides, that without the use of these active ingredients crop yields would decrease and this would cause troubles of subsistence for people living from agriculture.

However practice proves that the majority of these active ingredients has been successfully replaced by compounds which are less harmful to human health.

Based on these considerations one can declare, that banning the use and restricting the emissions of POP compounds listed by the international agreements does not cause direct social or subsistence problems in Hungary. Furthermore, there is no such sanitary emergency situation in the country, which would give reason to stockpile any of these compounds (such emergency situation is nowadays restricted mostly to the so-ca1led malaria zone).

2 Institutional background

Control, supervision and monitoring of tasks related to persistent organic pollutants (POPs) is provided for: by the relevant ministries, their background institutions, the Environmental Inspectorates exercising the role of authority, further by a number of state, municipal and civil institutional organizations participating in the POP issue.

2.1 Ministries, their agencies and background institutions

2.1.1 Environmental affairs

Ministry of Rural Development and its predecessors, the Ministry for Environment and Water and the Ministry of Agriculture and Rural Development

The Ministry for Environment and Water (Környezetvédelmi és Vízügyi Minisztérium, hereinafter: "KvVM") was responsible for the protection of environment until the spring of 2010 as a separate ministry. As a result of the government restructuring in 2010, the institutional background of environmental and nature protection has been fundamentally changed, as the KvVM continues its work combined with the Ministry of Agriculture and Rural Development (Földművelésügyi és Vidékfejlesztési Minisztérium, hereinafter: "FVM") in the Ministry of Rural Development (Vidékfejlesztési Minisztérium, hereinafter: "VM").

According to **Act XLII of 2010** on the list of the ministries of the Republic of Hungary, the Ministry of Rural Development is responsible for environmental issues. The minister of rural development is the member of the government who is responsible for the agrarian policy, agrarian and rural development, supervision of the food chain, food industry, forest management, land registry, cartography, land issues, hunting, aquaculture, protection of the environment, protection of nature and water management. The scope of activities and competence of the Minister of Rural Development is regulated by **Government Decree No. 212/2010 (VII. 1.)** on the scope of activities and competence of the individual ministers and the State Secretary heading the Prime Minister's Office. The professional duties related to the protection of environment are carried out by the state secretary responsible for environmental issues.

It was the responsibility of the KvVM to adopt, either on its own or in cooperation with other ministries, legislation related to chemical compounds and chemical pollutions, and to prepare Hungary's position in the case of decisions taken at the level of the European Union.
It was not in the competence of the ministry to adopt legislation related to the transportation of hazardous materials and the prevention of industrial accidents, and it was not responsible for the authorization of medicinal products, cosmetics, food additives, biocides and pesticides. The

duties of the ministry, which *"can be deducted from the division of labor in the government, are laid down in Act LIII of 1995 on the general rules of environmental protection (Kt.), in relation to chemical compounds and mixtures as well. The Kt. aims to protect the environment from the harmful effects of dangerous substances and products."* Furthermore, it was the duty of the ministry to ensure compliance with international agreements, and so it was responsible for keeping contacts with the Stockholm, Basel, Montreal, Kyoto, Aarhus and Geneva Conventions. It was also responsible for participation in the Strategic Approach to International Chemicals Management (SAICM) and the Environment, Health and Safety (EHS) Programme of the OECD. As the successor of KvVM, its duties are now carried out by the state secretary responsible for environmental issues at the Ministry of Rural Development.

Implementation of the POPs related tasks within the scope of other ministries is the duty of the ministers responsible for the specific portfolios, respectively. Within the VM, there are more organizational units dealing with matters related to this subject. Among these, the defining tasks are the responsibilities of the following departments (organizational units):

a./ Deputy State Secretariat for Nature Conservation and Environment Protection

- **Department of Environmental Protection**

This is where the command and control functions associated with POPs are installed. The national contact point ("focal point") of the Convention works here, whose role is to participate at international meetings on POPs, and to prepare the adoption of international agreements. A special department responsibility is to develop appropriate legislation for the prevention and control of POP emissions, and to report the annual atmospheric emissions data to the international organizations.

- **Department of Environmental Development Policy**

Responsibilities include the control of wastes containing POPs, assessment of landfills contaminated with POPs, planning, monitoring etc. of POP waste incineration capacities. According to instruction **No. 8/2010 (IX. 30.) of the Minister for Rural Development** on the organization of the Ministry of Rural Development and its rules of operation, the Department for Environmental Development Policy is responsible for the coordination of international conventions on chemical materials (POP, PIC) at the meetings of the Working Party on International Environmental Issues (WPIEI) of the European Council.

In addition, it is closely related to the issue of wastes contaminated with POPs, that the Department is to meet domestic tasks arising from the Basel Convention on the control of transboundary movements of hazardous wastes and their disposal, and it carries coordination responsibilities for representing the home position at international and EU negotiations.

b./ Deputy State Secretariat for Water Affairs

- **Department of River Basin Management and Water Protection**

In charge of preventing the pollution with POPs of both surface and groundwaters and soils, of developing measures and laws to control this pollution, and of planning and control of management programs for the remediation of areas contaminated with POPs.

c./ National Inspectorate For Environment, Nature and Water (Green Authority) and its local agencies (Regional Inspectorates for Environment, Nature and Water, Directorates for Environment and Water)

From the many responsibilities of the inspectorates we only list those, which are required for the execution of the Implementation Plan aiming at the reduction of POPs. In practice, enforcement of the environmental protection laws and regulations and duties of the first instance authority are carried out by the ten inspectorates, and by the Inspectorate as second instance authority, the functions and powers of which are laid down in **Government Decree No. 347/2006 (XII. 23.)**.

The national network of regional environmental inspectorates is responsible for the local implementation and control of POP regulation. The inspectorates, as official samplers play a significant role in the assessment of POPs. Management and update of the database from sampling and analysis is also the responsibility of the inspectorates.

Within the Inspectorate's core activities to be performed as state task, and also in relation to persistent organic pollutants, the Inspectorate exercises among others the powers of first instance authority and competent authority for environmental protection, nature conservation and water affairs, provided for in separate legislation, carries out tasks related to integrated pollution prevention and technical documentations of best available techniques, as well as further training, and coordinates authority tasks related to transboundary environmental impacts.

The competent regional inspectorates

From the core activities to be performed as state responsibility those which are related to the reduction of persistent organic pollutants are as follows:

- exercise the powers of first instance authority for environmental protection affairs, provided for in separate legislation;
- assist in carrying out tasks for the enforcement of international environmental interests;
- make available data obtained about the state of the environment and provide appropriate information;
- participate in the performance of environmental consciousness and awareness-raising tasks, and contribute to environmental research, education and awareness-raising activities.

d./ Background institutions

Regarding the changes in the environmental background institutions mentioned above, which took place following the spring of 2010, there are two newly established institutions that need

to be mentioned with special regard to waste contaminated with POPs: one of them is the **National Waste Management Agency Nonprofit Ltd.** (**OHÜ**), established in 2011, and the other is the **National Institute for Environment**, established in 2012. The **National Waste Management Agency Nonprofit Ltd.** (**OHÜ**) was established on 1 September 2011, and took over the responsibilities of the former organizations coordinating waste recovery with 1 January 2012. The OHÜ is responsible for the practical implementation of targets set out in **Act LXXXV of 2011** on environmental protection product charges. The OHÜ mediates and organizes the collection and utilization of waste originating from products subject to product charge, prepares the National Waste Collection and Recovery Plan, monitors and evaluates waste management processes, supports the development of waste management, and controls selective collection of residential and industrial waste. The OHÜ thus organizes and coordinates the separate waste collection, processing and recovery activities as system operator at the national level, which it performs through service orders.

The **National Institute for Environment**, **(Nemzeti Környezetügyi Intézet)**, established with 1 January 2012 (hereinafter referred to as "**NeKI**"), is an agency led by the Minister for Rural Development, which also has areas of responsibility that may be associated with POPs. The NeKI consists of a central institution and twelve regional branch offices. The NeKI performs tasks belonging to the Minister's functions and competence, for example the preparation of national and regional programs for the treatment and safe disposal of waste water, water status assessment, operation of the water management information system including the central and regional water records, implementation of key governmental developments and projects, and tasks related to the National Environmental Remediation Program.

It is also responsible for ensuring professional support to environmental monitoring systems operated for the purpose of monitoring the state and use of the environment, increasing the reliability of the data, and professional coordination of the activities of environmental laboratories. In its function related to waste management, which may be important with respect to waste contaminated with POPs, NeKI participates in the preparation of national and regional waste management plans, in professional foundation of the regulation of waste management, in carrying out impact assessments, in the development of background information for decision support, as well as in professional specialist activities for the EU.

2.1.2 Agriculture

In Hungary, agriculture is the largest land user: around 85% of the territory of the country is suitable for agricultural or forestry purposes, where soil and water quality is one of the most important conditions of production. It is essential to prevent soil and water pollution, and to eliminate existing pollution in agriculture. Typically diffuse pollution is generated in the agriculture.

Persistent organic pollutants are present in agriculture mainly in the form of pesticides, the use of which have long since been banned in the majority of cases, but these materials can still be found in warehouses, some living organisms and in the soil and natural waters.

The following functions of the Minister for Rural Development are related to the regulation of POP compounds:

- agri-environmental management,
- crop protection, plant health, and animal health management,

- protection of soil quality, central management of cartography, land administration, and water management for agricultural purposes.

The Ministry is responsible for the authorization of plant protection products. The minister *"provides marketing authorization for pesticides, plant protection products and tools, and materials for the purpose of yield-increase or improvement and protection of soil quality, and controls the quality and proper use of these materials".*

The Division of Plant Protection and Soil Conservation under the Department of Food Chain Control of the VM is responsible, inter alia:

- for managing and monitoring the plant and soil conservation institutions, and for the organization, management and administration of crop protection, plant health and soil conservation;
- for the management of testing for residues, heavy metals and other toxic materials in plant products, water and soil; for the management of administrative tasks of plant and soil protection related to the protection of quality of surface and groundwaters;
- for professional representation in the legislative activities of organizations for fruit and vegetable regulation and control (UNECE, OECD, FAO/WHO Codex Alimentarius) and of the relevant commissions of the EU.

a./ National Food Chain Safety Office (NÉBIH)

The newly created National Food Chain Safety Office (**NÉBIH**) is officially in operation from 15 March 2012, and was created through the merger of the Central Agricultural Office (MgSzH) and the Hungarian Food Safety Office (MÉBiH).

- The NÉBIH acts according to the "from farm to fork" slogan and places chain-like food inspections in the forefront, but performs the former agrarian administrative tasks of the MgSzH as well. Accordingly, this new entity controls the food safety and animal health, plant health, forestry and agricultural directorates of the government offices.
- The new organization further streamlines its laboratory activities and introduces new test methods. In the future, establishment of new facilities cannot be excluded.

The **NÉBIH** carries out the following tasks:

- authorization of the marketing and use of products for plant protection, withdrawal of products with expired or revoked permissions,
- keeping records of pesticide residues and pollution events, management of the database,
- supporting agri-environment schemes,
- operation of the Soil Information and Monitoring (TIM) system.

In relation to pesticides, the Directorate of Plant Protection and Soil Conservation (NTAI) of the NÉBIH carries out the duties of the PIC Designated National Authority, i.e. verifies and authorizes export and import applications of the plant protection products included in the PIC.

b./ Plant Protection Committee

Act XLVI of 2008 on the food supply chain and on the control and supervision of the food supply chain "authorized the Government to lay down in a decree the rules on the issue,

compilation and publication of the Codex of Plant Protection Methodology". Government Decree **220/2008 (VIII. 30.)** on the procedure of publication of codex of mandatory provisions and recommended guidelines in the field of food chain has set up the **Plant Protection Committee (NB)**, which is responsible for the professional management of the work on the Codex of Plant Protection Methodology. **Government Decree 220/2008 (VIII. 30.)** sets out the duties of the plant Protection Committee, for example, negotiation of professional issues relating to pest control, providing feedback on professional community and national legislative drafts, developing the draft of the Plant Protection Action Plan and the provisions and guidelines of the Codex of Plant Protection Methodology.
The Plant Protection Committee created in Hungary provides sufficient guarantees that the duties arising from the performance of the obligations imposed on the Member States by the EU directive adopted in this subject area will be carried out with appropriate professional competence and objectivity.

2.1.3 Chemical safety

a./ Ministry of Human Resources and some of its predecessors (Ministry of National Resources, Ministry of Health)

The Minister of Human Resources coordinates the tasks related to the maintenance of human health (in relation to POPs as well), which include among other things the assessment of the form, the extent and medical options of the harm to health, the publication of such solutions, and the creation of chemical safety.
The ministry and its authorities are responsible under **Act XXV of 2000 on chemical safety** for the national register of dangerous substances and dangerous preparations, and it is the function of the ministry to coordinate the notification of dangerous substances. It is the duty of the ministry to determine the R-phrases indicating specific risks associated with the use of dangerous substances or dangerous preparations, or the S-phrases indicating the safe use of these materials. Detailed rules for the content and form of the safety data sheet are determined by the Minister of Health. The tasks are carried out by the following institutions:

The central authority of the **National Public Health and Medical Officer Service** (ÁNTSZ) is the **Office of the Chief Medical Officer of State** (hereinafter: "OTH"). The national institutions, performing professional methodological duties, belong to the OTH organization. The institutions of the ministry are responsible for several areas affected by chemicals or are national competent authorities designated by international conventions.

b./ The Office of the Chief Medical Officer of State (OTH) of the National Public Health and Medical Officer Service and the public health agencies of government offices

Under the professional guidance of the OTH, public health agencies (county public health agencies or metropolitan district/district public health institutions) carry out tasks related to public health (environmental and community health, food and nutrition health care, chemical safety), health promotion (health protection, health education and health preservation), and perform specific tasks in the field of health administration and coordination.

c./ National Institute of Chemical Safety (OKBI)

The National Institute of Chemical Safety[1] (hereinafter: "OKBI") ensures the institutional background necessary for the safe handling of chemicals, carrying out different administrative, research, information and coordinating activities according to the provisions of the national legislation and the requirements of the European Union.The OKBI collects, analyzes and evaluates national data on chemical safety and the management of dangerous substances according to the relevant legislation, primarily **Act XXV of 2000 on chemical safety** and its implementing regulations, and informs about the conclusions drawn from the international and domestic data the government authorities specified in Article 25 of the Act on chemical safety and other government authorities authorized to prepare or make decisions in the field of chemical safety.

The OKBI is the competent authority in multiple areas, for example, it is the National Competent Authority of **REACH** and CLP (**GHS**), and in respect of industrial chemicals, it is the **PIC Designated National Authority**. The OKBI operates an Information Center.
On the basis of **Act XXV of 2000** on chemical safety, the OKBI operates the **Health Toxicological Information Service** (ETTSZ). One of the tasks of the OKBI ETTSZ department is the registration of dangerous substances and preparations, and collection of toxicity, public health and clinical data in relation to these materials. The department collects and processes the poisoning case reports from the health care system and produces an annual report, which is sent to the Central Statistical Office, the Ministry of Human Resources and the Office of the Chief Medical Officer of State.

d./ National Institute for Food and Nutrition Science (OÉTI)

Duties of the National Institute for Food and Nutrition Science include preparation of legislation and decisions related to food and nutrition, delivering opinions, providing technical and methodological guidance, and organization, research, education and public information in the field.
The **Department of Chemistry and Food Analysis** investigates and records the dietary supplements, foods for special nutritional purposes, cosmetics, and in addition regularly analyses new foods, formulas, and baby foods. The department is involved in the authorization of biocidal active substances. The Department *"prepares an opinion for biocidal cleaners and detergents used at food-producing areas, which on the basis of joint decree No. 38/2003 (VII. 7.) of ESzCsM-FVM replaces the OTH permit during the transitional period of authorization"*.

f./ National Institute of Environmental Health (OKI)

Established in 1998, the National Institute of Environmental Health (OKI) is set out to work in five departments. The Department of Environmental Health is responsible for tests and assessments regarding environmental and indoor air quality and soil hygiene, and carries out **environmental health risk estimates**. The Department of Water Hygiene and Water Security

[1] Basic tasks set out in the memorandum of OKBI:

a) technical and methodological guidance; b) organization, c) activities of the competent authority (REACH, PIC, GHS, biocides); d) preparation of expert reports; e) quality certification, quality control; f) scientific research; g) training and education; h) preparation of legislation concerning the competences; assistance in the implementation of responsibilities of Member States in the European Community; j) data acquisition, data storage, data processing and analysis.

participates in the preparation of decisions that affect the quality of water intended for human consumption (drinking water, mineral and spa waters) and monitors their implementation, as well as investigates and evaluates the chemical and microbiological quality of waters. The OKI explores toxic effects of chemical substances and preparations by experimental and predictive methods, the Department of Toxicology performs a lot of research, and the Department of Environmental Health Impact Assessment is responsible for epidemiological studies among others. On the basis of **Government Decree No. 219/2004**, OKI carries out limit definition, and delineation of contaminated areas during the remediation of contaminated areas.
Nearly all domestic authority is involved in the oversight of chemical safety.

2.1.4 Trade

a./ Ministry for National Economy

The Ministry is responsible among other things for product inspection, to define and enforce the requirements for transportation of dangerous goods and for the marketing of products containing POPs.
The Ministry's responsibilities include administrative tasks related to the composition and quality of products, for example, the enforcement of the provision in connection with POPs that products containing regulated POPs may not be placed on the market.
In the implementation of the PIC Regulation (Regulation 689/2008/EC) the Ministry's role is to ensure that banned or restricted industrial chemicals and pesticides be notified to the designated national authorities of the Rotterdam Convention (OKBI and NÉBIH-NTAI).

b./ Central Statistical Office (KSH)

In Hungary, the Central Statistical Office is responsible for statistical data collection and management. The Office shall collect, analyze and communicate the production and activity data on the basis of which the emission of persistent organic pollutants can be calculated.

c./ National Tax and Customs Administration (NAV)

In Hungary, the tax and customs administration is responsible for overseeing commodities subject to export and import prohibition under international conventions and EU regulations. In the implementation of the Rotterdam Convention and *"Regulation 689/2008/EC of the European Parliament and the Council concerning the export and import of dangerous chemicals" (PIC Regulation)* for its implementation, NAV is assigned control tasks where it needs to work together with the designated national authorities of the Rotterdam Convention (institutions of the OKBI and NÉBIH-NTAI).

3 Policy and regulatory environment

3.1 International conventions

Production, use and elimination of POPs has been regulated by a number of international conventions and protocols. The system of conventions and protocols is summarized in **Table 1**. The amendment of the Aarhus Protocol in 2009, and the amendments of the Stockholm Convention in 2009 and 2011 were incorporated into the relevant European Union regulation (850/2004/EC), explained later, and are therefore directly applicable for the country, without being installed separately in the Hungarian legal system.

International Convention	Acceptance	Finalization	Hungary joins	Hungary ratifies	Hungary promulgates
Aarhus Protocol	June 1998	October 2003	December 1998	April 2004	
Stockholm Convention	May 2001	May 2004	May 2001	March 2008	Act V of 2008
Amendment of the Aarhus Protocol – 7 new pollutants	December 2009	in progress	2009	has not happened yet	
First amendment of the Stockholm Protocol – 9 new pollutants	August 2009	August 2010	2009	August 2010	
Second amendment of the Stockholm Protocol – 1 new pollutant	October 2011	October 2012	2011	October 2012	
Rotterdam Convention	September 1998	February 2004	September 1999	October 2000	Government Decree No. 266/2004 (IX. 23.)
Basel Convention	March 1989	May 1992	March 1989	May 1990	Government Decree 101/1996 (VII. 12.) Government Decree 240/2005 (VII. 27.)

Table 1: Hungary and international regulations on POPs

3.1.1 The Aarhus Protocol

The Geneva Convention on Long-range Transboundary Air Pollution was concluded in 1979, Hungary signed the same year and ratified the following year, in 1980. Implementation of the Convention is made by Protocols; there are 8 Protocols for different areas. The Protocol adopted in Aarhus on June 24 1998 is on the emission of persistent organic pollutants (POPs). The Protocol aims to expand the scope of the Geneva Convention in addition to the well-known air pollutants occurring in large quantities to limit the emissions of non-biodegradable materials, which are much smaller in volume, but very toxic. It is important that the Aarhus Protocol only deals with emissions in the atmosphere. Hungary signed the **Aarhus POP Protocol** on 18 December 1998, deposited the instrument of ratification of the on 7 January 2004, and the Protocol entered into force on 6 April 2004 for Hungary. The tasks of the Aarhus POP Protocol were the first to be implemented.

Among the 16 materials covered here are the 12 groups of compounds of the upcoming Stockholm Convention.

The Protocol placed the emphasis on the following groups of substances:

- *Pesticides:*
  - aldrin,
  - HCB (hexachlorobenzene),
  - chlordane,
  - chlordecone,
  - DDT,
  - dieldrin,
  - endrin,
  - heptachlor,
  - HCH (hexachlorocyclohexane; mixture of lindane, containing at least 99% of the gamma isomer)
  - mirex,
  - toxaphene,
- *Toxic chemicals:*
  - hexabromobiphenyl,
  - PCBs (polychlorinated biphenyls);
- *By-products:*
  - PAHs (polycyclic aromatic hydrocarbons),
  - dioxins/furans,
  - HCB.

Based on the classification in the annexes:

- elimination of production and use (Annex I: aldrin, chlordane, chlordecone, DDT, dieldrin, endrin, heptachlor, hexabromobiphenyl, HCB, mirex, PCB, toxaphene);
- limited use (Annex II: DDT, HCH, PCB);
- reduction of by-product emission (Annex III: PAH, dioxins/furans, hexachlorobenzene).

<u>The 2009 amendment of the Protocol</u>

On 18 December 2009, Parties to the Protocol adopted an amendment to the Protocol, under which 7 new pollutants have been added next to the previous 16; these are:

- hexachlorobutadiene,
- hexachlorocyclohexane (HCH), including lindane
- PBDE
  - hexabromodiphenylether
  - heptabromodiphenylether
  - tetrabromodiphenylether
  - pentabromodiphenylether
- pentachlorobenzene
- perfluorooctane sulfonic acid and its derivatives (PFOS)
- polychlorinated naphthalene (PCN)
- short chain chlorinated paraffins (SCCPs).

The amendment has not yet entered into force because a sufficient number of Parties have not yet ratified it, including Hungary.

3.1.2 The Stockholm Convention

Some of the synthetic chemicals produced in increasing quantities turned out to be causing cancer and liver damage, and damaging the nervous, immune, endocrine and reproductive systems. Some of the chemicals emitted into the environment in large quantities also does not degrade in the environment (persistent) and accumulates in body tissues (bioaccumulative). In addition to certain industrial pollutants, pesticides used for the control of agricultural pests were in particular emitted into the environment in large quantities, harming ecosystems and human health. Released into the environment, these materials may exert their harmful effects for decades, enter the food chain, and as stable compounds, do not or only very slowly break down to photolytic, biological or chemical effects.

Created by the UNEP with global effect, the **Convention *on protecting human health and the environment from POPs*** was signed in Stockholm in 2001 by 92 countries and the European Union. Having regard to the circumstances and limited opportunities of many developing countries, the Convention covers the original list of 12 by the UNEP. Hungary joined the Stockholm Convention in 2001, but only ratified it in 2008 **by Act V of 2008**.

12 materials have been added to the POP list of the Convention, including:

9 pesticides:

- aldrin,
- dieldrin,
- endrin,
- heptachlor,
- chlordane,
- DDT (dichlorodiphenyltrichloroethane)
- mirex,
- HCB (hexachlorobenzene),
- toxaphene.

2 industrial materials and by-products:

- PCBs (polychlorinated biphenyls),
- HCB
- PCDD/PCDF (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans).

Production of substances in **Annex 'A'** to the Convention shall be prohibited and their use is only allowed in exceptional cases. Production and use of substances listed in **Annex 'B'** shall be allowed to a limited extent, while substances in **Annex 'C'** are POPs resulting from non-intentional human activities, where the objective is to reduce or eliminate their production.

<u>The 2009 amendment of the Convention</u>

At the 4th Conference of the Parties to the Convention in 2009, in their Decision No. SC-4/10-18 the participants of the meeting decided to add further nine new persistent pollutants to the list. The following substances were added to the pesticides group:

- chlordecone,
- α-HCH (alpha-hexachlorocyclohexane)

- β-HCH (beta-hexachlorocyclohexane),
- lindane
- pentachlorobenzene (also an industrial chemical and by-product)

The list of industrial chemicals was extended by the following substances:

- HBB (hexabromobiphenyl),
- HBDE (hexa- and heptabromodiphenylether),
- perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride,
- tetra- and pentabromodiphenylether.

The list of materials is in force since 26 August 2010 for all the Parties, which have not exercised notification under point b) of paragraph 3 of Article 22. Hungary is such a country.

The 2011 amendment of the Convention

At the 5th Conference of the Parties to the Convention in 2011, one new pesticide, endosulfan has been added to the list (Decision No. SC-5/3). Hungary banned endosulfan as a pesticide in 2006.

The following **Table 2** summarizes the substances included in Annexes 'A' to 'C' of the Stockholm Convention.

	Pesticide	Industrial material	Industrial by-product
Annex 'A' (final elimination)	Aldrin	PCBs (polychlorinated biphenyls)	
	Hexachlorobenzene (HCB)	Hexachlorobenzene (HCB)	
	Dieldrin	HBB (hexabromobiphenyl)	
	Endrin	HBDEs (hexa- and heptabromodiphenyl ether),	
	Heptachlor	Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	
	Chlordane	Tetra- and pentabromodiphenyl ether.	
	α-HCH and β-HCH (alpha- and beta-hexachlorocyclohexane)	α-HCH and β-HCH	
	Pentachlorobenzene	Pentachlorobenzene	
	Endosulfan		

	Lindane (gamma-hexachlorocyclohexane)		
	Mirex		
	Toxaphene (camphechlor)		
	Chlordecone		
Annex 'B' (restriction)	DDT (dichlorodiphenyltrichloroethane),	Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	
Annex 'C' (reduction of non-intentional production)			PCBs (polychlorinated biphenyls)
			Hexachlorobenzene (HCB)
			PCDD (polychlorinated dibenzo-p-dioxins)
			PCDF (polychlorinated dibenzofurans)
			Pentachlorobenzene

Table 2: List of substances included in the Stockholm Convention

The EU dimensions and relationship of the Aarhus Protocol and the Stockholm Convention are discussed in a separate chapter by reason of their importance.

3.1.3 The Rotterdam Convention (PIC)

The number and volume of materials produced by the chemical industry has grown steadily from the 1930s but trade in chemicals has increased by magnitudes from the 1950s onwards. In parallel, environmental and health risks and problems increased. It became clear that it would be necessary to control trade in hazardous chemicals and pesticides and to register materials. In 1989, under the governance of UNEP and participation of FAO a voluntary exchange of information on international trade of certain particularly hazardous chemicals was established, a system known as the "London Guidelines". In this international program, participants, more than a hundred countries, voluntarily obliged themselves to prior notification (Prior Informed Consent, PIC).

Hungary undertook in 1990 to implement the London Guidelines and the voluntary PIC procedure (as the only country in the region).

The **Rotterdam Convention** (on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade) was adopted on 10 to 11 September 1998. The Convention. became final on 24 February 2004. The task of the Rotterdam Convention is to promote shared responsibility and co-operation efforts between the Parties to the Convention involved in the international trade of certain hazardous chemical substances. Hungary signed

the Rotterdam Convention 10 September 1999 and ratified on 31 October 2000. The commitments voluntarily assumed under the Convention were regulated by **joint decree No. 46/2000 (XII. 29.) of EüM-FVM-KöM-GM on the prior informed consent procedure of the Rotterdam Convention**, which was completed by the since then repealed joint decree No. 41/2000 (XII. 20.) of EüM-Köm on the limitation of activities involving certain dangerous materials and dangerous preparations and by **decree No. 6/2001 (I. 16.) of FVM** on the licensing of the marketing and use of pesticides and on the packaging, storage, transportation of pesticides.

This area is governed by other EU regulations that have come into force since then, such as the REACH and CLP regulation (1107/2009/EC) concerning the placing of plant protection products on the market.
The Convention became final and binding on the Parties in 2004. Hungary promulgated the Convention by **Government Decree 266/2004 (IX. 23.)**. At the same time, **Decree No. 46/2000 (XII. 29.)** on the voluntary phase was repealed.
The legislation was repealed by **Joint Decree No. 8/2004 (XII. 1.) EüM -FVM-KvVM-GKM**. The Convention covers certain pesticides and industrial chemicals. The Rotterdam Convention does not prohibit or restrict the trade in chemicals, but imposes the obligation to provide information on their local use, which information may also serve as a backdrop for possible local restrictions. The Rotterdam Convention is complemented with the list of materials (Annex III to the Convention), which are considered dangerous by the Conference of the Parties under the present conditions of use. For the current list, visit the website of the Convention (www.pic.int). There are 43 chemicals listed, of which 32 are pesticide active ingredients (including four extremely hazardous pesticide mixtures) and 11 are industrial chemicals.

Based on the **Prior Informed Consent system** (PIC), the Parties shall provide information on the importation of substances on the PIC list, and whether in the future they intend to import these materials. It should also be reported if the use of a chemical substance is banned or severely restricted at the national level. Part of the Convention is the so called **early warning system**, on the basis of which a newsletter is published twice a year about countries that banned or restricted any material and information is provided about poisoning and environmental damage. As part of the system the exporting country shall inform the importing party if a substance is exported, which he has been banned or severely restricted by the exporting country. From the pesticide substances listed in Annex III of the Rotterdam Convention, our country only allows the import of products containing methamidophos for specific purposes, in the case of a written request. Importation of other pesticide active ingredients on the list is forbidden in our country. From the industrial chemicals, Hungary gives conditional license to the imports of PBB (polybrominated biphenyls), TML (tetramethyl lead) and tris(2,3-dibromopropyl) phosphate products, if their imports take place for permitted uses.

The Rotterdam Convention and the European Union

In the EU, the implementation of the Rotterdam Convention is mandatory for all Member States; the area was earlier regulated by Regulation 304/2003/EC of the European Parliament and of the Council of 28 January 2003 concerning the export and import of dangerous chemicals.

This EU regulation was withdrawn after the adoption of the Convention (because of the reference to inadequate legal basis) and was replaced by Regulation 689/2008/EC of the

European Parliament and of the Council of 17 June 2008 concerning the export and import of dangerous chemicals. However, this regulation has been revised to ensure consistency with other EU legislation, in particular with regulations governing chemicals and to define the tasks for which the European Chemicals Agency is responsible. The new Regulation (649/2012/EU) shall enter into force on 1 March 2014, and replace the current regulation. Regulation 689/2008/EC was introduced to Hungary by **Government Decree No. 123/2009 (VI. 12.)**.

Government Decree No. 123/2009 defines the competent domestic authorities and audit institutions. In Hungary, the Designated National Authority for plant protection products and yield enhancing substances is the National Food Chain Safety Office, and in the case of industrial chemicals and chemical preparations, the National Institute of Chemical Safety.

3.1.4 The Basel Convention

The Basel Convention deals with the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The Convention was signed on March 22 1989 in Basel, and entered into force on 5 May 1992.

Hungary ratified the Convention on 21 May 1990 and it was promulgated by Government Decree No. 101/1996 (VII. 12.). Government Decree No. 240/2005 (X. 27.) promulgated the amendments to the Convention. The Convention was approved by the European Union with Decision 93/98/EEC, and the EU became a full party to the Convention on 7 May 1994. Additional EU legislation is Regulation 1013/2006/EC of the European Parliament and of the Council of 14 June 2006 on shipments of waste. The Convention introduces a uniform control system for the international transport of hazardous and other wastes.

The Convention prohibits the export and import of waste between Parties and non-Parties (third countries). The only exceptions are wastes that are controlled by other international conventions, such as radioactive waste.

Annex I to the Convention lists the categories of waste that are subject to the control (Y codes). Annex III contains a list of hazardous characteristics (H codes), while Annex IV the codes of disposal procedures (R and D codes). Although waste consisting of or containing pesticides is hazardous waste, Annex I (list of hazardous waste categories) does not name pesticides directly, but it does name the waste organic phosphorus compounds, halogenated aliphatic hydrocarbons, etc. which might be present in plant protection products. In addition, waste contaminated with or containing PCBs, PCTs or PBB is shown in Annex I as a separate category.

In 1995, the 3rd Conference of the Parties (BC-COP-3) adopted a resolution (III/1) amending the Convention which became known as the "Ban Amendment". The Ban Amendment prohibits with immediate effect for countries listed in Annex VII to the Convention (Parties, members of the OECD and the EU and Liechtenstein) to export of hazardous waste to a third country for final disposal or recovery (after 31 December 1997). However, a legal debate arose around the entry into force of the amendment, to which a solution could only be found at the BC-COP-10 session held in 2011. The "Ban Amendment" became part of EU law in 1997, and is mandatory for all Member States, including Hungary. Implementation of the Convention is the responsibility first of all of the VM and the National Inspectorate For Environment, Nature and Water (as the Competent Authority of the Convention in Hungary) in cooperation with three other ministries and their background institutes.

In the framework of the Basel Convention – partially based on the request of the Parties to the Stockholm Convention - five different technical guideslines[2] have been developed until today in connection with the disposal and management of waste containing or contaminated with POPs.

These are mostly available in English3, (but unfortunately not in Hungarian) and provide essential information for POP waste stakeholders.

3.2 Relevant EU legislation

3.2.1 Regulation 850/2004/EC

The European Union is Party to both the Aarhus Protocol and the Stockholm Convention. Regulation 850/2004/EC of the European Parliament and of the Council, which entered into force on 20 May 2004, *for the purposes of protecting human health and the environment and with a view to eliminating POPs where feasible as soon as possible or minimizing their release, regulates the production, placing on the market and use of POPs and treatment and disposal of waste consisting of, containing or contaminated by POPs.* The latter is a new element in relation to the above-mentioned two international agreements. All of the pollutants contained in the Aarhus Protocol and the Stockholm Convention are covered in the Regulation, and it follows the extension of these international documents, while some of its provisions are more stringent than the requirements of the Protocol and the Convention. Regulation 850/2004/EC entered into force on 20 May 2004 in all EU Member States. Since then, it had been amended 8 times.[4]

Although as a result of the prohibitions contained in Council Directives 79/117/EEC[5] and 76/769/EEC [6]the marketing and use of most of the substances listed in the Protocol and the Convention have been phased out in the European Community, the creation of this new regulation was necessary, because in order to meet the international obligations charged on the Community and to minimize the release of POPs, it was necessary and appropriate to ban the production of such materials, and to limit the exemptions to the narrowest scope so that the exemption should only be applied if the material holds an essential function for a special application.

---

[2] 1 Updated general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (POPs).
2 Technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs).
3 Technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with 1,1,1 trichloro 2,2 bis(4 chlorophenyl)ethane (DDT)
4 Technical guidelines on the environmentally sound management of wastes containing or contaminated with unintentionally produced PCDDs, PCDFs, HCB or PCBs
5 Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with the pesticides aldrin, chlordane, dieldrin, endrin, heptachlor, HCB, mirex or toxaphene or with HCB as an industrial chemical

[3]http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/AdoptedTechnicalGuidelines/tabid/2376/Default.aspx

[4] Amendments to the Regulation are summarized in Table 3.

[5] Council Directive prohibiting the placing on the market and use of plant protection products containing certain active substances

[6] Council Directive on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations

The EU regulates the following POP compounds:

Pesticides: aldrin, HCB (hexachlorobenzene), chlordane, chlordecone, DDT, dieldrin, endrin, heptachlor, HCH (hexachlorocyclohexanes, including lindane), mirex, toxaphene, endosulfan, pentachlorobenzene

Toxic chemicals: HBB (hexabromobiphenyl), PCBs (polychlorinated biphenyls), tetrabromodiphenylether, pentabromodiphenylether, hexabromodiphenylether, heptabromodiphenylether, perfluorooctane sulfonic acid and its derivatives (PFOS), polychlorinated naphthalenes (PCN), short chain chlorinated paraffins (SCCPs)

By-products of technological processes: PAHs, PCDD/PCDF (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans), HCB, PCBs, hexachlorobutadiene and pentachlorobenzene.

Provisions and conditions of exemption relating to the regulated POPs are listed in the Annexes of the Regulation as detailed below (according to the current situation).

Annex I: List of substances subject to the ban of production and use

Part A: Substances controlled in the Stockholm Convention and the Aarhus Protocol

Substance	CAS No	EC registration number
Aldrin	309-00-2	206-215-8
Chlordane	57-74-9	200-349-0
Dieldrin	60-57-1	200-484-5
Endrin	72-20-8	200-775-7
Heptachlor	76-44-8	204-962-3
Hexachlorobenzene	118-74-1	200-273-9
Mirex	2385-85-5	219-196-6
Toxaphene	8001-35-2	232-283-3
Polychlorinated biphenyls (PCB)	1336-36-3 and others	215-648-1 and others
DDT (1,1,1-trichloro-2,2 bis (4-chlorophenyl) ethane)	50-29-3	200-024-3

HCH, including lindane	58-89-9 319-84-6 319-85-7 608-73-1	200-401-2 206-270-8 206-271-3 210-168-9
Chlordecone	143-50-0	205-601-3
Endosulfan	115-29-7 959-98-8 33213-65-9	204-079-4
Hexabromobiphenyl	36355-01-8	252-994-2
Pentachlorobenzene	608-93-5	210-172-5
Tetrabromodiphenylether $C_{12}H_6Br_4O$		
Pentabromodiphenylether $C_{12}H_5Br_5O$		
Heptabromodiphenylether $C_{12}H_4Br_6O$		
Hexabromodiphenylether $C_{12}H_3Br_7O$		
Perfluorooctane sulfonic acid and its derivatives (PFOS) $C_8F_{17}SO_2X$[7]		

Part B: Banned substances listed only in the Aarhus Protocol

Substance	CAS No	EC registration number
Hexachlorobutadiene	87-68-3	201-765-5
Polychlorinated		

[7] X = OH, metal salt (O-M+), halide, amide, and other derivatives including polymers

naphthalenes		
Alkanes[8]		

Annex II

Note: the Aarhus Protocol and the Stockholm Convention lists in this Annex the limited use POP compounds (e.g. DDT in some cases) only. Regulated more strictly by the Regulation, these unique applications are not authorized within the EU, so this Annex is empty of content.

Annex III: list of substances subject to emission reduction measures

Substance	CAS No
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)	
Hexachlorobenzene (HCB)	118-74-1
Polychlorinated biphenyls (PCBS)	
Polycyclic aromatic hydrocarbons (PAHs)[9]	
Pentachlorobenzene	608-93-5

As previously mentioned, Regulation 850/2004/EC has been modified 8 times so far, which are briefly summarized in the **Table 3**. Only the two of the amendments are hereinafter illustrated in more detail, which expanded Annexes I to III of the Regulation.

Amending Regulation	What does it	How does it modify it?
1995/2006/EC	Annex IV	Modification of concentrationlLimits
172/2007/EC	Annex V	Modification of maximum threshold concentrations and the description of the operation
323/2007/EC	Annex V	Introduction of pre-treatment procedures

[9] The following four compounds are to be used for the emission inventory as indicators: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene.

219/2009/EC	Text	Adjustment of a legal nature
304/2009/EC	Annex IV and V	Transfer of the new general technical guidelines of the Basel Convention
756/2010/EU	Annex IV and V	Accepts the nine new pollutants of the Stockholm Convention with specified exceptions
757/2010/EU	Annex I and III	Accepts the nine new pollutants of the Stockholm Convention with specified exceptions
519/2012/EU	Annex I	Accepts the nine new pollutants of the Stockholm Convention and the three new pollutants of the Aarhus Protocl with specified exceptions

Table 3: Amendments of Regulation 850/2004/EC

M7 Regulation 757/2010/EU of the Commission

Since it was agreed at 4th Conference of the Parties to the Stockholm Convention in 2009, that nine new substances should be entered in the Annexes of the Convention, Annex I and III of Regulation 850/2004/EC had to be updated within the meaning of the decisions adopted at the COP-4 meeting.
The COP-4 decided that eight of the candidate substances would be included in Annex 'A' of the Convention (elimination).
The ninth substance of perfluorooctane sulfonic acid and its derivatives (PFOS) are still widely used around the world, so COP-4 decided to include these together with a series of exemptions in Annex 'B' (restriction).
By including the substances covered by the COP-4 decision in Regulation 850/2004/EC, the scope of the restriction became in line with the decisions taken at COP-4 meeting (SC-4/2 and SC-4/10-18). The modifications were as follows:

- PFOS was included in Annex I,
- no exemption for DDT in Annex I,
- tetra-, penta - , hexa- , and heptabromodiphenylether was included in Annex I, with the conditions of application and rules of exemption
- hexachlorcyclohexanes (HCH), including lindane, are listed in Annex I without derogation,
- pentachlorophenol was added to Annex I without derogation and is shown in Annex III also,
- chlordecone and hexabromobiphenyl was included in Annex I.

M8 Regulation 519/2012/EU of the Commission

After the executive body of the Aarhus Protocol decided at its 27th meeting between 14 and 18 December 2009 that hexachlorobutadiene, polychlorinated naphthalenes (PCN) and short-chain chlorinated paraffins (SCCP) are entered in the Protocol, Part B of Annex I of Regulation 850/2004/EC had to be updated. As Annex XVII to Regulation 1907/2006/EC (REACH) previously restricted the marketing and use of SCCPs, but the EU restrictions are narrower than what the executive body has laid down, it had to be extended with the prohibition, with the exception to two exempt applications.
In addition, endosulfan was included in Part A of Annex I of the Regulation with this amendment, which material was added to Annex 'A' to the Stockholm Convention as a result of decision SC-5/03 adopted at the COP-5 session in 2011.

3.2.2 Other related EU legislation - the REACH Regulation

In addition to the above, it is important to mention again the REACH Regulation 1907/2006/EC, as a number of POP materials fall within its scope.

The regulation serves the protection of human health and the environment by requiring to collect and organize information on chemicals manufactured, imported and used in the EU. These databases provide the basis for risk management measures for the rolling back of hazards posed by chemicals. An essential element of the regulation is that the industry has a duty to ensure that the chemicals they produce, market or use are not harmful to human health and the environment. Therefore, to collect all information relating to chemicals is the duty and responsibility of the industry. Some of the information on the hazards of the materials is available to the public, which also helps develop conscious consumer behaviour. It also will develop research and development targeting substitution options of hazardous materials, and many hazardous materials currently in use will be replaced by materials that are less damaging to health and the environmental.

The production and sale of chemicals is at the global level, and the risks are the same the world over. Therefore, it is reasonable and useful if the hazards classification and labelling of the same product is the same in every country. It was an important step in the realization of this goal that in December 2002 the United Nations committee of experts on the transport of dangerous goods and on the globally harmonized system of classification and labelling of chemicals adopted the Globally Harmonized System of classification and labelling (GHS). The rules of the system applicable in the European Union were published and made mandatory by Regulation 1272/2008/EC on the classification, labelling and packaging of substances and mixtures. This so called CLP regulation is in force since January 2009, the rules must be applied to substances from 1 December 2010, to mixtures from 1 June 2015 onwards (until then, the old classification, labelling and packaging requirements can also be followed).
Both REACH and CLP has put in place several new provisions. Administration of these rules in our country is provided by institutions already operating. Most of the rules lay down the liability of manufacturers.

3.3 Complete regulation – the Stockholm Convention, the Aarhus Protocol and the POP Regulation

Table 4 summarizes the reporting obligations to international organizations on the implementation of the provisions of the international POP agreements (Convention and Protocol) and the POP Regulation 850/2004/EC, respectively. With regard to the Convention,

reports are submitted to the Secretariat of the Stockholm Convention, in the case of the Aarhus POP Protocol, to the United Nations Economic Commission for Europe, while in the case of Regulation 850/2004/EC, to the EU Commission.

Content of reports	Aarhus Protocol	Stockholm Convention	Regulation 850/2004/EC
Production and utilization data of banned POPs used as plant protection products or for industrial purposes	-	**until the end of the year of becoming a party to the Convention, and then until the end of every 4th year**	**Every year or every 3rd year: report (EU)**
Undesired by-products of thermal industrial processes: PCB, PAH, PCDD/DF and HCB emissions data into the air, water and soil, and production of an analytical report about these	**PCDD/DF, HCB, PCBs and PAHs: annually, until 15 February of the second year following the reporting year, using the forms of the Geneva Convention**	**until the end of the year of becoming a party to the Convention, and then until the end of every 4th year**	**Paragraph 1 of Article 6 of the EU Regulation: within two years of its entry into force (has been completed before 20 May 2006), and then every 3 years**

Table 4: Summary of reporting obligations

POPs subject to the overall control are summarized in ***Table 5***:

Table 5: POPs subject to the overall control

POP compound	UNEP 1995	AP* 1998			SC** 2001			EU-R.*** 2004					Water 2000/60/EC	PIC
								I		II	III	IV		
		I	II	III	A	B	C	A	B	A, B				
Aldrin	+	+			+			+				+	PS	+
Chlordane	+	+			+			+				+		+
Chlordecone		+			+			+				+		+
DDT	+	+	+			+		+				+	PS	+
Dieldrin	+	+			+			+				+	PS	+
Endrin	+	+			+			+				+	PS	+
Heptachlor	+	+			+			+				+	PHS	+
Hexabromobiphenyl		+			+			+				+		+
Hexachlorobenzene	+	+		+	+		+	+			+	+	PHS	+
Mirex	+	+			+			+				+		+
PCB[1]	+	+	+		+		+	+			+	+		+
Toxaphene	+	+			+			+				+		+
α-HCH and β-HCH (alpha- and beta-hexachlorocyclohexane)			+		+			+				+	PHS	+
PAH[2]				+							+		PHS	
PCDD[3]	+			+			+				+	+		
PCDF[4]	+			+			+				+	+		
Pentachlorobenz		+			+	+	+	+			+	+	PHS	

ene													
Endosulfan					+			+					**PHS**	+
Lindane (gamma-hexachlorocyclo hexane)		+			+			+				+		+
HBDEs (hexa- and heptabromodiph enylether),		+			+			+				+	**PHS**	
PFOS Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride		+	+		+	+		+				+	**PHS**	
TBDE/PBDE **Tetra- and pentabromodiph enylether.**		+			+			+				+	**PHS**	
SCCPs (short chain chlorinated paraffins)				+					+					
Hexachlorobuta diene				+					+				**PHS**	
PCN Polychlorinated naphthalenes		+							+					

1 polychlorinated biphenyls (209 compounds)
2 polyaromatic hydrocarbons (> 100 compounds)
3 polychlorinated dibenzo-p-dioxins (75 compounds)
4 polychlorinated dibenzo-furans (135 compounds)

* Aarhus Protocol (AP)
  - Annex I: substances to be eliminated
  - Annex II: substances to be restricted
  - Annex III: substances with emission to be reduced

** Stockholm Convention (SC)
  - Annex A: elimination
  - Annex B: restriction
  - Annex C: unwanted by-product (u-POP: unintentional POP generation)

*** EU Regulation No. 850/2004 of the EP and the EC (EU-R)
  - Part A of Annex I: substances prohibited under both the AP and the SC
  - B: substances prohibited under the AP only
  - Annex II: substances to be restricted
  - Annex III: substances with emission to be reduced
  - Annex IV: substances subject to waste management regulations

Annex IV: waste classification and maximum concentration limits of POPs

All POP materials are *water pollutants*. According to Annex X to the EU Water Framework Directive (2000/60/EC) and Directive 2008/105/EC, priority hazardous substances are given a PHS marking and priority substances a PS marking.

The use of most of the 10 substances have been banned in both Hungary and the EU before the revision of the EU pesticides, some (lindane, endosulfan) were checked again during the revision on the basis of Directive 91/414/EEC on plant protection agents, but their use was refused.

The Annex I to the PIC Regulation (Regulation 689/2008/EC of the European Parliament and the Council concerning the export and import of dangerous chemicals) lists the chemicals that are subject to export notification, require PIC notification, or fall within the scope of the PIC-procedure.

4 Inventory

Applied data systems

In drawing up the inventory of POPs, databases of the following specialized information systems and information from the following international reporting systems were used:

- Waste Information System (HIR)
- Groundwater and Soil Registry (FAVI)
- Surface Water Quality Information System (FEVI)
- Remediation Information System (KÁRINFO)
- Soil Information and Monitoring System (TIM)
- Nomenclature for Reporting (NFR)
- European Pollutant Release and Transfer Register (E-PRTR)

4.1 Priority pollutants

4.1.1 Pesticides

4.1.1.1 Situation report, manufacture of pesticides containing POPs and quantity used in Hungary

Manufacture, use and distribution of products containing the POPs listed in the annexes of international agreements as active ingredient is prohibited, the professional legislation in force provides accordingly.

Previously, Hungary manufactured and used a significant amount of pesticides containing POPs. More than 85 % of the country's territory is agricultural land, of which more than three-quarters may be used as arable land (4.7 million hectares). This data already indicates the importance of the use of fertilizers and powder and spray formulations during the decades of 'intensive farming'.

The insecticide effect of DDT was discovered in 1939 and subsequently, one after the other, pesticides containing POPs appeared on the market, including hexachlorohexane isomers (HCH), hexachlorobenzene (HCB), aldrin and endosulfan among others. DDT's bioaccumulate (builds up in living organisms) properties were discovered in the late 1950s, and then its withdrawing from the market began.

The majority of pesticides containing POPs was produced by two major domestic manufacturers: the Budapesti Vegyiművek (BVM) and Nitrokémia Ipartelepek (NK). In

addition, smaller import purchases also occurred, primarily from the former GDR, and especially from England and the former Federal Republic of Germany.

Plant protection products containing POPs were practically produced for the domestic market only, export data are not available.

The Plant Protection and Soil Conservation Directorates and the NÉBIH have an archive data base about the 60 years of use of pesticides containing POPs in Hungary, which is shown in the POP inventory. Quantitative use broken down by decade of the ten most important persistent pesticides containing chlorinated hydrocarbons is shown in ***Table 6***.

POP content PPP	1950-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	Total use
	(t)	(t)	(t)	(t)	(t)	(t)	(t)
DDT	60,239.0	59,852.0	43.5	-	-	-	**120,134.5**
HCH*	17,048.0	29,809.0	-	-	-	-	**46,857.0**
Lindane	2.6	119,065.0	70,141.0	927.5	48.7	0.0	**189,257.3**
Toxaphene	767.0	7,834.0	3,615.0	249.0	10.0		**12,475.0**
Aldrin	1.4	66,800.0	-	-	-	-	**66,801.4**
Dieldrin	9.5	442.0	-	-	-	-	**451.5**
HCB	0.3	43.1	142.5	-	-	-	**185.9**
Chlordane	-	0.1	-	-	-	-	**0.1**
Methoxychlor	0.3	188.3		0.0	0.0	0.0	**188.6**
Endosulfan	5.1	549.0	1,568.0	2,536.5	914	1303.7	**6,934.6**
Total	**78,073.3**	**284,589**	**75,510**	**3,723**	**9,730**	**1,303.7**	**444,165**

* alpha- and beta-hexachlorocyclohexane

Table 6: Quantitative use of 10 persistent pesticides containing chlorinated hydrocarbons, broken down by decades

With respect to pesticide distribution between 1950 and 2010, the **2,589,015 tons** of pesticide used included about **444,165** tons of pesticide containing POPs. This is 17.2% of the total amount.

The active substance content of the **444,165** tons of POP-containing products used in the six decades was 69,323 tons (about 15.6%).

Figure 1 shows the use of the total and the POP-containing products in relation to one another during the 60 years. The figure clearly shows that the 60 years use of plant protection products (upper bell curve) and within it the use of products containing POPs (lower bell curve) shows a Gaussian distribution with a peak in 1965 to 1966 (blue line), and that in the subsequent period the use of POP products declines.

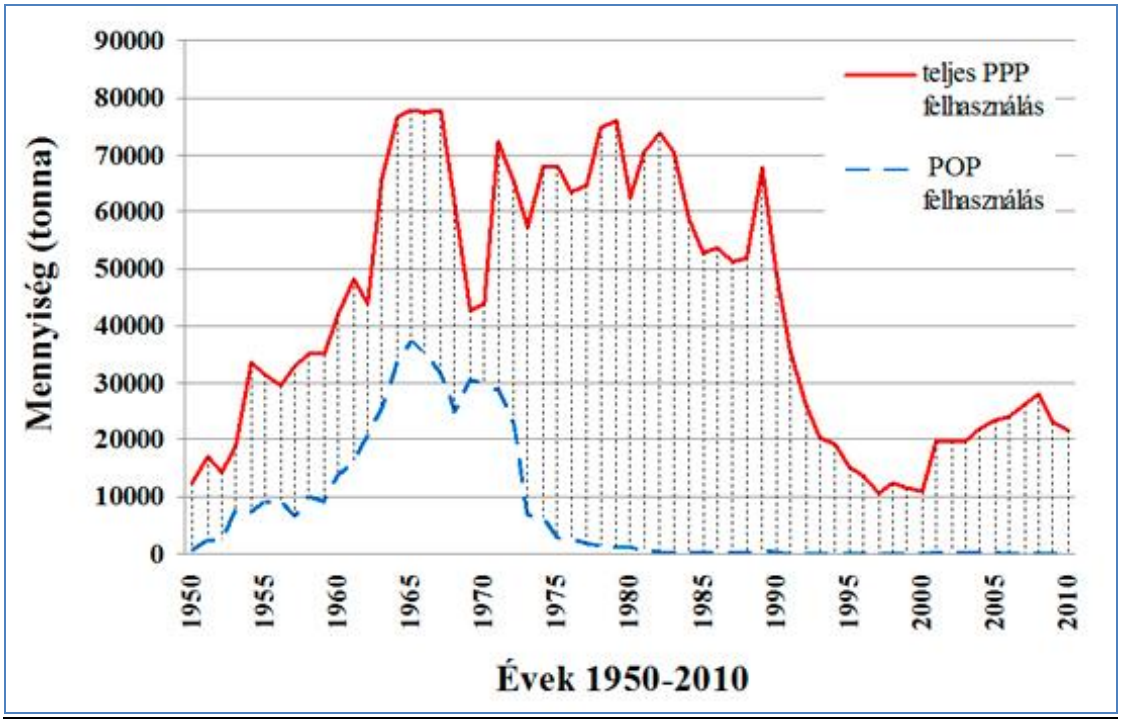


Figure 1: Use of pesticides and the ratio of products containing POPs (Source: Biokontroll Vol. 2 No. 3, September 2011, Ágnes Pethő)

Because of the diverse toxic effects, persistence (slowly degradable) and cumulation of the individual substances, the active ingredient content of the products does matter. Knowing the composition of the products, the actual amount of each active ingredient classified as POP can be calculated. For the sake of clarity, the change in the active ingredient content of the products sold containing POPs is broken down in 10 year periods (***Table 7***).

Substance	1950-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	Σ (t)
	(t)	(t)	(t)	(t)	(t)	(t)	
DDT	10,128.31	29,347.61	4.35	-	-	-	39,480.27

HCH*	**2,555.87**	**4,399.20**	**-**	**-**	**-**	**-**	**6,955.07**
Lindane (γ-HCH)	**2.10**	**8,787.82**	**4,314.98**	**175.65**	**3.90**	**0.0**	**13,284.45**
Toxaphene (chlorocamphene)	**153.42**	**1,595.68**	**1,807.45**	**75.20**	**1.00**		**3,632.75**
Aldrin	**0.70**	**1,893.71**	**-**	**-**	**-**	**-**	**1,894.41**
Dieldrin	**4.75**	**259.40**	**-**	**-**	**-**	**-**	**264.15**
HCB	**0.04**	**5.17**	**17.10**	**-**	**-**	**-**	**22.31**
Chlordane	**-**	**0.10**	**-**	**-**	**-**	**-**	**0.10**
Methoxychlor	**0.2**	**9**	**0.4**	**0**	**0**	**0**	**9.6**
Endosulfan	**2.6**	**274.5**	**1,414.80**	**1,290.00**	**334**	**456.3**	**3772**
Total	**12,847.99**	**46,572.19**	**7,567.9**	**1540.85**	**338.9**	**456.3**	**69,323**

***** alpha- and beta-hexachlorocyclohexane

Table 7: Changes in the active ingredient content of products containing POPs between 1950-2010

The maximum sales of pesticides containing POPs was between 1964 and 1971, when the level of use was permanently 30,000 t/year or above. During this period, the proportion of products with POPs as active substance was the highest in relation to all pesticides, reaching the maximum in 1969 with 72%. Subsequently, this ratio decreased rapidly. The table also shows that the largest use was from DDT, followed by lindane. DDT was far more used than the other active substances, since this was sold and used as "clean", stand alone active substance, and was also included in preparations at a much higher concentration.

Data source

Between 1950 and 1981, the data were collected by Agrotröszt. The 1982 data are from the Department of Plant Protection and Soil Conservation of the former FVM. For the period from 1983 to 2000, the data from the database of the Department of Statistics at the Agricultural Research and Informatics Institute (AKII) are shown in the Table [AKI 1982-2000]. The AKII compiled its database based on the data provided by merchants. Data for the period between 2000 and 2010 are from the NÉBIH's and its legal predecessors' annual pesticide sales data.

4.1.1.2 Domestic use of pesticides between 1950 and 2010

Between **1950 and 1960** the use of DDT (10,128 t = 15.7 %) and HCH (2,556 t = 4%) dominated within total use.

Between **1961 and 1970** the total use of POP substances increased to almost fourfold (from 20% to 70%) (from 12,848 tons to 46,572 tons). This is due to the threefold increase in the use

of DDT, that is, this material dominated the pesticide market (43 %). The most common formulas of DDT were marketed as Matador, Nikerol, Raven and Pernio. The use of HCH increased strongly as well (6.6 %). The use of lindane suddenly emerged from a minimum to 13%. The use of toxaphene increased by an order of magnitude as well (from 0.2 % to 2.4%), and large quantities of aldrin (2.8%) were imported for the production of superphosphate with aldrin. Dieldrin use was negligible compared to the total amount of other substances, but due to its strong persistence it is worth mentioning that all of its use happened in the first half of the 1960s.

Thus, it can be said that this period was the decade of POP substances. Removal of the active ingredients from the market began in 1965 with one of the DDT formulas (Hungária Matador 5% powder), which in 1966 set off a wave of withdrawals, in which several POP-containing products were withdrawn from the market (e.g. HCH in 1967).

Hungary was the first in the world to ban the manufacture, import and use of products containing aldrin, dieldrin, pure HCH or DDT active substance on 1 January 1968. The ban was introduced within the framework of the so-called chlorinated hydrocarbon eradication program, which was launched in the late 1960s by the then Ministry of Agriculture and Food (MEM).

The selling out of stocks of the products mentioned above caused the fact that sales of products containing POPs peaked in 1969 and 1970 in our country.
At the same time, the use of lindane-containing preparations flourished as the replacement of DDT. Following the 1968 withdrawal, it was practically only endosulfan and, in smaller quantities, lindane (for soil treatment) that remained in circulation, the persistence of which was significantly lower than that of the other POPs and its accumulation in living organisms was not detectable.

Between **1971 and 1980** the active substance composition changed radically, and the use of previous POPs decreased. The products containing chlorinated hydrocarbons were increasingly replaced phosphate esters. Due to the withdrawal, the share of DDT and HCH became insignificant, and although the share of lindane was still significant (6.5%), but the quantity used was halved during the period (4,324 tons). Use rate of toxaphene increased (2.7%) and endosulfan, which had not yet been declared POP material at the time, held its market share. Overall, it can be said that between the 1970s and 1980s the use of POP products decreased to11.3% in average. Their use only began to drastically decline after 1973: it decreased below 5% already after 1975, falling below 1 % after 1984.

Between **1981 and 1990** the use of POP substances declined to a minimum (1,541 tons/10 years, this quantity was made up to a smaller extent by lindane, and to a larger extent by endosulfan). The sale of lindane, which had played a dominant role until then, was therefore greatly reduced (0.26%), the sale of toxaphene was completely rolled back (0.11%), but the use of endosulfan was also reduced (1.9%).

Between **1991 and 2000**, practically only endosulfan remained in circulation, this substance gave almost all of the POP use in this period (339 tons/10 years). In 1992, withdrawal of lindane and toxaphene was partly completed by the withdrawal of the products named "Pol-Melisekt 50" and "Melipax", and the use of other products (e.g. Buvinol or the product containing 2,4,5-T) was also banned. The last pesticide containing lindane (the so-called Lindafor) was banned in 1999.

Between **2001 and 2010** there was a noticeable increase in the use of endosulfan (456 t/6 years) due to the selling out of stocks, but after its withdrawal (the endosulfan-containing products called Thiodan and Thionex) in 2006, its use has stopped. This virtually eliminated the distribution of POP-containing products in our country after 2007.

In conclusion, the withdrawal of a substantial part of POP-containing pesticides had happened before the end of the 1960s in Hungary, and by 2007 the withdrawal was fully completed. In the 30 years between 1980 and 2010, POP-containing products only accounted for 0.6 % of the domestic pesticide supply.

Table 8 shows the data concerning the use and withdrawal of certain substances

Use and withdrawal of POP-containing pesticides in Hungary			
Pesticide substance	**Number of plant protection products**	**I of use**	**Date of withdrawal**
Aldrin	2	1959-1967	**1968**
Dieldrin	2	1958-1967	**1968**
DDT	29	1950-1974	**1968**
HCH	9	1950-1967	**1968**
HCB	1	1959-1980	**1980**
Lindane	8	1956-1980	**2000**
Combination of DDT and lindane	6	1961-1969	**1970**
Toxaphene (camphechlor)	7	1958-1980	**1990**
Combination of DDT, lindane and methoxychlor	3	1960-1969	**1970**
Combination of lindane and TMTD	4	1962-1979	**2000**
Endosulfan	7	1959-2006	**2006**
Combination of lindane and endosulfan	**2**	**1974-1976**	**1992**

Table 8: length of use and date of withdrawal of certain plant protection products

4.1.1.3 Domestic legislation and the withdrawal of licenses

From the POP substances to be eliminated according to the international agreements, some were not manufactured in Hungary at all, and the use of some others was never permitted (e.g. mirex or chlordecone). In addition to the banning of these substances, the Hungarian legislation in force prohibits the manufacture and use of a number of POP substances, which the international agreements in question do not contain (e.g. 2,4,5-T or dicofol).

The licensing system of pesticides was worked out in parallel with the use of these products, and was continuously developed further. Insights like persistence, bioaccumulation and other environmental or health hazards led to the licensing requirements to become ever more stringent, depending on the results of the tests prescribed before the marketing of the product.

The institutional background of licensing was still relatively weak in the early 1950s and 1960s. The potential hazards and how and why to counteract them was not yet fully

understood, processing of scientific surveys and experiences was just in the initial stage, the related well-developed institutional system has only emerged in the next few decades, gradually.

The specific agricultural crop protection legislation distinct from the general agricultural law has evolved in the last half century. The FM decree of 1957 already mentioned the licensing of "production, use and marketing of plant protection substances and tools" separately, although it did not address its conditions in detail.

The situation really changed in 1964. The first comprehensive pest control codex, which was published at this time, synthesized the previous separate regulations, and together with its later amendments it contained really modern provisions, even by international standards.
Rising expectations towards licensing were only partially reflected in the legislation redefined in 1968: new requirements were added to the scope of data that need to be submitted, particularly regarding the actions required to protect beneficial organisms.

The Statutory Decree of 1968 remained in force until 1988. Statutory Decree No. 2 of 1988 and its implementing regulations were issued at this time, which contained modern regulations, geared to international standards.

In the ensuing time, it became increasingly clear that the next step could be the further development of internal system components (principles of classifications, assessment, rigorous, uniform criteria for decision-making etc.) and the institutional system of licensing. This is done today by transposing the legal order of the European Union into our existing legislation.

Among the domestic legislation it is important to mention Act XXXV of 2000 on plant protection (and its implementing regulations), Decree No. 89/2004 (V. 15.) of FVM on the authorization of placing on the market and use, as well as on the packaging, labeling, storage and transport of plant protection products, and Decree No. 43/2010 (IV. 23.) of FVM on the rules of plant protection activities.

Directive 2009/128/EC on the sustainable use of pesticides requires that each Member State should prepare a **National Implementation Plan**, which aims to establish measures to reduce the risks and impacts of pesticides on human health and the environment, as well as to reduce the agricultural risks of pesticide use. In Hungary, the National Implementation Plan was adopted in 2012 by the Plant Protection Committee of the Ministry of Rural Development. By this act, the direction of domestic plant protection has been defined for the long term.

Since the accession to the EU, Hungary joined in the pesticide licensing system of the European Union and must more effectively than before meet the increasingly stringent environmental and human health standards. After licensing the active substance at the EU level, the authorization of plant protection products is done zonally from 14 June 2011 under Regulation 1107/2009/EC. In addition, provisions of the EU CLP Regulation are gradually introduced for the authorization of new products. For pesticides already on the market, compliance with safety requirements should be fully enforced at the time of their review.

4.1.1.4 Illegal trade in pesticides

According to the information of the NAV, breach of the rules in force in relation to toxic substances it is not typical. Illegal shipments of chemicals did not have to be turned back at the border lately. Smuggling and counterfeiting of chemicals is detected 1 or 2 times a year.

Calculations of the European Crop Protection Association (ECPA), show that illegal trade results in the loss of EUR 360 to 510 million a year in Europe. According to the ECPA, while the share of counterfeit and illegal pesticides in Europe is estimated at 5 to 7%, the situation in Hungary is much better because the figure is only 1 to 2% according to their data.

In contrast, the 2004 surveys of the plant protection network render it likely that the rate is higher than 1 to 2 %: according to them *"Almost 10 percent of the raw plant products coming to the market in Hungary tested positive for residues not permitted in the specific plant product".*

The NAV checks the non-EU Eastern and Southern border traffic, and based on the experience, most of the illegal counterfeit pesticides come from China or India. Illegal traffic arrived in our country by road, rail, and even air in recent years.

The Hungarian Crop Protection Association (NISZ) launched a campaign against counterfeiting and illegal trade: raising awareness in publications and presentations to the problems posed by counterfeit and illegal products. In 2011, they published a video on their website titled "Stop the spread of illegal pesticides".

4.1.2 PCBs

The PCBs are a group of 209 different so-called congener biphenyl compounds, which differ by the number and position of the chlorine atoms.

Combustible at very high temperatures, the combustion gas can be more dangerous than the starting compound was: combustion by- products include hydrogen chloride and polychlorinated dibenzodioxins/dibenzofurans among others.
PCBs have good heat resistance and are stable, therefore they have previously been widely used in transformers and capacitors, heat transfer fluids, hydraulic systems, lubricants, paints, adhesives, sealants and insulating materials, and in plastics as softening agents.
The degradation of PCBs in the environment depends on the chlorine content: persistence generally increases parallel with the chlorine content. The microorganisms degrade mono-, di- and trichlorinated biphenyls relatively rapidly, but their ability to break down tetrachlorinated biphenyls is slow, while the higher chlorinated biphenyls are almost completely resistant to biodegradation. PCBs are toxic, and with their ability to accumulate they pose a serious threat to human health.

The use of PCBs in Hungary

PCBs have never been manufactured in our country, and their use in new equipment has been virtually eliminated since 1984 (small uses of 1 or 2 kg have been reported in some years). PCBs were replaced by other materials in these applications.
The previously imported PCBs were widely used in the industry: primarily in capacitors and transformers mixed in dielectric oils, in machinery as heat transfer and hydraulic fluid, and to a lesser extent, as plasticizers in paints, varnishes and inks.

4.1.2.1 Existing national legislation and objectives

In accordance with the provisions of the Stockholm Convention, Article 3 (1) of Regulation 850/2004/EC provides that the production, distribution and use of POPs listed in Annex I, either alone or in a preparation or as an ingredient of any product, is prohibited.

Industrial applications of PCBs are listed in this Annex of the Regulation, which means that specific domestic legislation for those applications is not necessary.

The Convention and the Regulation include a temporary relief for the PCBs, according to which the continued use of products containing PCBs at the time of entry into force of the Regulation may be permitted subject to the fulfillment of the requirements laid down in Directive 96/59/EC. This Directive was transposed by **Decree No. 5/2001 (II. 23.) KöM**[10], therefore the agenda is determined in the followings under the provisions of this Decree and in line with the National Waste Management Plans (2003-2008, 2009-2020).

Decree **5/2001 (II. 23.) KöM** required that in the case of equipment containing more than 5 litres of oil, with concentrations of PCB greater than 0.005% (transformers, capacitors and other equipment), the number of equipment, the quantity of oil (dielectric fluids), and the concentrations of PCB shall be specified.

The regulation required experimental measurement of the concentrations of PCBs in the oil, on the one hand to show that the devices actually do not contain PCBs, and on the other hand in order to settle the technical and legal merits of their further treatment, that is, to check how high is the PCB concentration in the oil versus the concentration limit fixed in the regulation. In fact, their decommissioning and disposal by 2010, as well as their usability after 2010 depends on the concentration of PCBs.

Under the regulation, any equipment which contained oil with more than 0.05% by weight concentration of PCBs, had to be dismounted until 31 December 2010 and their operator had to provide for the disposal of all the dielectric fluid and the housing of the equipment (e.g. transformer house), which have become waste. However, equipment in which the oil contains PCBs at a concentration between 0.005 and 0.05%, and if their technical condition allows, can be operated after 2010 until the end of their useful lives.

Measures taken so far and the results and conclusions

- In order to implement Decree No. 5/2001 KöM and to have uniform records of PCB-containing equipment nationwide, the ministry has aggregated operators within the scope of the legislation and the reported amounts on the basis of reports from the inspectorates. The survey recorded the situation in 2003 and 2004.
- Survey results: In 2004, there were 1,171 transformers registered by the inspectorates nationwide under the Decree. The dielectric fluid volume in these transformers was 159 tons in 2004.
- Capacitors were registered in greater numbers but with less fluid: 13,594 capacitors were registered by the inspectorates in 2004. The dielectric fluid volume in these capacitors was 96 tons in 2004.
- Together with the hydraulic oils containing smaller amounts of PCBs, located in 20 to 30 old mining machines placed in the others category, a total of about 313 tons of oil containing PCBs to be disposed of were registered in 2003, which fell to 255 tons in 2004. The decrease was primarily due to the fact that business organizations have begun to replace and dispose of equipment subject to Decree No. 5/2001 KöM and their oil charge. During the progress of the replacement of devices, around the end of 2006, the volume of PCB-containing oils decreased to 130 tons.

[10] Repealed in the meantime by Decree No. 144/2012 (XII. 27.) VM laying down detailed rules of treatment of PCB and equipment containing PCB (which is discussed in the detail in section "5.6 Waste containing or contaminated with POPs").

- According to the results of the survey, business organizations were obliged to uninstall and to dispose of until 31 December 2010 all the registered equipment currently operating.
- Domestic disposal of dielectric oils containing PCBs shall and may be carried out *by burning in waste incinerators*. Other chemical waste management, from environmental and economic point of view, is not coming into play at this point.

The important conclusion that can be deducted from the survey and the previous measures is, and this was the top priority NIP 1, that the PCB-containing oils must be collected from the equipment containing them and had to be disposed of in incinerators until the end of 2010, and that these oils should be replaced by less polluting liquids.

4.2 Dioxins/furans, PCBs, HCBs, PeCB and PAHs released to the atmosphere as undesired by-products of certain industrial processes.

POPs are formed in certain industrial, mainly thermal processes at high temperature and may be released to the atmosphere.

Although some of the POPs released to the atmosphere become deposited within the boundaries of the country causing soil and water pollution, the rest may be transferred to large distances to become deposited in other countries. Therefore POPs released to the atmosphere should be taken into account also as soil pollutants, although soil pollution is caused mostly by concentrated volumes of POPs disposed as hazardous wastes, sprayed as pesticides or entering directly the soil in some other manner.

Decree No 3/2002 of 22 February 2002 of the Ministry of Environment on the technical requirements, operating conditions and emission limit values of waste incineration, which is in compliance with EU legislation, confirms the emission limit value of 0.1 ngTEQ/m^3 introduced in 1991 for atmospheric dioxin releases. The relevant legislation already stipulates an obligation to perform two annual measurements of dioxin releases. **Decree No 4/2011 of 14 January 2011 of the Ministry of Rural Development** on the air pollution thresholds and emission ceilings for located point sources of air pollutants specifies emission ceilings for the following POPS:

- biphenyls/diphenyls (150 mg/m^3 above a mass flow of 3 kg/)
- napththalene (150 mg/m^3 above a mass flow of 3 kg/)
- dibenzo(a,h)anthracene (20 mg/m^3 above a mass flow of 0.1 kg/)

Unintentional POP emitting technologies

Table 9 summarises, without quantities, the group of persistent pollutants released unintentionally to the atmosphere. Although the list does not include release factors attached to particular technological features, it highlights the quantification difficulties of several pollutants due to their nature (e.g. incineration of communal waste, transport fuels).

These POPs may be released to the atmosphere as a result of the listed technologies or fuel incineration. With regard to **POP emitting technologies**, statutory measurement data, which could be used at the time of compiling the inventory, are available only for dioxin releases from waste incineration.

Fuels and technologies	*Air pollutants*			
	PAH	**PCB**	**PCDD/F**	**HCB**
lignite	+	+	+	+
brown or hard coal	+	+	+	+

firewood, biomass	+	+	+	+
heating oil, fuel oil	+	+	+	
gasolene	+	+	+	+
gas oil	+	+	+	+
kerosene	+		+	+
incineration of communal waste		+	+	+
incineration of hazardous waste		+	+	
incineration of hospital waste		+	+	
sintering		+	+	+
coke production	+		+	
SM steel production		+		
converter steel production		+	+	
electro steel production		+	+	
cast iron production		+	+	
secondary copper production		+	+	+
primary and secondary aluminium production	+		+	
brass production			+	
cement manufacturing		+	+	+
quicklime manufacturing		+	+	+
brick manufacturing			+	
tile manufacturing			+	
glass manufacturing			+	
ceramic production			+	
asphalt mixing			+	
paper and board production			+	
dichloroethane and EDC production			+	
cremation			+	
smoking of meat			+	
smoking			+	
landfills		+		

Table 9: POP emitting technologies

4.2.1 Monitoring network

Hungarian Air Quality Network (Országos Légszennyezettségi Mérőhálózat)

Air pollution measurements were started in Hungary in 1974 through the Regional Immission Monitoring Network.

Following the regular modernisation efforts of the system, online measuring points were installed in the 1990s and then further new methods and operating conditions were introduced.

The current operation is governed under **Decree No 306/2010 of 23 December 2010 of the Hungarian Government**, while the measuring network itself is operated by the Air Quality Reference Centre (LRK) of the Hungarian Meteorological Service.

Council Directives 96/62/EC, 1999/30/EC, 2000/69/EC and 2004/107/EC establishing the range of air pollutants to be monitored were transposed into Hungarian national law by **Decree No 4/2002 of 7 October 2002 of the Ministry of Environment and Water**. Although benzo(a)pyrene is the only POP among these agents, the PM10 concentrations measured at several stations or obtained from samples taken in municipalities may be used to subsequently detect other POP concentrations as well. **Decree No 6/2011 of 14 January 2011 of the**

Ministry of Rural Development clearly specifies the requirements for the location of measuring points and classifies the measuring devices, based on their urban, suburban or rural location and their station type, as background, industrial and traffic measuring devices.

Currently, there are **52 automated non-stop measuring stations** scattered around the country; the data supplied by them can be seen on http://www.kvvm.hu/olm. However, more important are the annual summaries, available on the same website even in the form of time series data, containing air pollution data obtained from the PM10 values of the municipalities.

Emission monitoring

PCDD/F emissions from waste incineration must be monitored at intervals specified in **Decree No 3/2002 of 22 February 2002 of the Ministry of Environment.** Compliance with the emission limit value of 0.1 ngTEQ/Nm^3 set for atmospheric PCDD/F releases must be checked accordingly and, in addition, waste incinerators must also report on such compliance when they submit their annual statements to the environmental authorities.

When the authorities issue a resolution to oblige operators, due to the technologies applied by them, to measure the atmospheric releases of benzo(a)pyrene belonging to the group of carcinogenic PAHs, such operators must supply the relevant data together with their annual statements; however, no measurements of the atmospheric releases of other POPs are compulsory at the moment.

NFR

UNEP is the environment programme of the United Nations whose main objective is to monitor the condition of environment and to obtain and distribute the relevant data. **NFR** (Nomenclature For Reporting) is the data management system of the programme containing air pollution data by country for a total of 23 pollutants. Using emission factors, the database tables of the countries calculate pollutant emissions for each industrial sector from a typical output value of the given sector. The database contains the toxic equivalents of dioxins and furans as well as the emission data of four PAHs (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1-2-3,cd)pyrene), hexachlorobenzene (HCB), hexachlorocyclohexane (HCH) and PCBs.

4.2.2 Integrated pollution prevention and control, best available technique

Integrated pollution prevention and control is governed by Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, which is an EU legislation of outstanding importance.

The integrated approach represents a principle of modern environment protection and means that the load and pollution caused by the various environmental media should be studied jointly and not separately. The control of emissions into air, water or soil separately may encourage the shifting of pollution from one environmental medium to another rather than protecting the environment as a whole.

Therefore, apart from regulating the emission levels, **IPPC** also deals with such other issues as energy efficiency, minimising the production of wastes, accidents leading to environmental consequences and returning the site to its original state at the time of abandonment. This legislation studies the polluting effect in a broader perspective and, in particular, it applies not

only to the environmental impacts of a single technology or operation but to those of the whole installation.

The enforcement of the integrated approach is ensured through the implementation of **BAT (Best Available Technique)** required under the legislation, which means in terms of the various processes (planning, authorisation, implementation, operation, abandonment) that the emissions should be reduced right at the source and that the natural resources should be used efficiently.

The conditions for carrying out the operations subject to IPPC should be specified by the competent environmental authority on the basis of the relevant BAT conclusions. The individual BAT conclusions make part of the **BAT reference documents (BREFs)** compiled by industry, the compilation and review of which is coordinated by the European IPPC Bureau. At the time of BREF reviews – when determining the BATs – it is important to take into consideration any guidance designed to prevent the formation or to monitor the emission of POPs. As to POP emissions, the following BREFs are particularly relevant: waste incineration, iron and steel production, cement and lime production, foundries, paper and fibre production.
The application of IPPC in national legislation is governed under **Decree No 314/2005 of 25 December 2005 of the Hungarian Government** regarding the procedures of environmental impact assessment and the single procedure of authorisation for utilising the environment.

4.2.2.1 Pollutant Release and Transfer Register (PRTR)

The establishment of EPER (European Pollutant Emission Register) was a basic element of Council Directive (EC) No 96/61 concerning integrated pollution prevention and control.

The main objective of EPER was to capture and store the comparable data of various polluting sources in the form of an integrated list or database. As such, EPER supplied information for the population, encouraged the industries to implement environmental innovations and emission reductions, and assisted the authorities and decision-makers in their efforts to follow up the achievement of various objectives laid down in the international treaties and protocols.

The UN-level PRTR (Pollutant Release and Transfer Register) (http://www.unece.org/env/pp/prtr.htm) is a data supply obligation based on the Aarhus Convention on "a*ccess to information, public participation in decision-making and access to justice in environmental matters"* (http://eper-prtr.kvvm.hu/oldal.php?id=3).

Pursuant to Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register (E-PRTR), the EPER system was replaced as from 2008. Accordingly, E-PRTR is compulsory for all Member States of the European Union. The purpose of the E-PRTR Regulation is **to increase public access to environmental information** by the establishment of a single European PRTR. The supply of accurate and updated information facilitates the process of informing the public and helps the work of non-governmental organisations, while the decision-makers are able to take pollution reduction measures in view of emission data.

PRTR is a public online database of the industrial pollutant releases of various industrial sectors. The database is built from the required reports; the relevant data must be reported, summarised by site, to the competent regional environmental authority. The obligation of **regular data supply** is linked to activities or emission thresholds.

The PRTR database contains the quantities of the relevant pollutants released to air, water and soil, or transferred as waste, by site and operator (http://prtr.ec.europa.eu/).

The implementation of E-PRTR in Hungary is coordinated by the Ministry of Environment. The PRTR database for Hungary is available online at http://prtr.kvvm.hu where it is possible to query, in accordance with the content requirements of EU legislation, the emission and waste transfer data of facilities subject to E-PRTR.

Annex II to E-PRTR Regulation (EC) No 166/2006 **lists most of the POPs** which are pollutants subject to the legislation. The currently available E-PRTR report (for the period of 2007-2011) contains releases to air reported by Hungarian industrial facilities for three substance groups (PCBs, dioxins + furans, PAHs).

4.2.2.2 Calculation of atmospheric POP emissions

Other data are available through ad hoc measurements and from automated non-stop measuring instruments or on the basis of calculations. The main objective of the latter method is to **make up for the lack of measurement results**, for which calculation guides – compiled mostly through practical experiences – are available. As the last time was in 2006 when industrial emission measurements were available for NIP 1, it was necessary to perform emission calculations. The EMEP/Corinair Atmospheric Emission Inventory Guidebook was used for the calculation of atmospheric emissions from NFR.

The essence of the method is that we take some of the non-pollution data available for the emitting technologies ("activity data" e.g. industry volumes produced, fuels consumed, etc.) in an effort to determine, with the help of an emission factor established in advance for each technology, the national volume of the relevant pollutant released in the given year. Though the quality of data produced by this method is not comparable to that of measurements, the method can provide an idea about the national importance of the relevant pollutants.

4.2.3 PCBs

General characteristics of PCBs

Polychlorinated biphenyls (PCBs) are halogenated hydrocarbons where the two benzene rings contain a certain number of chlorine atoms in certain locations. Poorly soluble in water, they have high solubility in organic solvents, oils and fats, which makes them extremely suitable for accumulation in living organisms. Depending on their level of chlorination, several compounds having somewhat different properties belong to this group. The compounds containing a small number of chlorine atoms are typically colourless, odourless and transparent or yellowish liquids of low viscosity but the colour deepens and the viscosity increases as the level of chlorination is increased.
Despite their discovery at the end of the 19th century, they became widely used only by the second half of the 20th century – due to their excellent thermal conductivity and high chemical/physical stability – mostly **as coolants and dielectric fluids in condensers and transformers**. However, as they were shown to be carcinogenic, their use in new equipment was banned in the developed world already during the 1970s and 1980s.

Hungarian regulation of PCBs

As to PCBs, the Stockholm Convention includes a temporary exemption under which products containing PCBs in use upon the entry into force of the Convention will be allowed for continued use in accordance with the requirements laid down in Directive (EC) No 96/59. This Directive was transposed into Hungarian legislation by **Decree No 5/2001 of 23 February 2001 of the Ministry of Environment** which was then replaced by **Decree No 144/2012 of 27 February 2012 of the Ministry of Rural Development.**

Use of PCBs in Hungary

No PCB compounds, or any oil containing them, have been **manufactured** or used in new equipment in Hungary since 1984, and PCBs have been replaced with other substances in their places application.

Formerly, imported PCBs **were widely used in the industry** mostly as additives to dielectric oils in condensers and transformers, further as heat transfer and hydraulic fluids in mechanical equipment and to a lesser extent as softeners in paints, lacquers and inks.

PCB compounds may be released to air – often accompanied by dioxins and furans – when oils containing PCBs are disposed through incineration or at the time of other burning operations. Based on NFR data, Hungary's calculated PCB emission was 18.66 kg in 2010 and 18.39 kg in 2011, which is a sign of great improvement when compared to the NIP 1 figure of 94.81 kg in 2004 ***(Figure 2).*** As the **energy industry and metallurgy** continue to be responsible for most of Hungary's PCB emissions, this improvement is mostly the result of the increased use of smoke filter technologies in the energy industry ***(Figure 3)*** which led to an emission drop of 83% in this industry between 2007 and 2011. Although to a lesser extent, emissions from small burning equipment were also reduced (by 33%).

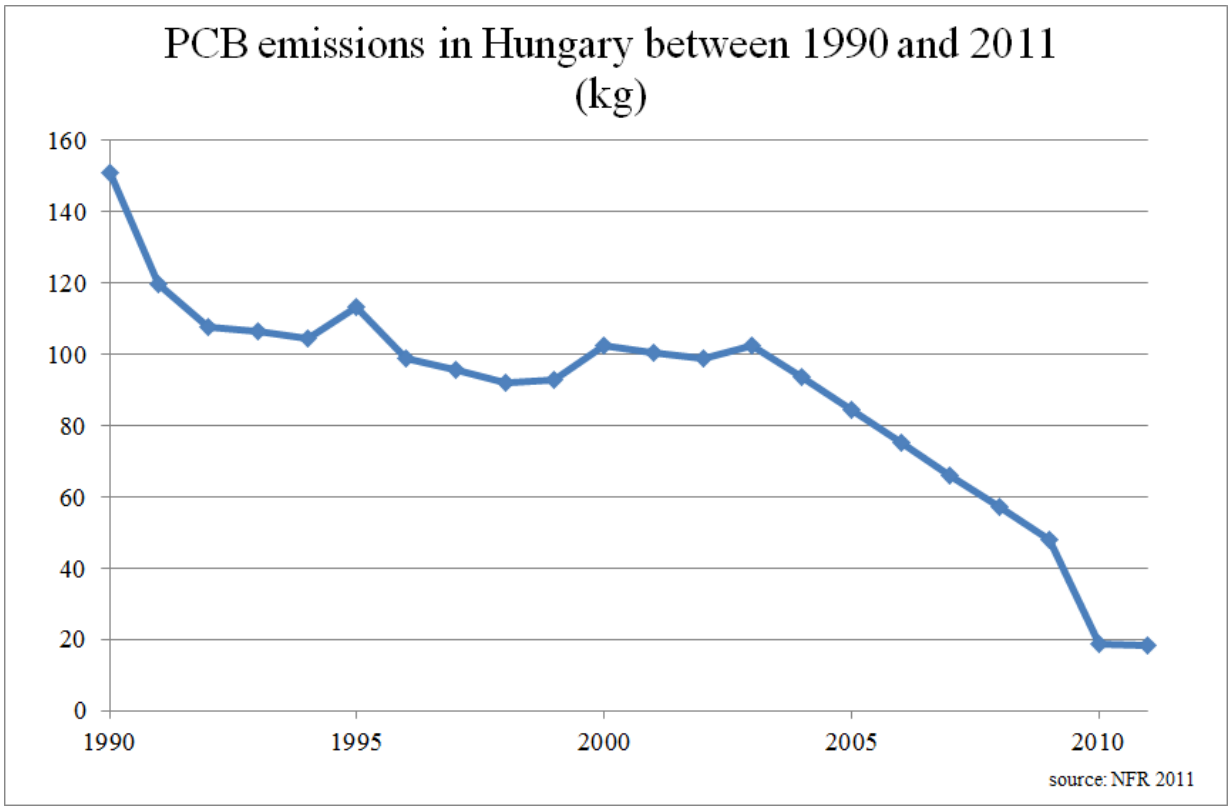


Figure 2

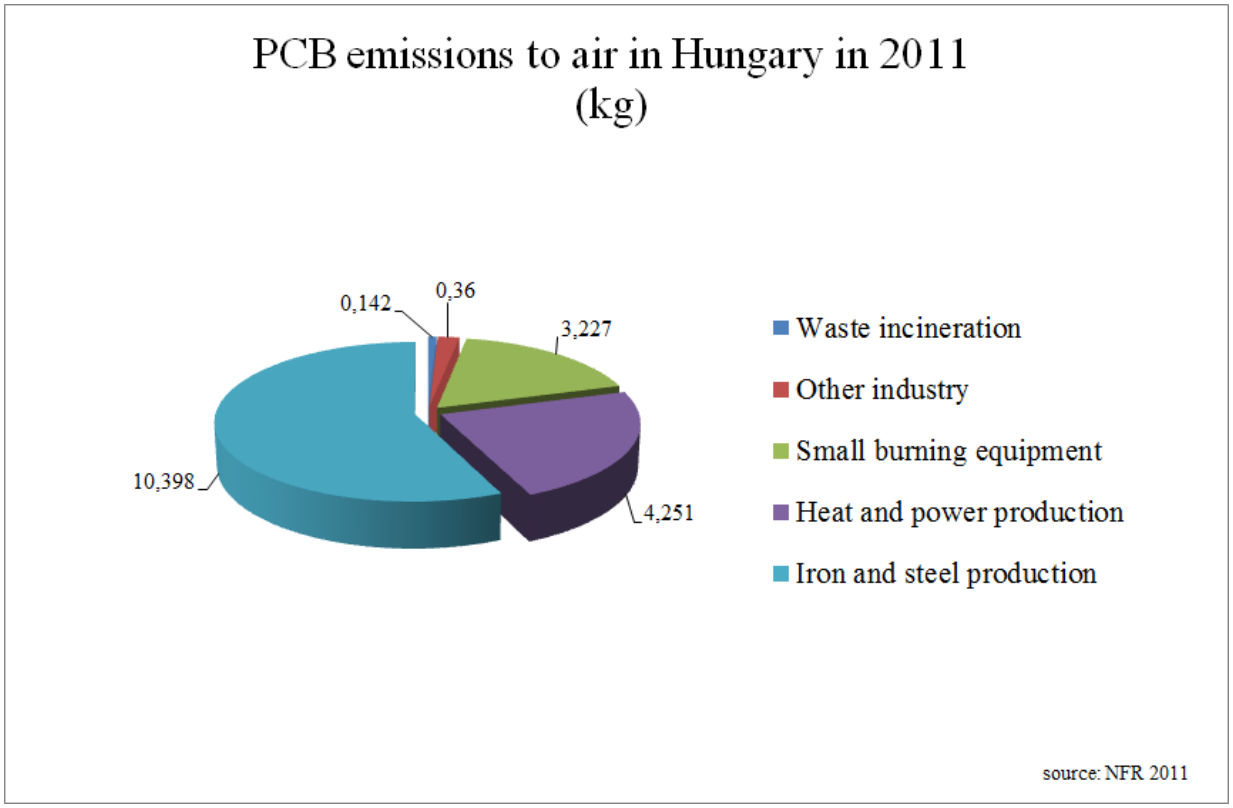


Figure 3

The Greenpeace and the Clean Air Action Group made a case study on indoor air quality, the findings of which are shown in the Clean Air Action Group section of the Non-governmental organisations chapter.

4.2.4 PAHs

General characteristics of PAHs

Polycyclic aromatic hydrocarbons (PAHs) consist of benzene rings including only carbon and hydrogen atoms; found mostly in fossil fuels, they are emitted to air as a result of the incomplete combustion of such fuels. Consisting of only two benzene rings, naphthalene is the simplest example of PAH. Polycyclic aromatic hydrocarbons are, in general, poorly soluble in water (if at all) but they readily mix with oils or fats and, usually, with alcohol and ether, too. As air pollutants, they are typically **bound to small particles**, they are detectable using gas and liquid chromatography or mass spectrometry, and their primary sources of emission include the **energy and chemical industry, waste incineration and households**.

The **human health effects** of individual PAHs **show great variations**. Benzo(a)pyrene, which has been known to be carcinogenic for a long time, is especially important in terms of human health. Benzo(b,j and k)fluroanthene, indeno(1,2,3-cd)pyrene and benzo(a)- and dibenzo(a)anthracene also have carcinogenic, mutagenic and teratogenic properties.

Hungarian regulation of PAHs

The domestic regulation of PAHs is based on **Decree No 306/2010 of 23 December 2010 of the Hungarian Government** on the protection of air which transposes into Hungarian law the provisions of Directive (EC) No 2004/107. Most importantly, the Directive stipulates – in lack of lower health limit values – the regular monitoring of PAHs and other pollutants in ambient air and sets the maintenance or improvement of air quality as an objective in this regard.

Levels of PAH air pollution in Hungary

In accordance with the legislative requirements, immission data established from PM10 with the help of OLM are available for several PAH compounds, although measured and calculated emission data are available only from PRTR and NFR, respectively.
According to ***Figure 4***, only one facility (Dunaferr Zrt) released PAH compounds above the statutory notification level in Hungary between 2008 and 2011. It is clear from the diagram that the emission, which was not high for a facility of this size, dropped to about one-fifth of its original level by 2009, although PAH emissions have increased since then.

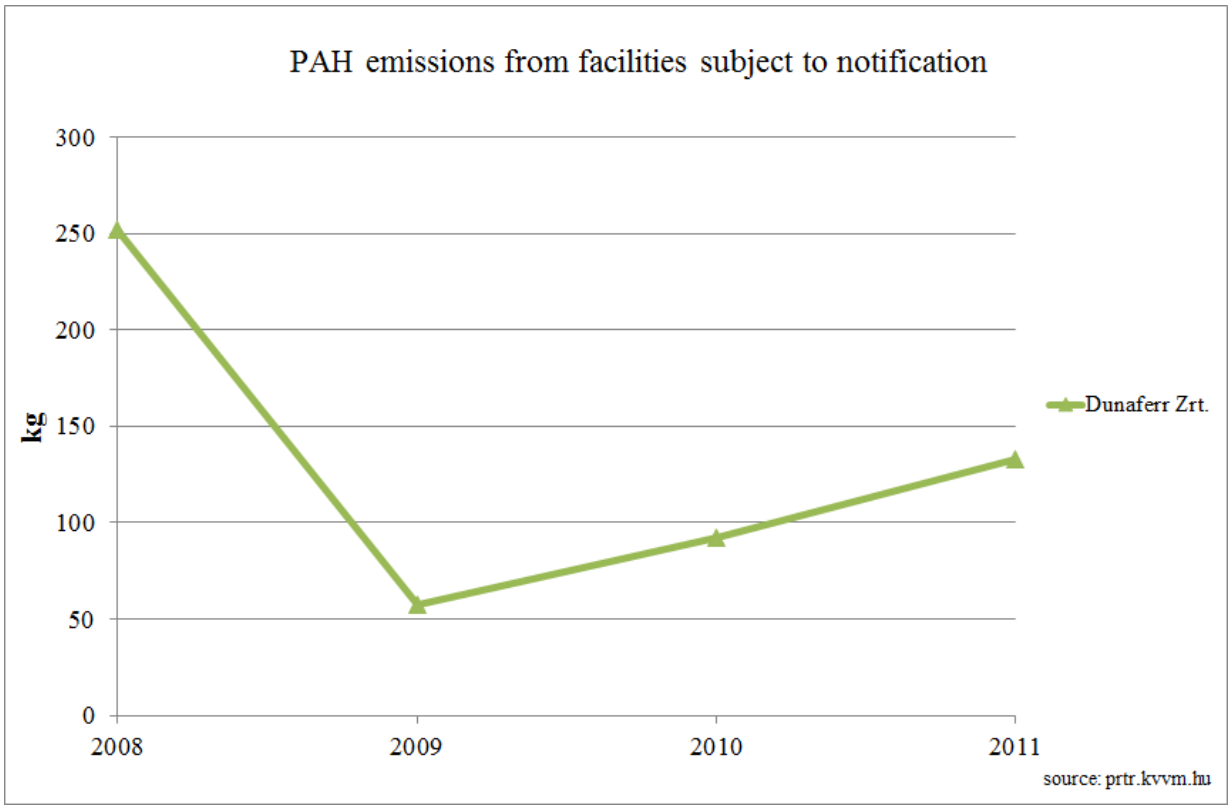


Figure 4

Figure 5 shows PAH emissions calculated for the entire area of Hungary. Although no data were available for 2007, it is clear that the economic crisis of 2008 and the resulting drop in industrial output caused a temporary reduction in emissions which, however, started a steep rise again for all compounds in 2009.

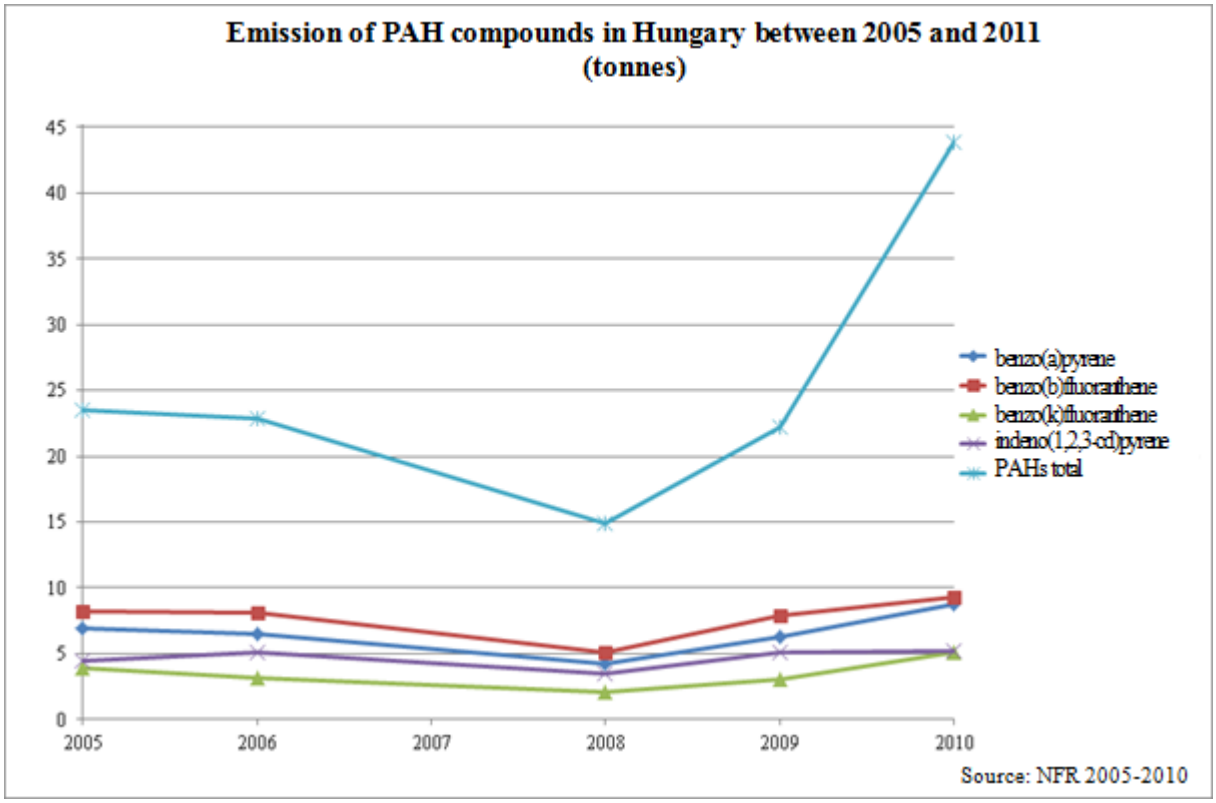


Figure 5

Figure 6 and Figure 7 serve for the comparison of atmospheric PAH imissions in Kecskemét and Sarród. Only these two settlements had reliable data (availability > 90%) in the Hungarian Air Quality Network. **The two measuring stations** considerably **differ from each other in terms of their location and properties**. As it is relatively close to the settlement and located in a central place less exposed to air currents, the Kecskemét measuring station is more sensitive to national values and to **emissions produced from traffic, industry and urban functions**. However, as it is located within the Fertő-Hanság National Park, the Sarród measuring station detects mainly transboundary emissions (exposed to northwestern winds) free from **anthropogenic impacts**. As the scale is identical in both diagrams, their data are easily comparable. Benzo(b,j and k)fluroanthene has higher levels than other pollutants in both cases and, despite different properties, the two stations show similar trends as well.

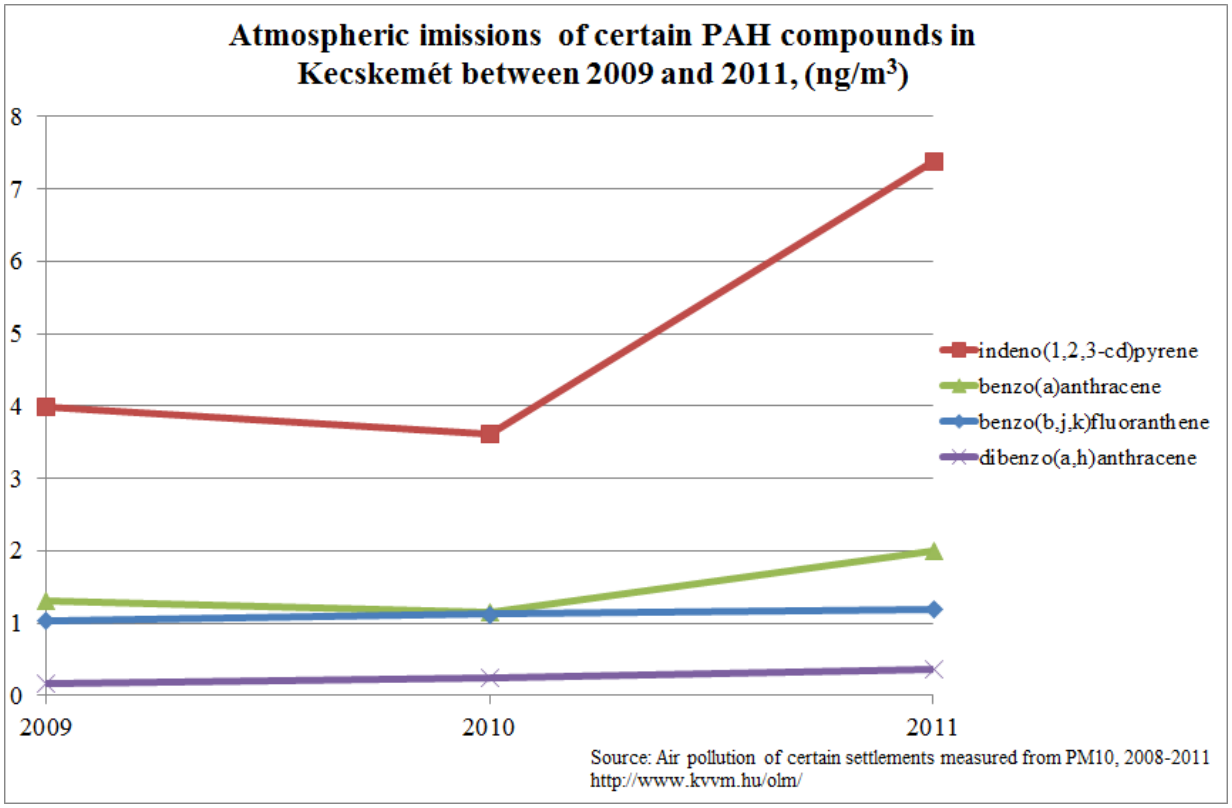


Figure 6

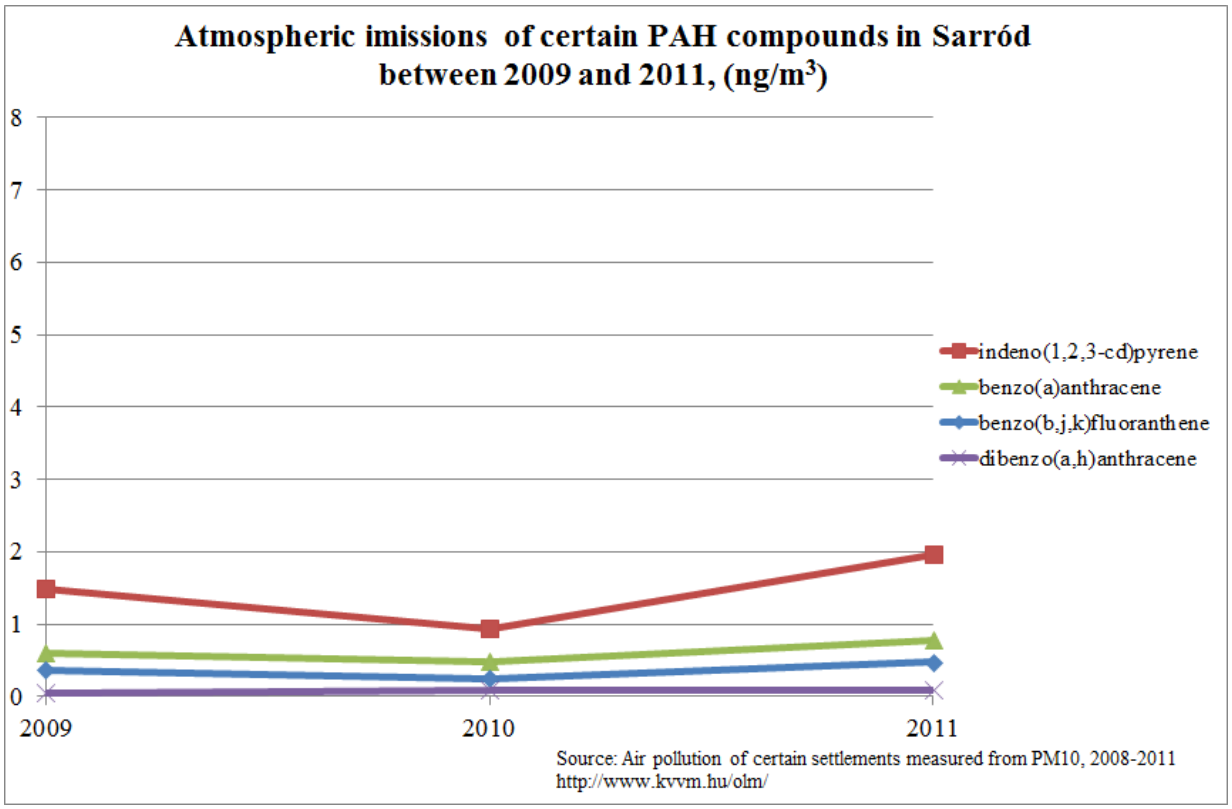


Figure 7

4.2.5 Dioxins/furans

General characteristics of dioxins and furans

Dioxins are cyclic organic carbon compounds in which oxygen atoms replace the two opposing carbon atoms in the benzene ring. Broadly speaking, all compounds are considered dioxins which contain this typical pair of opposing oxygen atoms. The nomenclature is similar with furans consisting of a five-membered aromatic ring with four carbon atoms and one oxygen, where all hydrocarbons containing such rings are also referred to as furans. Although their base compounds are also strongly toxic, **polychlorinated dibenzo-dioxins (PCDD)** and **polychlorinated dibenzofurans (PCDF)** are two unintentionally released substances, which are particularly important for the purpose of this document, where the main groups are found between two benzene rings containing different levels of chlorine. Typically occurring together, both compound classes are strongly toxic with proven carcinogenic, mutagenic and teratogenic properties.
Typically, they are **formed during the low-temperature combustion** of PVC, PCBs and other chlorinated hydrocarbons and, due to their high solubility in fats, they are easily accumulated in food chains despite their eventually low emission levels.

Hungarian regulation of dioxins and furans

As waste incineration represents the main source of both pollutant types, Hungarian law, apart from **Decree No 306/2010 of 23 December 2010 of the Hungarian Government**, regulates primarily the related activities.
Decree No 3/2002 of 22 February 2002 of the Ministry of Environment on the technical requirements, operating conditions and emission limit values of waste incineration lays down strict requirements for the parameters of waste incineration, confirms the emission limit value of 0.1 ngTEQ/m^3 introduced in 1991 for atmospheric dioxin releases and stipulates an obligation to perform two annual measurements of dioxin releases. Furthermore, the Decree clearly identifies the relevant dioxin and furan compounds.
It is important to note that the low concentration makes it difficult to perform immission measurements of PCDD/PCDF from ambient air and, therefore, the applicable legislation stipulates only **emission obligations**.

Levels of dioxin/furan air pollution in Hungary

Based on PRTR data, ***Figure 8*** shows the toxic equivalent in grams of the dioxin/furan emission levels of three industrial polluters subject to notification. Their emission levels dropped to a fraction of the original values after 2010.

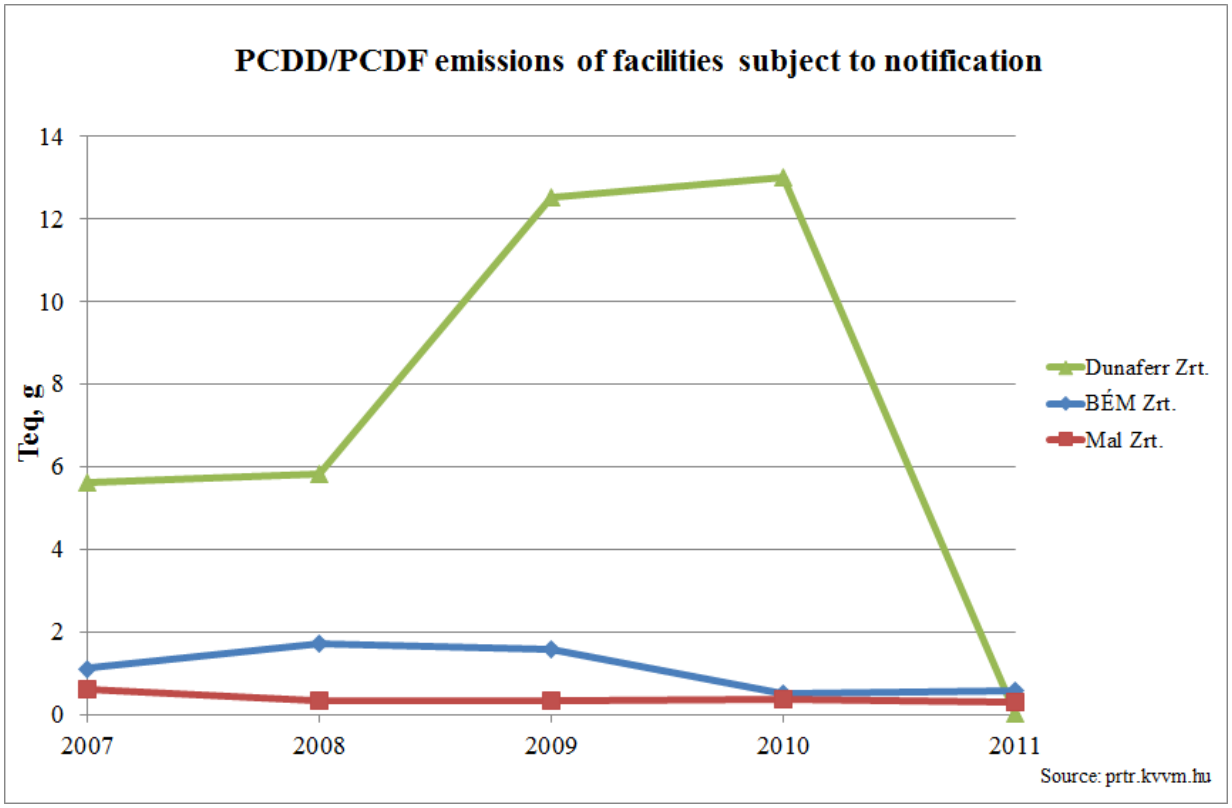


Figure 8

According to ***Figure 9***, PCDD/PCDF emissions in Hungary show a decreasing tendency, although it should be noted that no figures are available about the pollutants released to air without data supply e.g. as a result of the illegal incineration performed by the population, which means that the decrease applies only to the reported data.

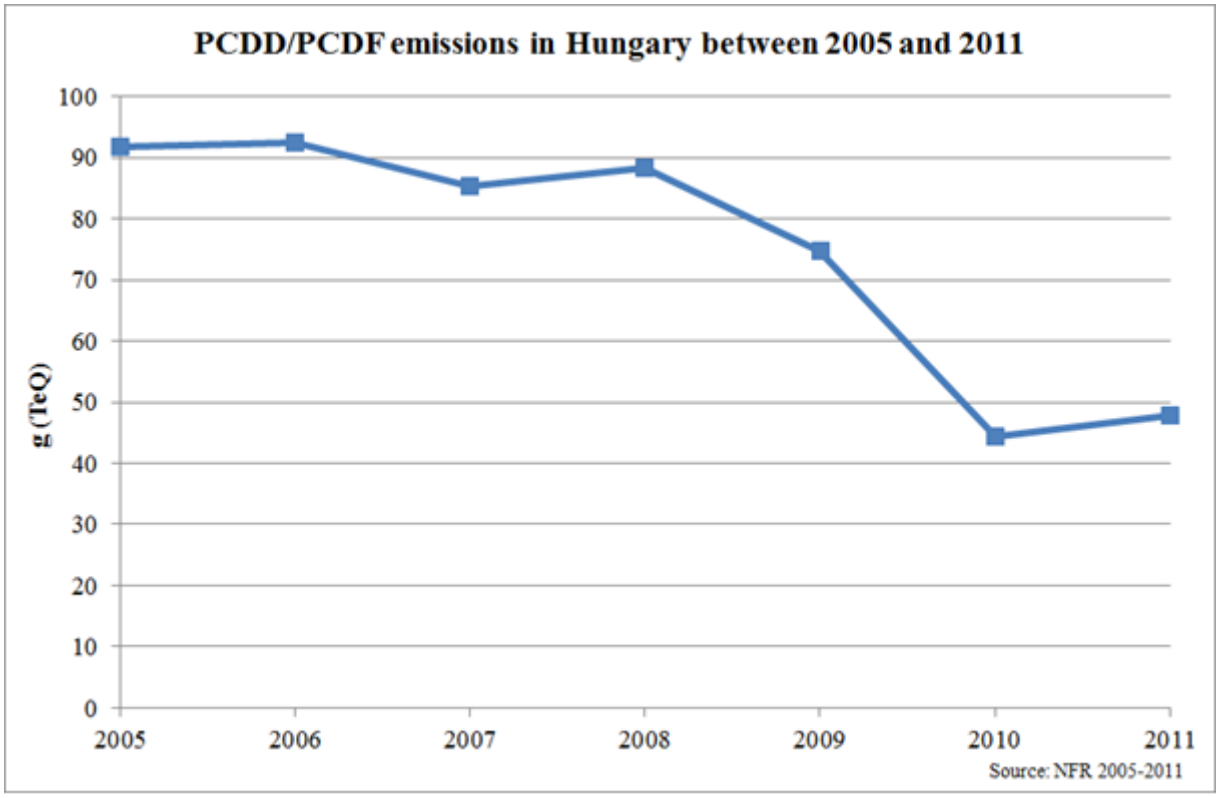


Figure 9

4.2.6 Penta- and hexachlorobenzene

General characteristics

Formerly, both compounds were widely used by the chemical industry and agriculture but, as both are prohibited for such use in Hungary, their main source of emission is unintentional today. As both compounds are formed during incineration mostly together with **dioxins and furans**, their typical sources of emissions are the same. The only exceptions are the compounds formed during the production of halogenated hydrocarbons (mostly carbon tetrachloride) and released to air as a result of the special features of the production process.
Both compounds are particularly hazardous for waterborne organisms and, due to their high solubility in fats, they are able to accumulate in food chains. Being already carcinogenic on their own, their incineration produces large quantities of dioxin and furan.
The original version of the Stockholm Convention included only hexachlorobenzene (HCB), while pentachlorobenzene (PeCB) was added to the amended list of restricted substances in 2009.

Levels of penta- and hexachlorobenzene air pollution in Hungary

The emissions of the two compounds are considerable but not significant, although calculated data from NFR are available only for hexachlorobenzene. According to ***Figure 10***, the **energy industry and waste incineration continue to remain responsible** for the majority of domestic HCB emissions, although both areas showed a reduction compared to 2010. According to NFR data, the total HCB emissions in Hungary amounted to 2.24 kg in 2011.

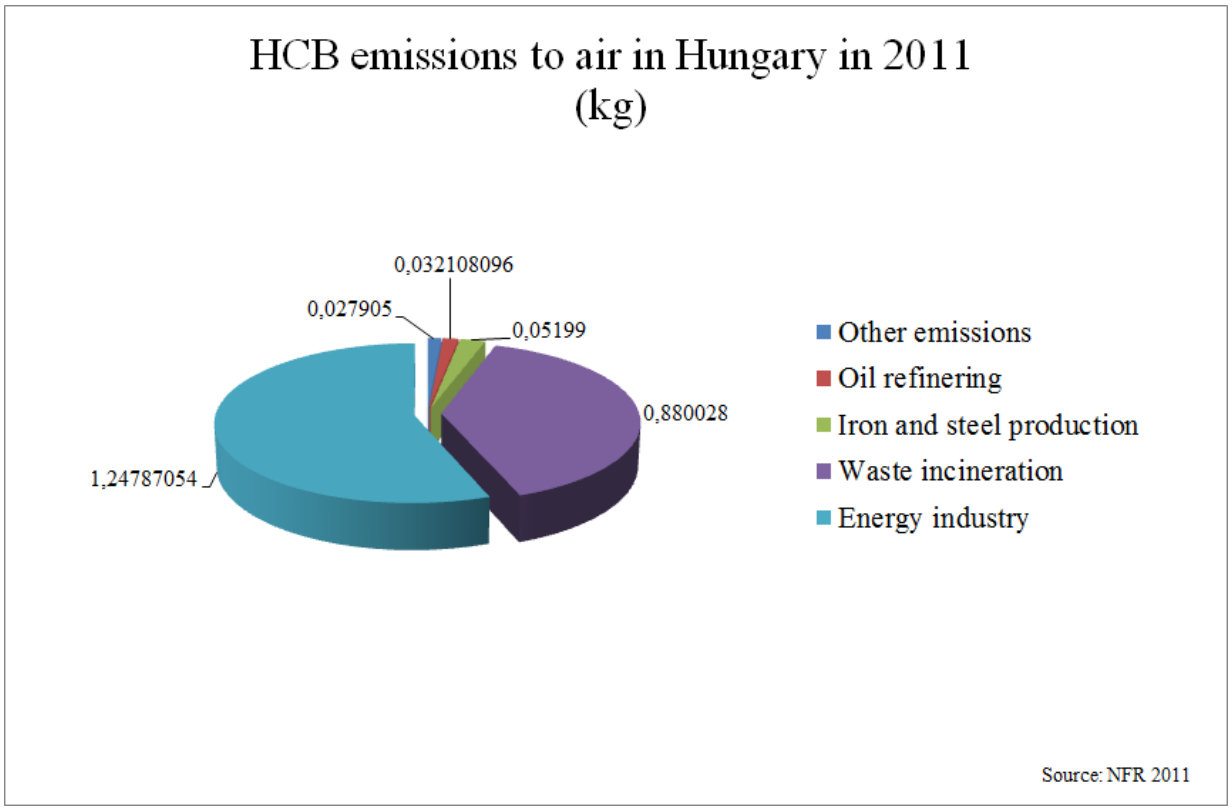


Figure 10

4.3 POPs released to water and soil from certain industrial technologies

Objective and countrywide/international results

Formed as the undesirable by-products of certain technologies, dioxins/furans, PAHs, PCBs and HCB may be released not only to air but also to water and soil.

The relevant domestic and international regulations are mostly of "immission" nature; in fact, relatively few regulations concerning this special field have laid down technological POP emission limit values so far.

Similarly to the obligation to report the emissions of the point sources of air pollutants, a system of regular data supply to protect the quality of surface waters is in place (baseline report sheets for water quality protection (VAL) and annual report sheets (VÉL)), which supplies data about the quantities of POP pollutants released to water.

Most measurement results obtained so far with regard to the POP contamination of soils and surface waters are of immission nature. These results provide considerable measurement information mostly about certain PAH and PCB pollutants or, thanks to recent measurements, pesticides released to soil and waters. National and international (cross border water) water quality databases are available for data supply on water quality, while mostly the Soil Information Monitoring (TIM) system points provide information on the POP contamination of soils.

Apart from a few exceptions, the measurement results of NIP 1 have shown pollution levels below limit values for both media as evidenced by the POP inventory data of 2003. In addition to the four POP groups discussed in this chapter, the presence of pesticides belonging to

controlled POPs was also examined in the samples but their concentrations were also below limit values. It is not surprising at all in view of the fact that most of these pesticides have been banned in Hungary for decades.
Nevertheless, it is obvious that efficient POP emission reduction measures can and must be taken right at the sources of emission, and that is why it is important to examine and measure the industrial POP emitting technologies.

4.3.1 Regulatory background

A decisive role is played in the regulation of the quality of surface waters and groundwaters by Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy and by its daughter directives which have been duly incorporated into Hungary's national legislation in the past few years. Annex 10 to the Directive (as well as Decision No 2455/2001/EC and Directive 2008/105/EC of the European Parliament and of the Council amending it) list the 45 most dangerous pollutants of waters including several POPs which are already controlled or will be controlled in the near future.

Basic elements of the applicable domestic legislation on the protection of water quality:

- Decree No 219/2004 of 21 July 2004 of the Hungarian Government on the protection of groundwater. It prohibits the direct or indirect discharge of pollutants and their decomposition products into groundwater (including mines and excavation lakes).
  In its chapter about the protection of water quality, it lays down detailed rules for activities performed to prevent or restrict the discharge of pollutants into groundwater and to maintain the good quality of surface waters.
- Joint Decree No 6/2009 of 14 April 2009 of KvVM–EüM–FVM on the limit values necessary for the protection of geological medium and groundwater against pollution and on the measurement of pollutants has established the pollution limit values of many pollutants including POPs in the geological medium and groundwater.
- Decree No 220/2004 of 21 July 2004 of the Hungarian Government laying down rules on the protection of quality of surface waters represents a substantial change as it is based on the emission limit values of waste waters and, for their establishment, on reference BATs and on pollutant emissions resulting from the related waste water treatment operations. It enumerates and regulates the substances and groups of substances belonging to priority lists I and II of hazardous substances including lots of POPs, and fully bans the discharge (release into sewers) of some of them (it should be noted that it is also prohibited to produce and use the POPs subject to such discharge ban).
- Decree No 10/2010 of 18 August 2010 of the Ministry of Rural Development laying down rules for the establishment and use of the pollution limit values of surface waters has established environmental and water quality limit values to achieve and maintain the good condition of surface waters.
- Decree No 28/2004 of 25 December 2004 of the Ministry of Environment and Water, implementing the above Government Decree, lays down the technological limit values of water pollutants. Among the 37 technologies to which this Decree assigns emission limit values, *POP emission limit values are laid down only for coking* (PAHs) *and non-ferrous metal production* (HCB). Therefore the use of current BATs, representing the level of best available technique, is very important.

- Regional and land-use monitoring must be performed to monitor the quality of groundwater pursuant to Decree No 30/2004 of 30 December 2004 of the Ministry of Environment and Water.

The purpose of each legislation listed above is to reduce pollutant concentrations right at the source of pollution. They also facilitate data supply for the protection of the quality of surface waters including, in particular, the use of baseline report sheets for water quality protection (VAL) and annual report sheets (VÉL). Pursuant to Decree No 28/2004 of the Ministry of Environment and Water, the emitters whose waste water emissions exceed 15 m^3/day are subject to data supply and self-revision.

4.3.2 Monitoring

Monitoring of waters is a regular sampling, measurement, inspection and perceptual activity that enables the determination and characterization of the quality and quantity of surface and groundwaters and the description of short or long term changes in their condition. For the purpose of compliance with the requirements of Article 8 and Annex V of the Water Framework Directive, the 'traditional' national detection network had to be significantly reorganized and Hungary had to start using the new "WFD monitoring programs" until 22 December 2006.

The regional monitoring system includes the monitoring systems continuously operated by agencies under the control of the Minister and the Minister responsible for water administration management, the monitoring of the condition of bodies of groundwater which is related to the quantity and quality of surface waters connected to these bodies of groundwater, the measurements of quality carried out on a regular basis, the havaria monitoring designed for status and impact monitoring of groundwater along large rivers, the special monitoring systems, designed to monitor a given area, especially observations in the field of long-term water resources. It is also part of the regional monitoring to monitor other public institutions that do not belong to the environmental ministry.

The environment monitoring system includes observations performed under a separate law by persons or organizations who or which perform an activity that affects the quantitative and qualitative status of groundwater, in particular monitoring of the protection of drinking water resources, mineral and medicinal uses by water utilities in the case of landfill operations and the recovery of mine lakes, and remediation monitoring systems for contaminated or permanently damaged areas under separate legislation.

Core networks for the quality of surface and sub-surface waters are monitoring systems funded from public sources, which provide regular immission data and are managed by NeKI and the inspectorates.

4.3.3 Surface water contamination

From the new POP compounds, Regulation 2008/105/EC of the EU lays down environmental quality limits in surface waters for the compounds listed in ***Table 10***.

	Environmental quality limit based on the annual average (µg/l)	Environmental quality limit based on the maximum allowable concentration (µg/l)
hexachlorocyclohexane	0.02	0.04
pentabromodiphenylether	0.0005	-
pentachlorobenzene	0.007	-
endosulfan	0.005	0.01
hexachlorobutadiene	0.1	0.6
alkenes (C10-13)	0.4	1.4

Table 10: Environmental quality limit values for POP compounds

From the new POP compounds, the database of data collected in the national surface water quality monitoring system (FEVI) contains concentration data for hexachlorocyclohexane, pentachlorobenzene, hexachlorobutadiene and endosulfan for the years between 2008 and 2012, which are detailed in ***Table 11***.

	Number of concentration data in the FEVI database for 2008-2012 (pc)	Number of data on limit exceedance in the FEVI database for 2008-2012 (pc)
hexachlorocyclohexane	19,266	12
pentachlorobenzene	8,371	24
hexachlorobutadiene	6,839	0
endosulfan	1,726	5

Table 11: Data of the FEVI database on POP compounds

In the period between 2008 and 2012, there were 12 hexachlorocyclohexane, 24 pentachlorobenzene and 5 endosulfan concentration data detected in our surface waters that were above the limit.

In the field of water policy, revision of the directive on environmental quality standards and expansion of the list of priority substances and priority hazardous substances took place this year. The amended regulation was promulgated on 12 August 2013. Approximately 2,000 substances were evaluated by professionals in terms of their quantity measured in surface waters, their lethality, production and use, and those selected on this basis are covered in this proposal. There were 12 priority substances added to the existing list. POP materials included as new compounds are heptachlor and perfluorooctane sulfonic acid.

From the former POP compounds, concentration data for the years 2008-2012 can be found in the FEVI database for PAHs, DDTs and "Drin" plant protection substances.

PAH group: limit exceedances of PAHs measured between 2008 and 2012 are shown in ***Table 12***.

Current year	anthracene	benzo(a)pyrene	benzo(b)fluoranthene	benzo(g,h,i)perylene	benzo(k)fluoranthene	fluoranthene	indeno(1,2,3cd)pyrene
2008		2	20	54	19	6	48
2009	7	3	16	97	11	22	70
2010	15	2	14	16	2	96	15
2011	1		6	30	2	32	23
2012				12	1	8	10
Total stations measured	604	604	604	603	604	604	603
Stations with exceedance	**23**	**7**	**56**	**209**	**35**	**164**	**166**

Table 12: All measurements and exceedances for PAH compounds

The environmental quality limits were used for the evaluation of the measured data: anthracene 0.1 µg/l, benzo(a)pyrene 0.05 µg/l, benzo(b)fluoranthene and benzo(k)fluoranthene 0.03 µg/l, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene 0.002 µg/l, and fluoranthene 0.1 µg/l.

Location of the measurements above limit, sampling time and measured concentrations are indicated in the attached tables. There were 23 anthracene, 164 fluoranthene, 7 benzo(a)pyrene, 56 benzo(b)fluoranthene, 35 benzo(k)fluoranthene, 209 benzo(g,h,i)perylene, 166 indeno(1,2,3-cd)pyrene above the limit concentration data in our surface waters in the period between 2008 and 2012.

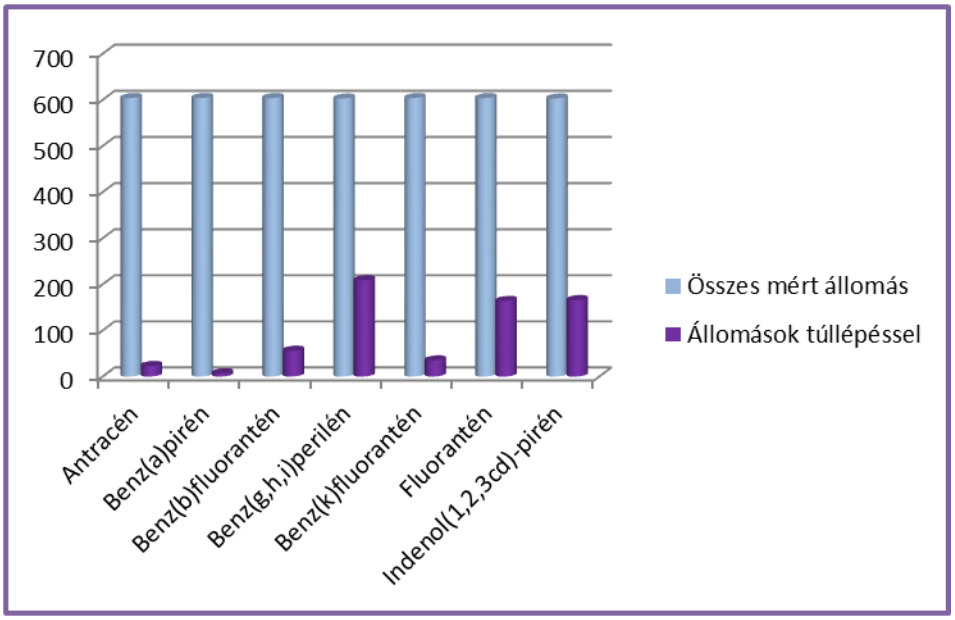


Figure 11: The number of PAH measurements compared to the number of limit exceedances

The proportion of the number of limit exceedances to the number of measurements is shown in the figure above.

Emissions of PAH-containing compounds in the aquatic environment (announced) are shown in ***Table 13*** and ***Figure 12***.

Current year	PAH emissions kg/year
2005	175.5400000*
2006	0.0337890
2007	0.0785122
2008	0.1366862
2009	0.3485873
2010	162.3489000*

*The 2005 and 2010 annual outlier comes from the same data provider; mistake in the unit can not be excluded.

Table 13: Emissions of PAHs in the aquatic environment

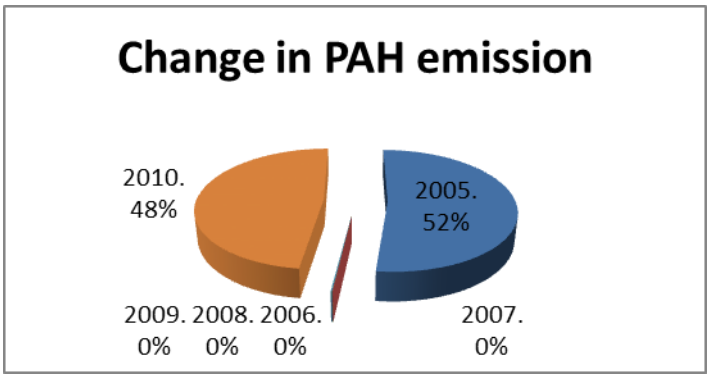


Figure 12

DDTs group

Limit exceedance was measured in 5 cases between 2008 and 2012. The exceedances are shown in ***Table 14***.

Date	Water quality parameter	Concentration	Watercourse	Environmental quality limit
05/14/2008	p,p-DDE	0.04 ug/L	Észak-Böddi	0.03
04/11/2011	o,p-DDT	0.08 ug/L	Szartos-patak	0.03
10/15/2012	p,p'-DDD	0.15 ug/L	Hortobágy-Berettyó-Főcsatorna	0.03
11/21/2012	p,p-DDT	0.02 ug/L	Tisza	0.01
11/21/2012	p,p-DDT	0.019 ug/L	Tisza	0.01

Table14: Concentrations for the DDT group

"DRIN" group

From the aldrin, dieldrin and endrin group of pesticides, concentrations exceeding the limit were measured alone for dieldrin in the period between 2008 and 2012, in a total of five cases.

4.3.4 Groundwater contamination

Subsurface water quality data for POP compounds are provided primarily by regional monitorings and expedition measurements. Regional monitoring data include data from WFD monitoring wells, water systems and other large-scale users, wells created under the water resource protection program, and in some cases, data on environmental use.

Polycyclic aromatic hydrocarbons

From the polycyclic aromatic hydrocarbons (PAHs), test results are available from the monitoring for acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzanthracene, chrysene, benzo(a)pyrene, benzo(e)pyrene, dibenzanthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(b)+(k)fluoranthene (expressed as one), indenopyrene, benzo(g,h,i)perylene, and total PAHs without naphthalenes.

PAHs classified as POP compounds: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indenopyrene. The proportion of measurements exceeding the pollution limits for PAH compounds is shown in ***Table 15***.

PAH components	Total (pc)	B value (µg/l)	Above B (pc)	*total measurements Above B (%)*
benzo(a)pyrene	1,117	0.01	29	*2.6*
benzo(b)fluoranthene	1,012	0.02	31	*3.1*
benzo(k)fluoranthene	1,017	0.02	17	*1.7*
benzo(b)+(k)fluoranthene (expressed as one)	95	0.02	3	*3.2*
indenopyrene	1,085	0.01	17	*1.6*
total PAHs without naphtalenes	1,169	2.00	13	*1.1*

Table 15: Measurements exceeding the pollution limits for PAH components

Chlorinated aromatic hydrocarbons

Chlorinated aromatic hydrocarbons classified as POP compounds include pentachlorobenzenes and hexachlorobenzene (HCB) (***Table 16***).

Chlorinated aromatic hydrocarbons	Total (pc)	B value (µg/l)	Above B (pc)	*total measurements Above B (%)*
pentachlorobenzenes	457	0.05	42	*8.8*
hexachlorobenzene (HCB)	1,577	0.05	1	*0.1*

Table 16: Measurements of chlorinated aromatic hydrocarbons exceeding the pollution limits

Polychlorinated biphenyls

In the case of polychlorinated biphenyls, the analytical results gave values to all of the PCBs. Concentrations in excess of the limit were measured in 9 cases, which accounted for 4.9% of all measurements.

DDT/DDD/DDE

In the course of the DDT/DDD/DDE measurements, the following measurements were taken: o,p-DDE, p,p-DDE, total DDE, o,p-DDD, p,p-DDD, total DDD, o,p-DDT, p,p-DDT, total DDT, total DDT/DDD/DDE. For DDT/DDD/DDE, in addition to the determination of the pollution limit value (B), determination of the threshold value took place as well during the preparation of the river basin management plan (***Table 17***). The threshold value was determined in the same concentration value nationwide for the shallow-porous, shallow-mountainous and karstic water bodies. For porous, mountainous, thermal porous or thermal karstic water bodies threshold values have not been established.

DDT/DDD/DDE	Total (pc)	B value (µg/l)	Above B (pc)	*total measurements Above B (%)*
o,p-DDE	26	0.001	0	*0*
p,p-DDE	73	0.001	1	*1.4*
Total DDE	1,021	0.001	21	*2.1*
o,p-DDD	58	0.001	0	*0*
p,p-DDD	72	0.001	1	*1.4*
Total DDD	1,039	0.001	16	*1.5*
o,p-DDT	62	0.001	0	*0*
p,p-DDT	104	0.001	0	*0*
Total DDT	1,042	0.001	25	*2.4*
total DDT/DDD/DDE	1,432	0.001	57	*57*
	Total (pc)	threshold value (µg/l)	Above threshold value (pc)	*total measurements above threshold value (%)*
total DDT/DDD/DDE	1,432	0.1	5	*0.3*

Table 17: DDT/DDD/DDE measurements in excess of threshold value

Drin

From the Drin compounds, measurements of the following POPs occurred: Aldrin, Dieldrin, Endrin. It can be said on the basis of the measurement results (***Table 18***) that pesticides above pollution limit have not been occured in Hungary.

Drins	Total (pc)	B value (µg/l)	Above B (pc)	*Total measurements Above B (%)*
aldrin	734	0.1	0	*0*
dieldrin	734	0.1	0	*0*
endrin	1,106	0.1	0	*0*

Table 18: Drin measurements exceeding the limit

HCH

The following HCH compounds have been measured: α-HCH, ß-HCH, d-HCH, g-HCH (lindane), and total HCH (***Table 19***).

HCH	Total (pc)	B value (µg/l)	Above B (pc)	*Total measurements Above B (%)*
α-HCH	692	0.1	0	*0*
ß-HCH	688	0.1	0	*0*
g-HCH (lindane)	1,604	0.1	0	*0*
total HCH	1,659	0.1	0	*0*

Table 19. HCH measurements exceeding the limit

HCH (B) contamination did not occur in any of the measurements.

Other pesticides

The following other pesticides have been measured: heptachlor, mirex, cis-chlordane, trans-chlordane, chlordane (chlordrin). Toxaphene has not been measured recently. ***(Table 20)***

Other pesticides	Total (pc)	B value (µg/l)	Above B (pc)	*total measurements Above B (%)*
heptachlor	729	0.1	0	0
mirex	15	0.1	0	0
toxaphene	0	0.1	-	-
cis-chlordane	76	0.1	0	0
trans-chlordane	76	0.1	0	0
chlordane (chlordrin)	91	0.1	0	0

Table 20: Measurements of other pesticides in excess of the limits

The FAVI database contains results of the chemical analysis of pesticide residues in a total of 6,015 groundwater samples collected for pesticide testing between 1999 and 2011. These samples came from a total of 4,191 sampling points with different object identifiers. Municipal assignments, object identifiers, EOV coordinates, and the main sizing and operating data of sampling points are retrievable from the database. Distribution of the number of annual pesticide samples processed in the database is shown in the following chart.

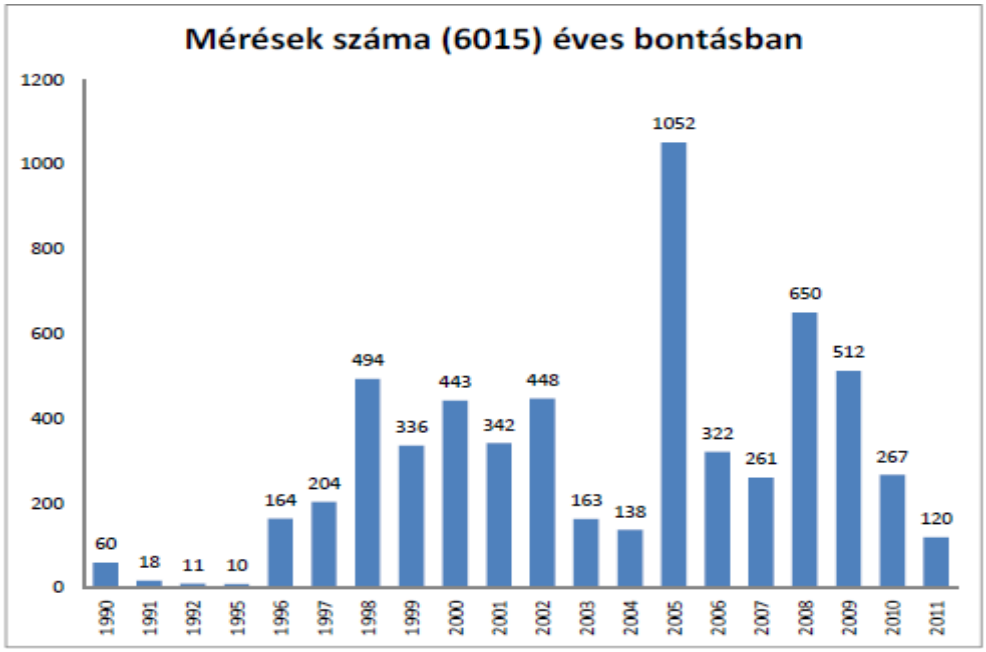


Figure 13: Distribution of the number of pesticide samplings per year

Joint evaluation of the groundwater test results and the results measured at TIM points has also taken place. During the test, from the 79 pesticides and/or their degradation products, twenty was detected typically. It was found as the result of the research that triazine compounds, and atrazine in particular, were the most frequently detected compounds in groundwater (in 29.6% of 4,191 samples, in a total of 1,239 samples), and soils (in 118 of the 490 TIM samples tested, i.e. in 24.1%).

Tests of drinking water quality

From the national drinking water quality data, on the basis of the data submitted by the Public Health Agencies to the historical drinking water database before 2012, tests of a total of 1,696 samples were carried out between 2009 and 2012 (endosulfan: 1,654, lindane: 38, alpha-hexachlorocyclohexane: 2, beta-hexachlorocyclohexane: 2). Poor test results were recorded just in two cases for lindane (both in 2012). For the other components, poor test results have not been not recorded.

The above is presented also in tabular form:

Name of substance	Total samples (pc) 2009-2012	2009	2010	2011	2012	Poor samples (pc)
lindane	38	14	9	6	9	2
endosulfan	1,654	226	209	554	665	0
alpha-hexachlorocyclohexane	2	0	0	0	2	0
beta-hexachlorocyclohexane	2	0	0	0	2	0

Table 21: POP compounds found in drinking water

Based on the assignment from the VM and with the involvement of the Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Science and the Department of Environment and Environmental Safety at the Szent István University, the NeKI conducted a research in 2013 on the basis of the measurements of persistent pesticides in soil and groundwater. The result of the work is summarized in the document titled " Study on the testing of the effects of pesticide pollution and load, with particular attention the triazines".

Summary

During the measurement of POP compounds in groundwaters, 62% of all measurements did not exceed the threshold limit value for the given compound (B), while in 38% of the measurements exceedances were observed. The number of measurements and the proportion of concentrations exceeding limits are shown in ***Figure 14*** below.

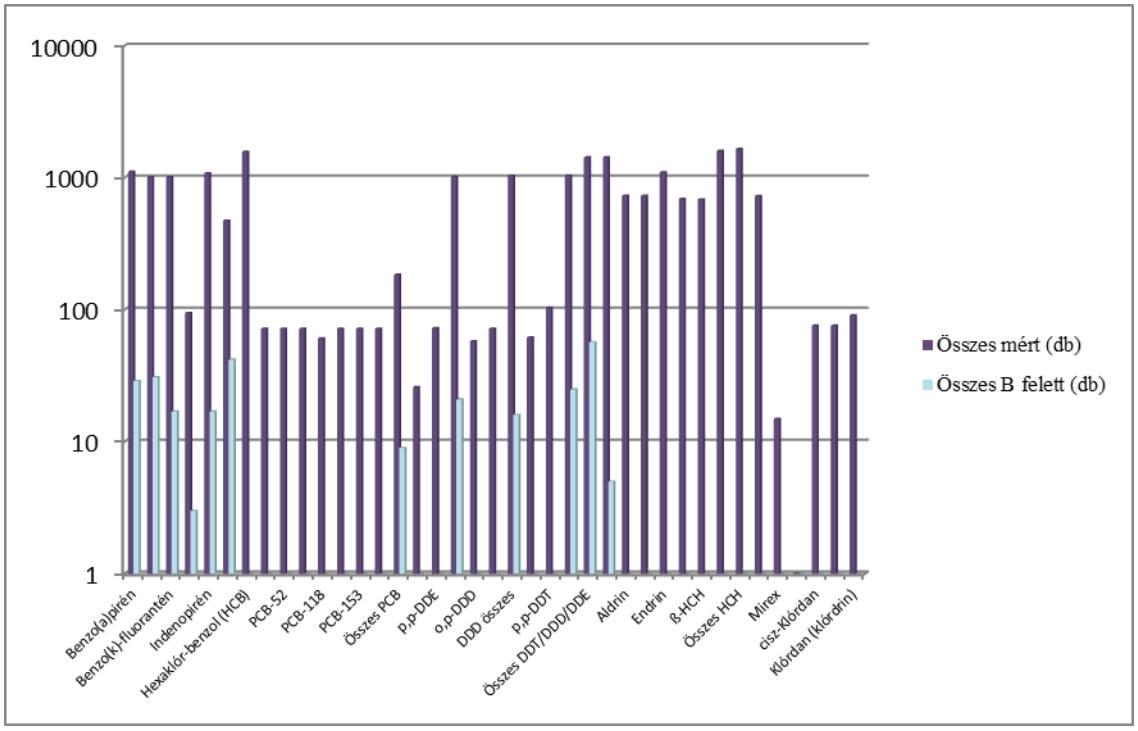


Figure 14: The number of measurements related to groundwaters and the rate of concentrations in excess of the limit

4.3.5 Measurements and evaluation of results

The chapter of the POP inventory dealing with surface and groundwater quality states that based on the water monitoring data and the new immission type POP pollution measurements, the national condition survey of dominant POP materials in surface and groundwaters started during the preparation of the River Basin Management Plan. However, this is a cost-intensive task.

Previous emission measurements on water quality did not reflect any major POP emissions, but additional emission measurements and exploration is needed for the sources of pollution, near which the level of contamination occurred to be in excess of the limit.

Based on Directive 2008/105/EC on hazardous substances, each Member State shall prepare an emission inventory for each river basin district in their territory by the end of 2013. In this inventory, the sources of emissions and the paths of pollution propagation should be recorded, in which the pollutants reach the water bodies. Such complex assessments are necessary that effective action can be taken to reduce pollution.

To demonstrate the POP concentrations (D/F, PAH, HCB, and PCB) in waste water and residues from industrial technologies, which are important in respect of the emission of POPs, additional measurements are necessary. For the majority of technologies, where emission threshold values have not been laid down in the regulations, measurements can be financed from international sources or from the state budget. The measurement results shall then be compared to the emission parameters available with the help of BAT methods, and modernization of the technology and/or the separation should be initiated, if necessary.

Example of the Velence lake

Surface water measurements:

POP measurements were performed on surface water samples collected by the staff of the Central-Transdanubian Environmental, Nature and Water Inspectorate, and on groundwater samples from the monitoring wells at the Velence lake.

The results of year 2011: Within the framework of the monitoring program in 2011, analysis of 31 surface water samples was performed at the Pesticide Analytical Laboratory in Velence, which reported a total of 1,054 examinations. The samples were collected by the staff of the Central-Transdanubian Environmental, Nature and Water Inspectorate. In 18 of the samples the measurements produced 37 positive test results, which fell in the 0.015 μg/l to 0.37 μg/l range. The substances detected were the following: bentazon (7), desethyl-atrazine (6), desisopropyl-atrazine (5), trifluralin (5), 2,4-D (3), dichlorprop (2), MCPA (2), terbuthylazine (2), acetochlor (2), dicamba (1), s-metolachlor (1), and chlorpyrifos (1).
24 groundwater samples were analyzed the Velence lake monitoring wells. In 19 of the samples 50 positive test results were detected, which fell in the 0.013 μg/l to 0.363 μg/l range. Especially dicamba (13), bentazon (8), trifluralin (6) and fenoxisav derivatives MCPA (4), 2,4-D (3) and dichlorprop (3) occurred in the results. Other than that, atrazin (3) and its degradation products (3), terbuthylazine (3), prometryn (2) and isoproturon (2) were detected by the laboratory.

Groundwater measurements

In 2007, in the publication titled "Assessment of pesticide concentrations of groundwaters in the catchment area of the Velence lake", the Plant Protection and Soil Conservation Directorate of the Fejér County MGSZH published the results of processing the data generated by the regional monitoring system launched in the 1990s . Processing of the measurements of 391 groundwater samples collected between 1990 and 2005 showed, that 120 of the 391 water samples contained pesticide substances above the detection limit, most frequently acetochlor and atrazine.

4.3.6 Geological and soil contamination

In terms of the environmental behaviour of pollutants, they characteristically accumulate in the ground below the surface, and despite the biogeochemical transport processes taking place there, they persist in the environment longer than other elements. For this reason, the ground below the surface is of high importance for the purposes of investigating the persistent organic compounds, that is, the combined analysis and evaluation of the surface, the geological medium and the groundwater, as well as the analysis of its long-term time series.

Due to the legal basis, measurement results of POP contamination in the soil, the geological medium and the surface waters are immission type data. It was primarily the continuous and systematic examinations of the Soil Information and Monitoring System (TIM), operational since 1992, that provided data on the POP contamination of soils. Concerning the geological medium and groundwaters, we could get a national picture from the analyses carried out on the basis of data collected in the Environmental Registry for Groundwater and Geological Medium. (FAVI)

Based on this, considerable amount of measurement data concerning the ground below the surface is available mainly on individual PAH and PCB contaminations and, in recent times, on pesticides. However, it is clear that effective POPs reduction measures can and should be undertaken at the emission sources, this is why the inspection and measurement of industrial POP-emitting technologies is important.

4.3.6.1 Regulatory background

The legal framework for the protection of soils is a heterogeneous system bearing the specificity of land use, of which the followings are the most important aspects with regard to POP materials:

The main land use is connected to the agriculture, in relation of which Act CXXIX of 2007 on the protection of arable land provides the comprehensive rules, which shall be applied jointly with the detailed rules provided for in Decree No. 90/2008 (VII. 18.) FVM laying down detailed rules of elaboration of soil conservation plans. The Act lays down the functions of the state in the national monitoring of soils, and the system of licensing for soil protection, while the Decree of the Minister establishes the soil investigations necessary for the preparation of the plan.

Legislation governing the emission of hazardous substances into the soil includes **Act XXXV of 2000 on plant protection, which is integrated within the framework of Act XLVI of 2008 on the food supply chain and on the control and supervision of the food supply chain**, as well as its implementation rules, and the rules concerning the marketing and use of plant protection products and the treatment of pesticide residues as waste, including Act CLXXXV of 2012 on waste and its implementing regulations.

Concerning the pollution with POP substances, the criteria for soil contamination were laid down in a joint legislative package together with groundwaters for the previously described reasons.

Given their close correlation, conservation of geological medium and groundwaters were placed in a common legal framework in the Hungarian legal system. According to **Government Decree No. 219/2004 (VII. 21.) on the protection of groundwaters**, direct discharge into groundwaters of K1 and K2 pollutants under Annex VIII of Council Directive No. 80/68/EEC, or any material that contains these substances or the degradation of which may lead to the formation of these substances, and their discharge into any man-made lake, which is in direct contact with groundwaters, is prohibited Indirect discharge of hazardous substances into groundwaters in areas which are extremely sensitive in terms of the condition of groundwaters is also prohibited.

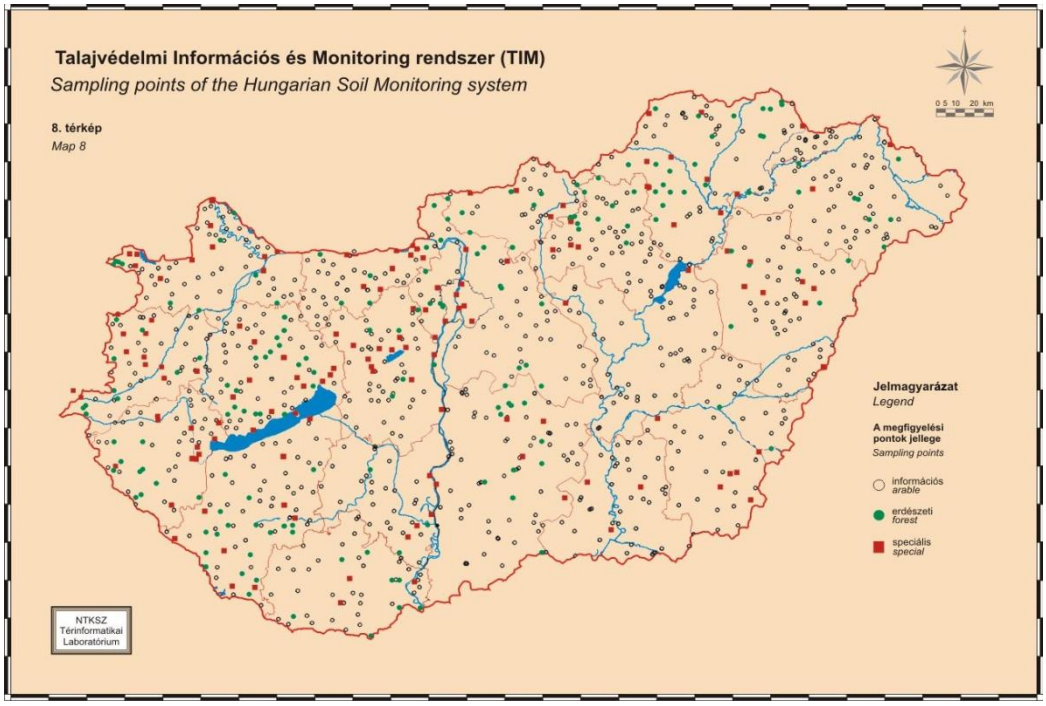
Activities carried out to prevent or limit the introduction of pollutants into groundwater and to ensure the good quality of groundwater, as well as the process aimed at environmental remediation and restoration of contaminated sites are regulated in detail in the chapter on the protection of water quality.

4.3.6.2 Evaluation of measurement results

Monitoring of the ground below the surface takes place according to the TIM and FAVI systems on a national scale, and so do the occasional, non-systematic expedition-like

measurements. Such measurements were made for example during the first compilation of the POP inventory.

TIM: the national monitoring network comprises 1,235 points, which corresponds to a 1:100,000 scale map, approximately. 70% of the TIM points is located in agricultural areas, 15% in forest ecosystems, while 15% in risk or degraded areas from the point of view environmental protection and nature conservation. The locations of measurement points were designated at representative points of soil and geographical units for a realistic presentation of soil conditions. National and regional distribution of the location of measuring points is shown in ***Map 1*** below:



Map 1: Measurement points of the TIM system

Soil samples used in the tests are collected each year from September 15 to October 15. Among the parameters examined, some show typical seasonal dynamics, so the sampling is always done in the same period of the year. Annual sampling is made at the basic sampling points.

Some of the parameters to be tested were determined only once, at baseline, because they are stable and change very little with time, while other parameters are fixed annually or every three or six years. Separate sampling is done for the purpose of microbiology, soil physics, soil chemistry and radioactivity tests, for the testing of the water management properties of the soil and for archiving in the soil bank.

The archived soil samples allow that if financial resources are available (e.g. thematic research projects), special examination of the previous samples can be performed retrospectively, and decades of data sets can also be prepared on the basis of the analyzes of archived soil samples.

The test data are stored in the geographic information system (GIS), which allows that the location of the soil profile can be revisited and sampling repeated.

Measurement of POPs in soils at TIM points may take place every three or six years, depending on the budget situation. The so-called baseline recording took place first in 1993, and then in 1996 and 1997 and in 2000 there were other comprehensive studies performed, that covered primarily pesticide residues in the three layers, as well as PAHs, PCBs and dioxins.

Pesticide residue tests on soil samples taken from the three upper genetic segments of the approximately 100 soil profiles from the TIM measuring points, representing agricultural areas, were already performed in 1993. The chlorinated hydrocarbon insecticides tested: a and b HCH and lindane, the drins (aldrin, endrin , dieldrin), endosulfan, DDT, heptachloroendosulfan and three hydrocarbons not listed as POPs.

From the pesticides tested, only the concentration of pp DDT (in 26% of the test samples) and one of its isomers, pp DDE (30%), and lindane (5%) exceeded the detection limit, which is 5 mg/m3 for DDT and its isomers, and 1-2 mg/m3 for lindane, so the measurement method was highly sensitive.

The concentration of chlorinated hydrocarbon pesticides in our soils decreased by 60-80% compared to the measurements made between 1975 and 1977, but certain components will continue to occur, especially in the deeper layers.

PAHs were measured in 1996-1997 at 30 to 60 so-called "S" (special) TIM points installed in heavily polluted industrial districts. The majority of the components were detectable at the detection limit (0.1 mg/kg), but the PAH content of the samples was generally lower than the background value, and the "B" threshold limit (1 mg/kg) was only exceeded by the measurement results for some point source pollutions.

PCB tests took place in 1996 at 33 TIM points, and in 1997, 6 PCB isomers were measured at 44 TIM points. During the measurements in 1996, the PCB concentration exceeded the 0,001 mg/kg detection limit (PCB 138) only in one sample, its rate was 0.0013 mg/kg, but this did not reach even the value of the background concentration. Therefore, in 1997, the detection limit was substantially refined (0.05 mg/kg), and then only one of the 44 samples contained all of the 6 isomers. But it did not exceed the "B" threshold value, and not even the "A" background concentration.

The **dioxin/furan test** was made at 43 TIM sampling points in both 1996 and 1997. Concentration of the two compound groups, with the exception of one sample, was around the "A" background concentration, but did not reach the "B" pollution threshold, which for the two groups together is 5 ng/kg.

Measurement of **HCB (hexachlorobenzene)** took place in 1997. HCB concentrations greater than the background concentration could not be detected, even from the 47 soil samples put together.
FAVI MIR: The chapter of the POP inventory dealing with groundwater quality (see there for the groundwater monitoring system and the data) states that based on the water monitoring data and the new immission type POP pollution measurements, the national condition survey of dominant POP materials in surface and groundwaters started during the preparation of the River Basin Management Plan. However, this is a cost-intensive task.

As ***Table 22*** demonstrates, during the sampling of the analyzed TIM points in year 2010, pesticide residue tests were done for the following substances shown below:

Name of substance	Soil 0-30 cm mg/kg	Soil 30-90 cm mg/kg
aldrin	0,0017	0,0055-0,0091
alpha-endosulfan	0,0024-	0,0041-0,0542-
beta-endosulphan	0,0029	0,0045 – 0,0478
endosulfan sulfat	0,0032-0,011	0,0032-0,011
alpha HCH	----	0,0,043-0,0387
beta HCH	0,026	0,0059-0,0406
dieldrin	0,0025	0,0045-0,0571
endrin	-----	0,0037 – 0,0407
heptachlor	0,0018	0,0086- 0,037
heptachlor epoxide	0,0023	0,0042-0,0386
lindane	0,01-0,016	0,0086-0,01
p.p.DDT	0,0052-0,0294	0,0013-0,0504
o.p.DDT	0,0005-0,003	0,0007-0,0544-
p.p.DDE	0,0008-0,249	0,0006-0,115
o.p.DDE	0,0004-0,0029	0,0035 – 0,0468
p.p.DDD	0,0007-0,025	0,0017-0,118
o.p.DDD	0,0009-0,0017	0,0438- 0, 044

Table 22: Results of pesticide residue tests taken from samples in 2010

4.3.7 Remediation of geological media

The occurrence of local pollution means in every case an enrichment in the vicinity of an emission source. National inventory of potential sources of contaminants and contaminated sites began under the National Environmental Remediation Program (OKKP), following the approval of the program by the government in 1996 and after the adoption of the professional regulatory system in 2000. The number of contaminated sites and pollution sources under the OKKP, regardless of the scope of responsibility, was estimated to be about 30 to 40 thousand in 1994-1996 by the studies establishing the start of the program, with the overall costs for the detailed fact-finding and remediation estimated during the preparation of the program at more than 1,000 billion HUF, and the duration at about 30 to 40 years.

With the progress of the of the national inventory of contaminated sites, the estimated number of contaminated sites was halved using various archives and databases, and in the KÁRINFO database, which was created in the first phase of the process of national inventory, about **15 thousand** contaminated and potentially contaminated sites were registered. The number of registered contaminated sites decreased to 1 100 data sheets by 2005. With the operation of the registry reformed in 2007, data sheets from new areas and with new contents has been submitted. At the moment, nearly 2000 potentially and proven contaminated areas are registered, which requires some kind of remediation exercise.

The extent of contamination is determined by comparison to the values laid down in Decree No. 6/2009 (IV. 14.) KvVM-EüM-FVM on limit values established for the protection of groundwater and the geological medium, where in addition to PCBs, PAHs, dioxins, dibenzofurans, and chlorobenzenes, various pesticides (e.g. DDT and its degradation products, drins, atrazin etc.) can also be found.

In the event of probable contamination or damage from a point source, remediation shall be made. Obligated to remediation is who is defined to be responsible in Articles 101-102/A of

Act No. 53 on Environment Protection in 1995. The remediation process is regulated by **Government Decree No. 219/2004 (VII. 21.)** on the protection of underground waters.

Independent collection of left behind long-term environmental damages and contaminated sites, which can be defined as point sources of pollution (non-diffuse), is supported by the national inventory, regardless of the area of responsibility. The professional background database for the national inventory is the FAVI-KÁRINFO subsystem, which is provided for by **Decree No. 18/2007 (V. 10.) KvVM** on the provision of data by the Groundwater and Soil Registry (FAVI).

The statistics prepared in the FAVI-KÁRINFO live database about the areas after the exploration on the basis of the occurrence of contaminants in environmental media (geological medium and groundwater) are illustrated in ***Table 23***.

Main pollutant categories	Solid phase (geological medium) [%]	Liquid phase (groundwater) [%]
Chlorinated hydrocarbons (CHC)	1	5
Mineral oil	64	53
(PAH)	6	5
Heavy metals	12	10
Phenols	1	1
Aromatic hydrocarbons (BTEX)	16	26
Total	*100% (identified pollutant categories)*	*100% (identified pollutant categories)*
Number of sites in the calculation	450	*450*

Table 23: Statistics on the occurrence of contaminants in environmental media

Based on the foregoing, geological media are contaminated in Hungary with mostly mineral oil, basically TPH and BTEX components. The presence of PAHs and halogenated aliphatic and aromatic hydrocarbon pollutants is less significant, due to their carcinogenic properties, however, they deserve increased attention.

It can be established in the statistical analysis of polluted groundwaters that, in close relation to the geological medium, the incidence of BTEX and TPH as pollutant components is the most

typical. An increased concentration of PAHs and especially halogenated aliphatic and aromatic hydrocarbons can be observed in groundwaters in relation to geological formations, which is justifiable also with their physico-chemical properties, while the incidence rate of heavy metal pollutants in groundwater is somewhat relegated to the background.

Thus, the examination of the relationship between NIP 2 and the remediation tasks in respect of **areas contaminated by PAH components** is of dominant importance.

The potential remediation tasks occur primarily in the context of power plants and heating plants, as well as firing clay and other industrial landfills.

The most relevant components in terms of NIP 2 occur in 5-6 % (100 pcs) of actual major domestic remediation exercises (2,000 pcs), while they are involved in 2.5 % of potential remediation tasks (50 pcs). This rate is essentially due to PAH components, which is present in combination with other hydrocarbon polluters.

4.4 Waste containing or contaminated with POPs

The accurate identification of waste containing or contaminated with POPs is made difficult by several factors. First, it is a problem that it is extremely difficult and costly to define the POP contents of the waste. On the other hand, although the various types of waste are distinguished in our waste inventory system by the so-called EWC codes in accordance with the European Waste Catalogue[11] (waste types qualifying as hazardous waste are designated with *), but the POP content of the waste cannot be concluded on the basis of the code, only the PCB, pesticide and wood protector content can. Also in the case of the latter, the POP compounds themselves are only a fraction of the amount of waste, of course. Thus, the current waste records do not allow POP-specific waste data queries.

It is important to point out that compared to the NIP 1 planning period (the early 2000s), the long-term waste management objectives have changed significantly both at the EU and national level.

The principles enjoying primacy, such as "waste prevention" or "waste as material and energy source", were transferred to the domestic legal system by the transposition of the Waste Framework Directive[12] (HKI), and mainly by the entry into force of Act CLXXXV of 2012 on waste (hereinafter referred to as Ht.).
Parallel to the entry into force of the new Ht., rethinking of some of the implementing legislation became necessary, which process has not yet been completed. So, since the NIP 2 has to determine forward-looking measures, it is important to keep in mind that the regulation of waste management, including management of hazardous waste (including POP waste), was radically transformed in 2013.

Article 7 of Regulation 850/2004/EC and the related Annexes IV and V contain basically the provisions relating to (POP) waste management.

[11] Until 4 September 2013, according to Decree No. 16/2001 (XII. 11.) KöM, as amended by Decree No. 22/2004 (VII. 18.) KvVM, and from 5 September 2013 according to Decree No. 72/2013 (VIII. 27.) VM on the list of wastes.
[12] Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives (HKI)

4.4.1 Wastes of priority pollutants

4.4.1.1 POP waste from pesticides[13]

Namely waste from pesticides and their packaging materials

Historical pesticide waste

Over the past 50 years, a total of nearly 2.4 million tons of pesticides were used in Hungary, of which almost 20% (446,881 tons in total) were products containing POP agents. Nevertheless, some of the products sold have not been used (their best before date has expired due to the termination or transformation of large-scale agricultural farms), or the use of certain products were prohibited by law, thus becoming waste.

However, taking into account that the probability of detection of regulated POP substances in pesticide residues is small (because most of them have been banned in our country decades ago), so their collection and disposal shall be performed cost effectively.

That is, it is not worth to devote a lot of energy, time and funds to their identification, as these residues, whether containing POP or not, shall be considered hazardous waste and disposed of accordingly.

(The data of residues do not indicate POP content, so any unidentified pesticide waste is assumed to be potentially POP containing.)

The problem of historical pesticide waste should be settled, because they pose a significant environmental risk, and may cause environmental pollution at any time. Accurate assessment and safe disposal of expired pesticides or pesticides considered as waste is a task under both the National Plant Protection Action Plan and the National Waste Plan.

To liquidate the waste problem caused by pesticides, as a first step, Decree No. 103/2003 (IX. 11.) FVM on the design of a collection system for the collection and disposal of wastes of packaging materials contaminated with plant protection products was promulgated. This was followed by Decree No. 89/2004 (V. 15.) FVM on the authorization of placing on the market and use, as well as on the packaging, labelling, storage and transport of plant protection products (as amended several times in the meantime).

According to a 2003 survey based on self-declaration, agricultural farmers and plants held about 300 tons of historical pesticide waste. The Ministry of Environment organized two collection campaigns earlier: 128 tons of pesticide waste were collected and disposed of in Bács-Kiskun and Pest counties in 2005, and an additional 58 tons in Zala, Somogy and Veszprém counties in 2006. Remediation of other counties has not yet been achieved due to insufficient funds. The amount of expired pesticides has decreased since the survey, thanks in part to collection actions announced in the years since, but waste pesticides not yet taken over still pose significant environmental and human health risks. The collection campaigns previously organized by the Ministry of Environment covered only five counties, 14 counties were left out of them. Based on the data of the 2003 survey, there might still be about 200 tons of historical pesticide waste in these counties, but this estimate is made uncertain by the voluntary nature of the declaration, and the time that has passed since then.

[13] This subsection is based on the Second National Waste Management Plan.

Their reproduction is not expected because of economic and administrative reasons (high price of pesticides, the clear deadline for the use of substances withdrawn in the EU review program, storage requirements, disposal in the technology), development of a situation similar to what was created by the disappearance of large farms in the 1990s, is not to be expected.

Waste data on plant protection products from the HIR (EWC 200119*) are presented in ***Figure 15*** and ***Table 23***.

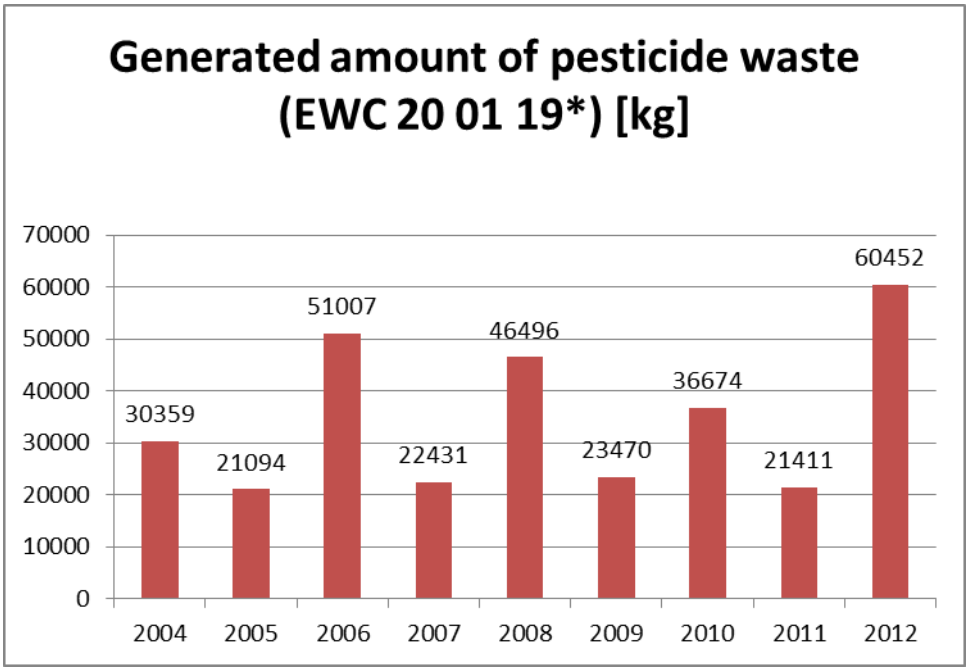


Figure 15

Between 2004 and 2012, the **treatment of waste** containing pesticides happened as follows:

R1 - Use principally as a fuel or other means to generate energy
D5 - Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
D9 - Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the D-D12 operations (e.g. evaporation, drying, calcination, etc.)
D10 - Incineration on land
D14 - Repackaging prior to submission to any of the D1-D12 operations

Year	Method of treatment	Quantity [kg]	Total [kg]	Rate of incineration
2004	D10	54,475		
2004	D14	690		
2004	D9	1,932		
2004	R1	2,900	59,997	95.6%
2005	D10	72,869		
2005	D5	2,755		
2005	R1	869	3,624	96.4%
2006	D10	199,414		
2006	D5	2,759		
2006	R1	442	202,615	98.6%
2007	D10	75,871		
2007	D5	915	76,786	98.8%
2008	D10	48,875		
2008	D14	3		
2008	D5	250	49,128	100.0%
2009	D10	61,858		
2009	D5	1,107		
2009	R1	628	63,593	98.3%
2010	D10	62,753		
2010	D5	391	63,144	99.4%
2011	D10	54,152		
2011	D5	2,479	56,631	95.6%
2012	D10	87,428		
2012	D5	1,135	88,563	98.7%

Table 24:The management of pesticide waste (by method of treatment), between 2004 and 2012 (Source: HIR)

Treatment of pesticide is mostly waste (more than 90%) by incineration (in hazardous waste incinerators, regardless of the POP content).

Pesticide packaging

According to the survey conducted in 2003, the quantity of packaging waste contaminated with historical pesticides is about 600 tons. Between 2003 and 2005, in addition to the quantity required by law, 600 tons of historical packaging waste was collected and disposed of, which was financed by the pesticide manufacturers and distributors, and by this the problem of packaging materials contaminated with pesticides was solved.

Currently about 1900 to 2000 tons/year of packaging materials contaminated with pesticides is generated in Hungary, mostly plastic pots (70%), contaminated paper bags (20%), associated waste (10%) and a minimal quantity of waste glass.

From 1 January 2013 onwards, the general conditions relating to pesticide packaging waste are determined by Government Decree No. 442/2012 (XII. 29.) on packaging and on waste management activities related to packaging waste. Under the Decree, it must be ensured that at least 60% of the weight of packaging placed on the market each year is recovered, and in at least 55% its material is processed. This general obligation also includes pesticide packaging, but in the case of packaging waste (potentially) contaminated with pesticides, safe performance of the 60% recovery can only take place in hazardous waste incinerators with energy recovery. Recycling of material may be considered for guaranteed uncontaminated and separated secondary or tertiary packaging and residue metals separated from the incineration residue.

In the case of packaging contaminated with pesticides, the Decree allows the transfer of the obligation of recovery to intermediary bodies. The collection and disposal of packaging contaminated with pesticides, funded by the pesticide manufacturers and primary distributors, is organized by an intermediary organization since 2003. Activities of the non-profit ltd. cover 98% of the Hungarian plant protection supply market and 75% of the market in treated seed. Under the current system, manufacturers are not interested in taking-back packaging in excess of their obligation, although the environmental risk of contaminated packaging significant, and the goal is to achieve the highest possible return rate.

	Emission (t)			Collection (t)			Collection (%)		
	2010	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Plastic	1,351	1,494	1,405	832	996	1,080	62%	67%	77%
Metal	81	72	74	11	10	41	14%	15%	55%
Associated	127	126	150	70	51	35	55%	46%	23%
Paper	339	317	377	165	240	233	49%	64%	62%
Total	**1,898**	**2,012**	**2,006**	**1,078**	**1,297**	**1,389**	**57%**	**64%**	**69%**

Table 25: Treatments of packaging contaminated with pesticides, 2010-2012 (Source: OHT-II)

Recycling of packaging not contaminated with pesticides, similarly to any other type of packaging, is the responsibility of the obligor performing obligations of the producer individually or, in the case of collective performance, the responsibility of the OHÜ. The special rules applicable to the disposal of wastes of packaging materials contaminated with plant protection products are laid down in Decree No. 103/2003 (IX. 11.) FVM.

4.4.1.2 PCB waste[14]

In relation to waste containing or contaminated with PCB (polychlorinated biphenyl), the following legislation should be mentioned:

[14] This subsection is based on the Second National Waste Management Plan.

I. Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)

The Directive envisages environmentally friendly disposal of PCBs and equipment containing PCBs as soon as possible. Each Member State was required to record larger equipment containing more than 5 dm^3 of PCB, and to produce a plan for the disposal of the equipment on this record. The records had to be submitted to the Commission within three years from the entry into force of the Directive.

For the small transformers containing more than 0.05 percent by weight of PCB, the Directive required the reduction of PCB concentrations below 0.05 percent by weight, but preferably below 0.005 percent by weight. The disposal of large appliances had to be carried out by the Member States by the end of 2010.

In December 2011, the European Commission sent a questionnaire to the Member States relating to the implementation of the Directive. (The questionnaires were based on the state on 31 December 2010.) It could be established on the basis of data received from the competent environmental, nature and water inspectorates, that Hungary was not able to fully comply with the obligations set forth in Directive 96/59/EC and the obligations laid down in the transposition of this Directive, Decree No. 5/2001 (II. 23.) KöM, until the 31 December 2010 deadline.

Subsequently, the competent department of the VM attempted to measure the status on 31 December 2011 (one year later) in another questionnaire. The replies showed that waste from equipment containing over 5 dm^3 of PCB was declared only in the jurisdiction of the Lower-Tisza Region KTVF. The volume of this is 0.36 tons, and the PCB content is 0.18 tons. However, since by nature and in terms of their use these are museum equipment, it can be concluded that **by 2011 our country managed to comply with Directive 96/59/EC**.

II. Decree No. 5/2001 (II. 23.) KöM on the detailed regulation of the management of PCBs and PCTs and of instruments containing them (already repealed)

In Decree No. *5/2001* (II. 23.) KöM, any non-adjusted equipment that has contained PCBs earlier or currently contain PCBs falls within the definition of equipment containing PCBs.

Owners of equipment containing more than 5 dm^3 of PCB were required to register these equipment until 31 December 2001. These equipment containing more than 5 dm^3 of PCB could be operated until 30 June 2010. Decontamination of equipment and disposal of PCBs removed had to be completed by 31 December 2010 the latest. The Decree sets out the conditions for the clean up of transformers filled with liquids containing PCBs in a concentration higher than 0.05 percent by weight. Requirements of the Decree on the conditions of activities related to hazardous waste shall be applied to the on site collection of PCBs that have become waste or waste containing PCBs, as well as in the case of transfer to business entities authorized to deal with their disposal.

III. Decree No. 144/2012 (XII. 27.) VM laying down detailed rules of treatment of PCB and equipment containing PCB (in effect)

Although Decree 144/2012 (XII. 27.) VM repeals Decree 5/2001 (II. 23.) KöM, but the provisions contained therein are confirmed by taking over the content, including the deadline for the completion of certain liabilities in 2010.

By way of derogation from Directive 96/59/EC, the VM Decree extends the registration and reporting requirements also to equipment with a charge smaller than 5 dm3, and with it,

without time limits, the disposal obligations as well. Paragraph (2) of Article 9 of the VM Decree provides that the obligor must make the notification about the records to the competent environmental, nature and water inspectorate until 31 March each year, which data are aggregated by the OKTVF in November of the current year and sent to the Minister of Rural Development.

Steps and options of the management of waste containing or contaminated with PCB include (prevention, collection, storage, disposal):

Prevention: Encourage the replacement PCBs in industrial applications with materials presenting no or reduced risks to the environment and human health. The production of PCBs is banned under the Stockholm Convention. The replacement of PCBs may be done, for example, by using dry-type transformers or a filling liquid not containing PCBs (chlorinated aromatic hydrocarbons, fluorinated hydrocarbons, silicone oils, mineral oils).

Collection: *i) Management of transformers and hydraulic systems containing PCBs:* As a first step, PCB oils are removed and collected. Then, the residual PCB is removed from the drained apparatus by washing. The disposal of PCB-containing waste is done in an incineration plant suitable for waste disposal. If the washing liquid is water-based, the PCB contamination is separated in a separator and the liquid can be used again for washing. If an organic solvent is used for washing, the spent washing liquid is incinerated together with the PCB waste. Residual metal parts from the transformer (steel, copper) are taken to the smelter. *ii) PCB-containing capacitors:* Capacitors containing PCBs are contained, for example, in fluorescent lights or older types of electric generators. PCB-containing capacitor waste must not be dumped. *iii) PCB-containing equipment:*

Hazardous materials are usually removed from the large transformers and hydraulic equipment containing PCBs and they are cleaned as well. However, the cleaning may not be done, in which case the entire equipment should be considered hazardous waste. *iv) Separate PCB-containing waste liquid:* Liquid waste containing more than 50 mg/kg (0.005 percent by weight) PCB shall be classified as hazardous and cannot be disposed of in landfill. *v) PCB-contaminated equipment:* Any equipment containing more than 50 mg/kg (0.005 percent by weight) PCB-containing liquid waste shall be classified as hazardous.

Storage**:** In contrast to previous rules, the latest amendment of **Decree No. 144/2012 (XII. 27.) VM** lays down more stringent conditions for the operations serving the disposal of waste PCBs and PCB-contaminated equipment and objects, and excludes the D12 operation (permanent storage): 1 D8 operation in accordance with *Annex 2* of the Ht.; 2 D9 operation in accordance with *Annex 2* of the Ht. (by: distillation, phase separation (e.g. emulsion breakdown), other (physico-chemical treatment consistent with the chemical properties of the waste)); 3 D10 operation in accordance with *Annex 2* of the Ht. (by: incineration in hazardous waste incinerator or other thermal destruction (e.g. burning plasma)). D15 operation defined in *Annex 2* of the Ht.

Disposal**:** Although the technical possibilities for the disposal of PCB-containing waste are extensive, the disposal, in practice, is mainly done by incineration, in accordance with the POP Regulation (850/2004/EC) as well. The total mass of PCB-containing equipment need not be destroyed, only their oil content shall be disposed of by incineration, if cleaning of the equipment from the oil and the preparations for disposal are performed in accordance with the regulations. The domestic disposal capacity practically means the incineration capacity of hazardous waste incinerators. The POPs disposed of are mostly PCB-containing oils or pesticide residues, however, dioxin-formation is to be expected during incineration.

Accordingly, high temperature technology is needed for the proper disposal of PCBs, which excludes the emission of dioxin (temperatures above 1,200 ˚C and gradual cooling).

Domestic situation regarding PCB waste (data)

On the basis of the general reporting requirement for PCB-containing waste (Government Decree No. 164/2003 (X. 18.) and Government Decree No. 440/2012 (XII. 29.) repealing it) the volume of generated and treated waste of this sort is clearly identifiable. PCB-containing waste may come from a very wide scope of uses as follows:

EWC 130101* - hydraulic oils containing PCBs

EWC 130301* - insulating and heat transmission oils containing PCBs

EWC 160109* - components containing PCBs

EWC 160209* - transformers and capacitors containing PCBs

EWC 160210* - discarded equipment containing or contaminated by PCBs, other than those mentioned in 16 02 09

EWC 170902* - construction and demolition wastes containing PCBs (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units , PCB-containing capacitors)

Table 26 shows the annual quantity of **waste containing PSBs generated** between 2007 and 2011.

EWC code	2007	2008	2009	2010	2011
130101*	0.120	6.010	0.635	0.090	-
130301*	16.249	13.077	2.144	28.320	1.205
160109*	0.774	0.636	0.021	0.299	5.078
160209*	79.329	72.998	112.003	244.499	51.775
160210*	14.801	-	0.704	0.188	0.004
170902*	0.630	0.873	9.110	0.188	0.720
Total	**111.903**	**93.594**	**124.617**	**273.584**	**58.782**

Table 26: Annual amount of waste containing PCBs generated between 2007 and 2011 expressed in tons (Source: OHT-II)

Clear upward or downward trend cannot be observed in the **formation of PCB-containing waste** between 2007 and 2010, but the implementation of Decree No. 5/2001 (II. 23.) KöM, according to which cleaning of PCB-containing equipment that have become waste and disposal of removed PCBs should be carried out until 31 December 2010, is reflected in the formation datasets in so far as the EWC 130101*, EWC 130301*, EWC 160209* and EWC 160210* code wastes formed in a much larger proportion (the rate particularly increased approaching 2010), than after 2010.

Between 2009 and 2011, the **treatment of waste containing PCBs** happened as follows: **R1** - Used as heating fuel or in other ways to generate energy; **D5** - Specially engineered landfill

(e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.); **D10** - Incineration on land; **D14** - Repackaging prior to submission to any of the D1-D12 operations. The evolution of the quantity of PCB-containing waste treated between 2009 and 2011 is shown in ***Table 27***.

EWC code	R1	D5	D10			D14
	2010	2010	2009	2010	2011	2009
130101*	-	-	-	-	-	-
130301*	1.797		2.450	14.329	16.384	-
160109*	-	-	-	0.310	-	-
160209*	-	-	166.870	186.357	141.918	2.692
160210*	-	-	1.650	0.110	0.412	-
170902*	-	3.441	0.256	-	-	0.800

Table 27: Treatment of PCB-containing waste (tons) between 2009 and 2011 (Source: OHT-II)

- : data not available

The quantity of generated and treated PCB-containing waste is shown aggregated and by EWC code ***in Table 28 and 29***:

	2009	2010	2011
Quantity of PCB waste generated [tons]	124.617	273.584	58.782
Quantity of PCB waste treated [tons]	174.718	206.344	158.714

Table 28: Quantity of PCB-containing waste generated and treated between 2009 and 2011 (tons) (Forrás: OHT-II)

EWC code	2009		2010		2011	
	generated [tons]	treated [tons]	generated [tons]	treated [tons]	generated [tons]	treated [tons]
130101*	0.635	-	0.090	-	-	-
130301*	2.144	2.450	28.320	16.126	1.205	16.384
160109*	0.021	-	0.299	0.310	5.078	-
160209*	112.003	169.562	244.499	186.357	51.775	141.918
160210*	0.704	1.650	0.188	0.110	0.004	0.412
170902*	9.110	1.056	0.188	3.441	0.720	-
Total	**124.617**	**174.718**	**273.584**	**206.344**	**58.782**	**158.714**

Table 29: Quantity of PCB-containing waste generated and treated by identification code between 2009 and 2011 (tons) (Forrás: OHT-II)

Presumably, in compliance with the storage requirements of PCB-containing waste and in terms of the time of treatment from delivery, certain wastes will be handled at a later date in relation to the time of their formation. Dismantling of PCB-containing equipment produced the old days, which have reached the end of their useful life in the past few years or will reach it in the next few years, will also increase the amount of waste to be treated.

In recent years, between 2006 and 2010, part of the PCB-containing waste was disposed of abroad, in France. ***Table 30*** describes the types of PCB-containing waste and the quantity shipped to France for disposal in respect of the relevant years.

	EWC code	Method of treatment	Quantity [tons]
2006	160209*	D10	7.86
2006	160209*	R1	37.22
2007	160209*	R1	9.2
2008	160209*	R1	16.74
2009	160209*	R1	35.51
2010	160209*	R1	18.87

Table 30: Quantity of PCB-containing waste transported to France for disposal (Source: OHT-II)

Based on the data in the above tables, the following waste balance sheet shows the distribution by method of treatment of the PCB-containing waste generated and treated between 2009 and 2011 (***Table 31***).

Year	Waste generated [tons]	Waste treated [tons]	Recovery		Incineration		Landfill		Repackaging	
			R1		D10		D5		D14	
			[tons]	%	[tons]	%	[tons]	%	[tons]	%
2009	124.617	174.718	-		171.226	98.001	-	-	3.492	1.999
2010	273.584	206.344	1.797	0.871	201.106	97.462	3.441	1.668	-	-
2011	58.782	158.714	-	-	158.714	100	-	-	-	-

Table 31: Waste balance sheet, distribution of generated and treated PCB-containing waste by method of treatment between 2009 and 2011 (Source: OHT-II)

Results

- The PCB compounds belong to the persistent organic pollutants, the so-called POP substances, therefore implementation until 2011 of the relevant legislation, Directive 96/59/EC, and in consonance, Decree No. 5/2001 (II. 23.) KöM, and later Decree No. 144/2012 (XII. 27.) VM replacing the above Decree, has key environmental and health significance.

- Compared to the previous OHT I, the most significant result was the adoption of the above-mentioned regulations, and thanks to their terms, formation of most of PCB-containing waste showed a decrease after 2010, the deadline set to meet disposal obligations.
- Due to the said regulations and the legally binding deadline, information of the general public has become more widespread than it was in the past.

4.4.2 Other waste containing or contaminated with POPs

Waste Electrical and Electronic Equipment (WEEE)

The POPs characteristic to waste electrical and electronic equipment (WEEE) are the brominated flame retardants. The group of so-called brominated flame retardants (BFR) include the poly**b**rominated **d**iphenyl **e**thers (BDEs: tetra-, penta-, hexa-, hepta-BDE), which have the favourable property that through the release bromine radicals at high temperatures they suppress combustion and prevent the fire from spreading. Thus, an important area of use of these compounds is the fire protection of different materials and products. Therefore they are applied in the manufacture of electrical equipment, e.g. plastic cover technical equipment, such as photocopiers, computers or TVs, monitors, printers, printed circuit boards (mainly from epoxy resin) and other information technology equipment. These flame retardant compounds are also often used in the following areas: furniture making, upholstery, textile manufacturing, manufacturing of mattress tissues and other household products, insulation and polyurethane foam (construction), manufacturing of constructive and unsaturated GRP panels (rail vehicles).

The current data collection does not cover the POP content in WEEE. Therefore the WEEE legislation is just briefly introduced below, and the collection and utilization associated with the WEEE is only discussed in general terms.

Related legislation

The EU legislation intends to ensure more environmentally friendly production and treatment of waste from electrical and electronic equipment (WEEE) in two ways:

- on the one hand, by limiting the hazardous material content in products: prohibiting the use of certain substances, so that the waste does not contain specific components highly dangerous and harmful to the environment, and that at the end of the product life cycle recovery of the equipment can be easier and less risky (RoHS Directive);
- on the other hand, by imposing quantified requirements for the collection and recycling of waste (WEEE Directive).

I) *RoHS Directive:* The key provisions of Directive 2002/95/EC (RoHS) is that a ban was ordered for certain product flows on the use of polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) (as well as lead, mercury, cadmium, and hexavalent chromium) in electrical and electronic equipment put on the market from 1 July 2006 onwards. Decree No. 16/2004 (X. 8.) KvVM transposed the Directive into Hungarian law. In the meantime, it became necessary to revise the Directive and on 8 June 2011, Directive 2011/65/EU (RoHS 2) was adopted, replacing Directive 2002/95/EC. Government Decree No. 374/2012 (XII. 18.) concerning the restriction of the application of certain hazardous materials in electrical and electronic equipment, transposing the new Directive into domestic law, entered into force on 3 January 2013.

II) *WEEE Directive:* Directive 2002/96/EC on WEEE (Waste Electrical and Electronic Equipment) was transposed into Hungarian law by Government Decree No. 264/2004 (IX. 23.) concerning the collection of waste originating from electrical and electronic equipment. In the meantime, however, Government Decree No. 443/2012 (XII. 29.) on waste management activities related to electrical and electronic equipment entered into force on 2 January 2013. For the future, it is important to note that in July 2012,

Directive 2012/19/EU entered into force, amending the WEEE Directive (the "WEEE recast"), which builds on the established systems in respect of the product stream, in its approach and implementation, however, brings about material changes. Hungary is in the process of legal harmonization.

WEEE collection, recovery and disposal

In accordance with the EU standards, Hungary began to register manufacturers of electrical and electronic equipment and collect and recover waste proportional to emissions in an organized fashion in 2005. The major part of the amount collected, similarly to the output side, is made up by large household appliances, including household refrigerators.

Amount of WEEE collected between 2009 and 2012 [tons]			
2009	**2010**	**2011**	**2012**
46,533	40,520	35,030	40,808

Table 32: WEEE collection between 2009 and 2012 (Source: OHT-II)

With the introduction of the organized system in 2005, a special recovery industry has developed for the treatment of EEE waste in Hungary. Thus, the major share of the collected waste is now being utilized in our country, a smaller part in the Member States of the European Union, while treatment outside of the EU is almost negligible.

Electrical and electronic equipment put to disposal are to a lesser extent disposed of by incineration for energy production, to a larger extent by dumping, their amount, however, is maximized in 2% by law in relation to the total quantity collected.

The basic requirement is to keep the amount collected at 4 kg/person/year, which was laid down in Directive 2002/96/EC. Not later than in 2018 (derogation target), EEE waste collection must be at least 65% of the amount issued.

Since nearly 70% of the WEEE mass is metal, metallurgical recovery enjoys primacy for this material flow. Most of the domestic pre-treated metal secondary raw materials will be put to metallurgical recovery in Italy or Germany.

In order to develop the collection network and the recovery capacity, medium and long-term national planning is needed, on the basis of which financial aid should be provided in the operational programs of the 2014 to 2020 period to the waste industry, and so to the WEEE industry as well.

4.4.3 POP waste from certain industrial processes

As unwanted by-products of certain technologies, e.g.incinerators, metallurgy, technologies used for paper and construction sector etc., dioxins/furans (D/F)[15], PAHs, PCBs, PeCB (pentachlorobenzene) and HCB may enter the water, soil and waste in addition to being emitted into the air.

Ministry resources separated during the preparation of NIP 1 for the measurement of POPs entering waste and technological waste water, allowed one measurement each at some power plants, waste incinerators and two DUNAFERR metallurgical plants, a total of 12 locations in 2005. Measurement results about dioxin emissions of incinerators into technological waste water are available since 2003, as Decree No. **3/2002 KöM** required this to be measured by incinerators, where the flue gas cleaning technology involves wastewater discharge.

4.4.3.1 Related legislation

The permissible POP concentration range in residues (slag, ash, fly ash) generated in the course of industrial technologies and falling within the scope of the provisions on waste management is included in Annex IV and V of Regulation 850/2004/EC. For the majority of controlled POPs, this range is between 50 mg/kg to 5,000 mg/kg, except for dioxins, where the range is between 15 μg/kg and 5 mg/kg and PCBs, where the maximum concentration is 50 mg/kg. If higher concentrations of POPs occur, the material not be placed in hazardous waste according to the Regulation, and should be disposed of in other ways, which practically means incineration.

Data, measurement and evaluation of results

As mentioned before, **detailed measurement data** and results **are not available for the presentation of POP contamination in waste**. The main reason is that **POP compounds have not been emphasized in neither the domestic nor the international waste lists**, and the POP content of EWC codes is not known.

To demonstrate the POP concentrations (D/F, PAH, HCB, and PCB) in waste water and residues from industrial technologies, which are important in respect of the emission of POPs, separate measurements are necessary. (For the majority of technologies, where emission threshold values have not been laid down in the regulations, measurements can be financed from international funds or from the state budget. The measurement results shall then be compared to the emission parameters available with the help of BAT methods, and modernization of the technology and/or the separation should be initiated, if necessary.) Measurements of POP content in process residues and waste water should be carried out for certain technologies, e.g. waste incineration, metallurgical technologies, coal and biomass-fired power plant emissions. In line with this, the first measurements were made in 2005 to determine the POP content of high-temperature process residues: release of four regulated POP compounds was measured.
The measurement plan, due to limited financial resources, targeted only one measurement each of the 12 sites and only to perform the most important inspections of waste water, slag remaining in boiler, fly ash accumulating in dust cyclone, and in the desulphurizator (filter dust accumulating in electro filter drain stub).

[15] There is only a few data available in the international literature on the concentrations of D/F, to be disposed of as unwanted by-products from certain technologies, and their issue was only regulated in 2006, by Annex IV and V of Regulation 850/2004/EC.

4.4.3.2 Details of the formation of certain types of waste assumed to be POP-containing that are by-products or residual materials of industrial processes

These figures are shown for illustration purposes only, and it is important to keep in mind that the POP content of the wastes is completely unknown (we only assume that they contain POP contamination).

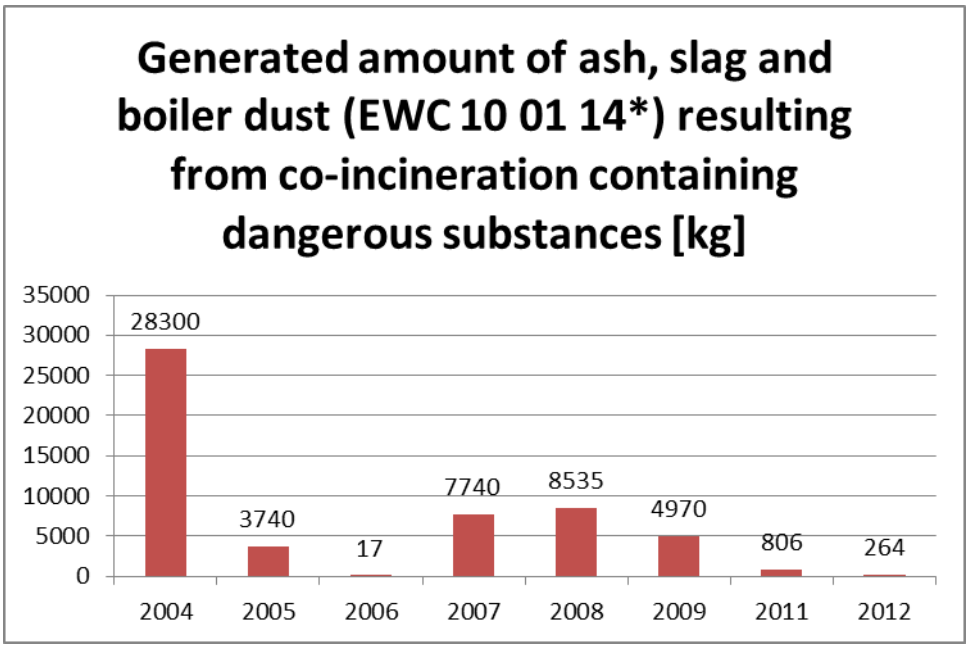


Figure 16

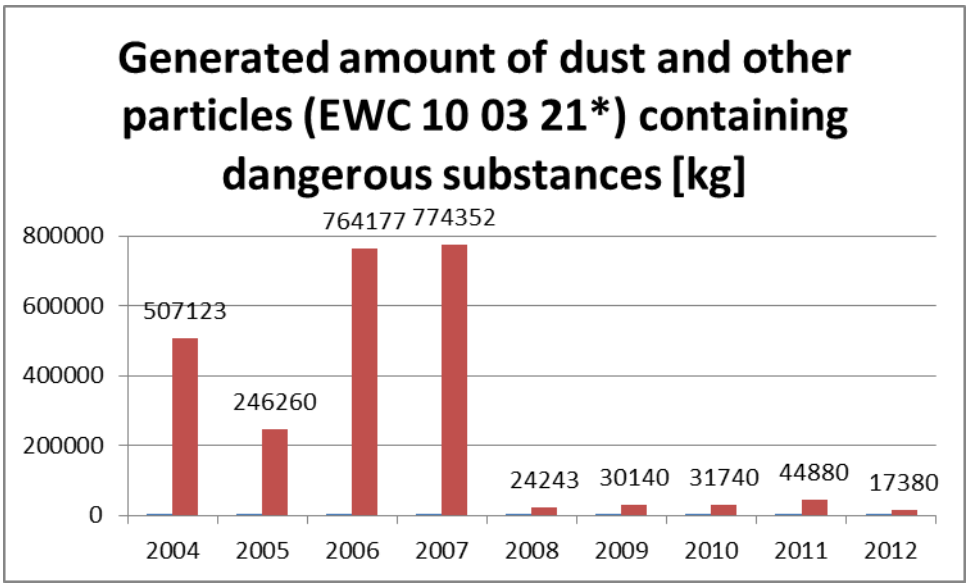


Figure 17 (Source: HIR)

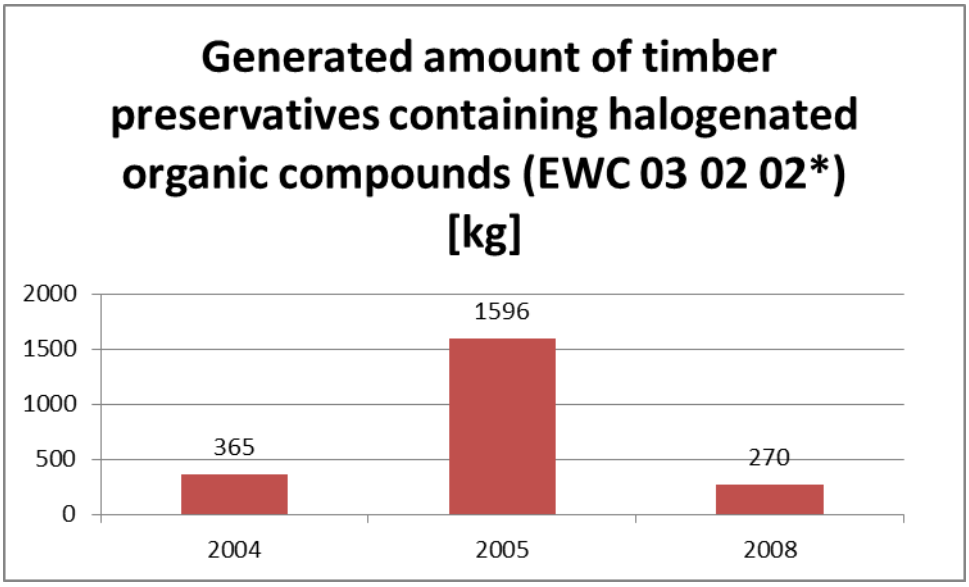


Figure 18 (Source: HIR)ű

4.5 POP substances in human, food and production site samples

POP substances can enter food and the human body in a number of ways. PAHs may enter food from the flue gases in the air or from the soil (as contaminants of environmental origin), during food processing, or through certain packaging and wrapping materials, contaminated with PAHs. They can enter the human body by drinking water, by inhaling contaminated air (smoke, urban air), and by the consumption of contaminated food.

The PCB content of food is closely related to levels measured in the environment. In vegetable foodstuffs they usually occur only at very low concentrations, close to the detection limit, while in plants containing oils and fats their concentration tends to be slightly higher. Most researchers believe that plants do not absorb the PCBs from the soil, but from the air through sedimentation. PCBs may enter the human body from the air or foodstuffs among others.

Chlorinated hydrocarbons, though to a decreasing extent, can still be detected in almost all human fat tissue and breast milk. In fact, some pesticides banned several decades ago can be detected in the blood as well. UNEP (United Nations Environment Programme) and WHO (World Health Organization) organized a global program to assess the extent to which breast milk samples are contaminated with POP materials. The second phase of the program started in 2013, and it is recommended accordingly to verify the POP contents of milk samples in Hungary.

Based on the report on pesticide residues published by the MÉBiH[16] in 2009, laboratory tests identified the following POP materials in production site samples:

[16] According to Government Decree No. 22/2012 (II. 29.) MÉBiH merged into the National Food Chain Safety Office (NÉBIH), formerly known as the Central Agricultural Office, as an independent directorate.

Substance	Number of cases (pc)	Residue measured mg/kg	Median
aldrin and diedrin	4	0.01-0.1	0.043
endosulfan (total)	3	0.012-0.021	0.016

Table 33: POP substances detected in laboratory studies from production site samples (Source: NÉBIH)

In addition, it can be said that aldrin and dieldrin residues have been detected in pumpkin seed oil during the production site survey. The amount of residue in the case of aldrin was 0.076 mg/kg and for dieldrin 0.10 mg/kg. The above substances were detected in a total of two samples.

Decree No. 66/2010 (V. 12.) FVM on maximum residue levels of pesticides in or on food and feed of plant and animal origin and their official control, which also serves the compliance with Commission Implementing Regulation 788/2012/EU of 31 August 2012 concerning a coordinated multiannual control programme of the Union for 2013, 2014 and 2015 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin.

4.6 Future production, use and emission of POPs – conditions of exemption

Possible exemptions or postponements under Regulation (EC) No 850/2004:

– the equipment in use may still contain PCB in accordance with the provisions laid down in the Regulation (and in the corresponding Decree No 5/2001 of 23 February 2001 of the Ministry of Environment);
– fire-fighting foams containing PFOS placed on the market before 27 December 2006 were allowed for use until 27 June 2011;
– the articles containing endosulfan produced on or before 10 July 2012 were allowed for putting on the market and use as constituents of such articles until 10 January 2013, and the articles containing endosulfan already in use on or before 10 July 2012 are allowed for putting on the market and use as constituents of such articles.

Hungarian regulations regarding the temporary exemptions listed above:

– pursuant to Decree No 5/2001 of 23 February 2001 of the Ministry of Environment, equipment oils containing PCB had to be disposed of at the latest by 31 December 2010, if the concentration of oils exceeds 0.05% by weight, and Hungary was able to comply with this provision of Directive 96/59/EC by 2011. If the PCB concentration is lower and the equipment operate without any problem, they must be disposed of at the end of their service life.
– according to information received from the National Directorate General for Disaster Management, only one foaming agent (“Light Water”) of all foaming agents distributed in Hungary and used by disaster management bodies contained PFOS. The Directorate used all previously procured stocks until 27 June 2011.

– due to the efforts to get rid of existing stocks, the use of endosulfan somewhat increased between 2001 and 2010 but its use came to an end in Hungary after the withdrawal in 2006 (Thiodan, Thionex).
– however, POPs may be used as a substance used for laboratory-scale research or as a reference standard under Regulation (EC) No 850/2004.

5 Public awareness

As POPs are among the most toxic compounds, it is a requirement under international agreements to provide information to, raise the environmental awareness of and ensure free access to data for the general public as well as to inform and train the various target groups (decision-makers, managers, trainers, sensitive groups, scientists, technical experts, workers). Different information must be provided to different target groups:

- the inspectors of the environmental inspectorates must obtain more in-depth and detailed knowledge because they liaise with the POP emitting facilities or, eventually, the specialists of inspectorate laboratories perform the emission measurements. This was the purpose of the technical conferences organised primarily for the experts of inspectorates and the environmental officers of companies under the UNIDO project;
- it is an important task to provide a clear picture of the issue for political and economic decision-makers, which requires the compilation of major information in a brief form;
- another target group is the general public, where the clear presentation of information is a priority objective. As more than 90% of POPs reach the human body via foods and as foods transfer POPs released to the environment many years or even decades ago, an individual can hardly do anything directly today against the adverse health impacts of such POPs. People must be armed with authentic and accurate information against sensationalism and scaremongering.

According to three international POP agreements, the general public must be informed about the hazardous substance content of products and articles, the health risks associated with POPs, the options to reduce those risks and to eliminate the presence or reduce the emission of POPs, and the use of alternative substances.
Further tasks regarding information supply to the general public are the following:

- to disclose all information related to POPs except for information considered confidential under the applicable legislation.
- to devise and implement training and exercising programmes on environmental and health impacts, prevention and pesticides alternative to POPs. These programmes must be aimed at population groups which are underinformed and more exposed to the harmful effects of POPs (e.g. women, children, people with low level of education).

5.1 Information about government websites

Chemicals website run by the Ministry of Rural Development

Run by the Ministry of Rural Development, this website (www.vegyianyag.kormany.hu) gives a review of the domestic, EU and international regulations, treaties and programmes regarding chemicals. The website uses the relevant legislation and treaties to describe the institutional system and the areas of domestic, EU and international chemicals regulations. The summaries and the linked sites allow the visitors to obtain a more in-depth review of the individual topics. Furthermore, the Ministry's public section publishes information and announcements related to food safety and plant protection.

"Növényvédelem" (Plant Protection) – periodical

"Növényvédelem" is a scientific periodical of the Ministry of Rural Development providing a continuous flow of information about the EU requirements applicable to pesticides (including, in particular to hazardous pesticides) and a series of articles about the international agreements, protocols and regulations applicable to pesticides. The online version of the periodical is freely accessible (www.novenyvedelem.agroinformkiado.hu/).

Official website of the National Food Chain Safety Office (NÉBIH)

Established in 2010 (as the legal successor of MÉBiH and MgSZH), NÉBIH has an official website (www.nebih.gov.hu/) where the public section of the Directorate for Plant Protection, Soil Conservation and Agri-environment regularly publishes pesticide-related information (permits and withdrawals) including the annual breakdown of the results of detailed pesticide residue tests.

Websites of EMMI background institutions

The EMMI background institutions (national institutes in charge of professional methodological tasks) belong to the Office of the Chief Medical Officer (OTH), which is the central organ of the National Public Health and Medical Officer's Service (ÁNTSZ).
As OTH accommodates the National Competent Authority for Biocidal Products, the information, updated lists and supporting materials regarding the national and Community licensing and review programme of the biocidal products and active ingredients provide valuable guidance for economic operators involved in the distribution of biocidal products and for official bodies.
Other information and supporting materials regarding hazardous chemicals such as the Hungarian List of Hazardous Substances can also be found on the ÁNTSZ website (www.antsz.hu).

OKBI website

Visitors to the National Institute of Chemical Safety (OKBI) website (www.okbi.hu) may browse through OKBI's organisational chart and statutory tasks as well as a vast array of information regarding the regulations and risks of the chemical substances. There is a separate subpage for the EU legislation and international agreements for which OKBI acts as the competent authority. In particular, the National REACH Helpdesk Service's website is here and one can reach the GHS National Competent Authority and the Designated National Authority for PIC Procedure also from the main website of OKBI. Biocides belong to EMMI's

competence. However, as OKBI also performs biocide-related tasks, the website also contains information in this regard. Numerous technical, awareness raising and training materials can be downloaded from the website of OKBI.

Health Toxicological Information Service

One of the tasks assigned to the Health Toxicological Information Service **(**ETTSZ) within OKBI is to keep a record of hazardous substances and preparations, collect their toxicological, public health and clinical data, and provide the necessary information in the case of eventual poisoning. Visitors can find information about these activities on the website.

Antidote website

The antidote website of OKBI (www.okbi.hu/ellenmereg) highlights various poisons occurring in households, at schools and in nature. It helps to avoid these poisons and gives advice on what to do in case of poisoning. The website gives information about poisonous plants, hazardous drugs, household chemicals and pesticide sprays. Intended mostly for teachers, OKBI has also compiled a study with similar content titled "Cases of poisoning in childhood" which describes poisonous materials and prevention methods.

OSZIR

Financed from EKOP funds, it was possible to refurbish and add new functions to the information systems designed to facilitate the rapid reaction and support the official activities of ÁNTSZ and the Public Health Administration Bodies of the Government Offices in Budapest and in the counties. Coordinated by ÁNTSZ, the Chemical Safety System of the National Technical Information System (OSZIR-KBIR) has replaced the old Chemical Safety Information System (KBIR). This system represents the electronic platform for recording the statutory data supplies and the official operations and, through modern database management, it provides information for business, official and NGO entities. Following a registration process, the technical system can be accessed from the ÁNTSZ website.

"Biokontroll"– periodical

Published with financial support from the Ministry of Rural Development, it is the technical periodical of the Hungarian Federation for Organic Farming which has already published numerous articles about pesticides containing POPs. The periodical focuses primarily on ecotoxicologic effects and the aspects of organic farming. The periodical is also available online(www.biokontroll.hu).

5.2 Websites of industrial associations

MAVESZ website

Established in 1990, the Hungarian Chemical Industry Association (MAVESZ) is a national body of professional/economic interest representation consisting of domestic and foreign chemical companies operating in Hungary. The purpose of MAVESZ, which is a member of the European Chemical Industry Council (CEFIC), is to represent the interests of the chemical industry in the field of legislation and in front of authorities and to inform the members about environmental and other statutory rules.
The MAVESZ website (www.mavesz.hu) introduces legislation applicable to the chemical industry, contains news, studies, proposals and statistics about chemicals, publishes news about various events, and describes (in the environmental sections) the environmental investments made in the Hungarian chemical industry and the Responsible Care Programme.

KOZMOS website

The Hungarian Cosmetic and Home Care Association (KOZMOS) represents the cosmetic, household cleanser, maintenance, detergent and personal hygiene product manufacturers and distributors operating in Hungary. Its purpose is to inform its members about the relevant legal, scientific, environmental and consumer issues and to perform lobbying for industry interests in the legislative preparatory phase and also in political and technical debates.
The KOZMOS website (http://www.kozmos.hu) contains opinions on legislation, technical positions and presentation materials.

NISZ website

Established in 2004, the Hungarian Crop Protection Association (NISZ) has the task of representing the interests of pesticide manufacturers and/or importers operating in Hungary. As an associate member, NISZ has joined the European Crop Protection Association (ECPA). Just like other industrial associations, NISZ represents the interests of pesticide manufacturers in the shaping of the domestic, EU and international pesticide policy and provides help for the members in the implementation of new regulations. Furthermore, NISZ fights against illegal pesticide use. The NISZ website (http://hucpa.hu/) contains legislation, news and information intended mostly for its members.

5.3 Activities of non-governmental organisations

The main purpose of the task regarding POPs is to safeguard human health. It is advisable to carry out this task with the extensive and deliberate involvement of civil organisations and, in particular, "specialised" green organisations which can efficiently represent public interests. During the work it is important to deepen POP knowledge, spread the information as far as possible and increase active participation in the field of protection and prevention. As POPs include the most toxic substances (e.g. dioxins), it is particularly important to inform the general public about the effects and risks of such substances.

The green organisations play a useful role by informing the general public, conducting training courses, designing and running information websites as well as organising and managing competitions and other public events. They are well positioned to establish contact with foreign

civil organisations involved in environment protection and to exchange information and offer help in technical issues. IPEN (International POPs Elimination Network) is an international green network specialised in dealing with the effects and elimination of POPs, the Hungarian member organisation of which is doing useful work in the field of information supply to the general public.

Most green organisations in Hungary are attached to the same network, which makes it easier for them to cooperate, allocate the tasks and apply for funding more efficiently. This network is the Hungarian Green Movement with more than 300 member organisations. Being a Hungarian member organisation of IPEN, the Civil Centre Foundation of the Hajdú Region (Hajdúböszörmény) has agreed to distribute POP information in Hungary and to prepare a clear translation of the Stockholm Convention on POPs.

The public information work of green organisations must be facilitated through the compilation of information material(s) discussing the harmful effects of POP compounds and, whenever possible, the NGOs must be enabled to attend the technical meetings focusing on POP materials.

Clean Air Action Group

Founded in 1988, the Clean Air Action Group is an environmental NGO dealing mostly with air quality and sending out to more than 500 recipients its newsletter discussing chemicals, containing scientific and political news about the risks of such chemicals, and informing about the activities of domestic and international green organisations with regard to chemicals. The Action Group's blog site on http://vegyi.blog.hu/ publishes news about the chemicals and describes the campaign operations of green organisations.

Their work on this topic is greatly assisted through international connections as the Action Group is a member of IPEN, the Pesticide Action Network – Europe and the Health & Environment Alliance. Since 2003 the Clean Air Action Group has organised numerous programmes to discuss the risk of chemicals, mitigate the level of individual exposure and support the preparatory phase of legislation processes. Acting within the framework of a KEOP 6.1.0 tender in 2009-2010, the Clean Air Action Group highlighted the risks of chemicals contained in various products.

Furthermore, the Action Group conducted a study on indoor air quality in 2010 and retained an accredited laboratory to analyse the samples, taken at 10 different locations, for their content of inorganic (metals) and organic substances. The latter included seven PCBs (tri-, tetra-, penta-, hexa- and heptachlorinated ones) which were then compared with the tolerable daily intake (TDI). Although as a result of the small number of sampling sites no overall conclusions covering greater areas can be drawn from the study, ***Table 34*** clearly shows the order of magnitude differences between the air samples regarding their PCB content. It is also evident that, when comparing the sampling sites with each other, the different PCB compounds typically show the same rate of occurrence.

Pollutants (mg/kg dust)	School	Kindergarten	Office	PC chop shop	Housing estate	TDI (mg/kg)
PCB 28 (2,4,4'-triCB)	0.0018	0.0008	0.0019	0.0136	n.a.	0.00002
PCB 52 (2,2,5.5'-tetraCB)	0.0010	0.0004	0.0012	0.0147	n.a.	0.00002
PCB 101 (2,2',4,5,5'-pentaCB)	0.0007	0.0005	0.0042	0.0620	0.0036	0.00002
PCB 118 (2,3',4,4',5-pentaCB)	0.0014	n.a.	0.0048	0.0594	n.a.	0.00002
PCB 153 (2,2',4,4',5,5'-hexaCB)	0.0009	0.0009	0.0075	0.0569	0.0043	0.00002
PCB 138 (2,2',3,4,4',5'-hexaCB)	0.0010	0.0011	0.0087	0.0732	0.0050	0.00002
PCB 180 (2,2',3,4,4',5,5'-heptaCB)	0.0005	0.0006	0.0048	0.0293	0.0027	0.00002
Detection limit of method (nd): 0.0001 mg/kg by component						
source: http://www.levego.hu/sites/default/files/porminta-ertekeles.pdf						

Table 34: PCB test results of indoor air quality

FészekInfo

The National Association of Large Families has launched its Healthy Nest Programme (http://www.feszekinfo.hu/eg-szs-ges-f-szek-az-elk-pzel-s/) in cooperation with WECF (Women in Europe for a Common Future). The purpose of this programme is to protect foeti, infants, children and pregnant women from various environmental risks including, in particular, chemical substances.
The programme involved the production of leaflets and a detailed publication intended for families. The project also has an interactive child-friendly website at http://feszekinfo.hu/. The website and the publication describe the hazards inherent in different chemical substances and the way children and pregnant women can be protected from the risks represented by such chemical substances. Details are given about several hazardous substances (e.g. phthalates, bisphenol A) and then the less risky alternatives are discussed.

Greenpeace website

The Hungarian Greenpeace website (http://greenpeace.network.hu) informs about the activities of Greenpeace in Hungary. A chemical campaign subpage is also part of the Greenpeace website. Here a separate chapter deals with the risks of hazardous chemicals and the trade of chemicals and wastes. Greenpeace has studied chemical residues in vegetables and measured

the level of pollutants in domestic rivers during the past few years. In one of their surveys regarding POPs, they sampled the vegetable parts (pollens, guttation drops) which become in contact with bees and the bee pollen and bee bread found inside the hive. No POPs were detected in the analysed samples.

Kockazatos.hu website

Kockazatos.hu is operated by the Hungarian Environmental Partnership Foundation (Ökotárs Alapítvány) coordinating the project with the Environment and Energy Operational Programme. The purpose of the project is to provide information about the chemical substances considered most hazardous by the website operators. The process of collecting and processing the materials and verifying the technical content of information is assisted by experts from Szent István University FAES IELM Department of Environmental Protection and Environmental Safety, Clean Air Action Group, National Institute of Chemical Safety and National Institute of Environmental Health. Within the project the Environmental Health Information Portal has been set up. The project was completed with funding from the European Union, co-financed by the European Regional Development Fund. Intermediate body: Energia Központ Nonprofit Kft. – National Development Agency.

6 Research and development

Technical infrastructure, research and development, measurements

The background institutions of certain ministries (OKBI, universities and research institutes of the Hungarian Academy of Sciences) are conducting scientific researches to study POP compounds, pesticide active ingredients, their emissions and new substances. According to information received from the Department of Microbiology at ELTE (Eötvös Loránd University), their current research project focuses on the isolation and characterisation of PCB decomposing bacteria.

Currently, some 50-70 laboratories are accredited for the sampling and analysis of organic pollutants. These include the laboratories of the National Food Chain Safety Office, ÁNTSZ, environmental inspectorates, universities, certain national institutes and some large companies, and also some analytical business ventures.

5-7 laboratories are ready to sample and analyse PCDD/DF emissions, including 3 ones equipped with the latest hi-res mass spectrometers meeting even the most sophisticated demands for accurate measurements.

As the domestic R&D activities are limited by the low level of available budget, the realistic option will include the takeover of foreign R&D results.

Progress in the field of R&D

Table B in Annex 1 to Decree No 201/2001 of 25 October 2001 of the Hungarian Government on the quality standards and monitoring of drinking waters requires the testing of pesticides and total pesticide content of drinking water at the consumer points. Pursuant to the Decree, the competent public health administration body should forward to OKI the official and self-revision water sampling results measured by the water suppliers. The drinking water database system of OKI-OTH is able to monitor at national level the presence and any limit value exceedance of pesticide active ingredients in our waters. It should be noted in view of the results that the supplied drinking water may be contaminated with low levels of pesticide residues even under the current water quality testing regime. According to the analysis of the

pesticide residues detected in drinking water samples taken at consumer end points, the total pesticide content exceeded the limit value in 2% of the samples between 2008 and 2012. The active ingredient frequency tests did not show any residue from prohibited substances (e.g. DDT).

7 Measures

7.1 Four sets of NIP 1 measures and their assessment

The four sets of priority measures were as follows:

- To increase the number of POP emission measurements and monitoring efforts (air, water, solid residues, waste) and the number of controlled technologies (emissions from metallurgy, power plants, etc.) in order to obtain a higher number of more reliable data about the level of emissions – *the measure component should be maintained;*
- To apply the provisions of the best available techniques (BATs) to the POP emitting industrial technologies – *the measure component should be maintained;*
- To collect the oils from the equipment filled with PCB containing oil, perform their disposal in an environment-friendly manner and replace the oils in the equipment – *the measure has been basically implemented according to HIR data*.
- To continue the collection of obsolete pesticide residues from the country and perform their disposal in an environment-friendly manner – *the measure component should be maintained as it has been implemented only partially*.

7.2 Detailed implementation plan

When determining the measures, we took account of the implementation of measures specified in NIP 1. The measures that have been fulfilled only partially or not at all should be maintained in NIP 2. Furthermore, in order to prevent the future occurrence of the difficulties encountered at the time of NIT 2 preparation numerous measures have been determined which will facilitate the compilation of additional reports in the future. The following section will describe the set of measures together with the planned objectives.

7.2.1 Measures to reinforce the institutional background

Objective: To strengthen the cooperation between the ministries and institutions affected by POP regulations and to coordinate the tasks.

- *To maintain and operate the POP Interministerial Committee in order to facilitate the exchange of information, discuss the technical aspects of the measures, coordinate the tasks affecting several ministries, regulate new compounds and regularly check the implementation of measures*

Objective: To employ inspectors experienced in the enforcement of POP regulations.

- *To prepare publications, organise regular training courses on POP-related inspection tasks and application of BATs for environmental inspectors with special regard to the technologies listed in Part II and Part III of Annex C to the Stockholm Convention*

Professionals dealing also with POP tasks will be needed in all fields, which will require the further training of 3-4 persons per inspectorate with special regard to new substances.

Objective: To inform the professional circles about the effects of POPs and the limitation of their emissions.

- *To organise a professional conference each year with the participation of NGOs*

As part of the awareness raising efforts it is necessary to organise a conference each year for professional circles and NGOs about the effects of POPs and the limitation of their emissions. The involvement of NGOs in the measure is justified by their role played in the supply of information to the general public.

7.2.2 Measures regarding the legislative background

Objective: To comply with the provisions of international and EU legislation affecting POPs.

- *To transpose the amendments of international treaties into the national legislation of Hungary*

The ratification process of international treaties has not been completed yet. Although the Stockholm Convention and the Aarhus Protocol, being the most important instruments, have already been ratified, the amendments have not been fully transposed into the national legislation of Hungary.

Objective: To prepare for the addition of new substances to the Convention and for the eventual use of exemptions. (Article 4 of the Stockholm Convention, Part A and B of Annex I to the EU Regulation)

- *To assess the exemption demands for new POP substances to be added to the Convention*

The amendment of the Stockholm Convention through the addition of 9 new pollutants and endosulfan is binding upon Hungary as Hungary failed to submit a notification of exemption. However, for any future amendment of the Convention, an eventual need for the option to submit a notification of exemption should be examined if the regulation regarding the latest pollutants might represent a problem to the country. It should be established through further assessment in the form of an interministerial discussion of the finished material.

Objective: To become familiar with the new information regarding POP regulation and to efficiently represent our professional interests.

- *To attend international conferences and professional meetings*

Participation at conferences, meetings or workshops related to international treaties would greatly contribute to compliance with the obligations laid down in the international treaties. The representation of our professional interests at the highest level of the conferences of the Parties is of major importance.

7.2.3 Measures to eliminate releases from the use, placing on the market and/or production of POPs (Part I of Annex A to the Stockholm Convention, Part A and B of Annex I to the EU Regulation)

Objective: To comply with the provisions banning the production, use and placing on the market of the relevant POPs.

- *A monitoring programme should be elaborated and implemented to check the content of POP pesticides or POP containing pesticides in arable land and agricultural produce in order to avoid their use and placing on the market*

It is prohibited to produce and use the POPs listed in Annex A to the Convention. This regulation does not imply new provisions for Hungary as it corresponds to the national legislation and practice.

The withdrawal of the licence of pesticides containing these active ingredients took place many years before their legislative banning. In addition to these POP compounds, many other POP active ingredients are subject to a ban on use and production in Hungary. However, ongoing checks are required to identify illegal shipments of pesticides with POP active ingredients entering Hungary.
As the licences of the pesticide active ingredients listed in Regulation (EC) No 850/2004 have already been withdrawn and as less hazardous alternative substances have been introduced for plant and soil protection purposes in the meantime, **no further measures other than ongoing checks will be required in this area**.

- *To clarify with the market supervision and consumer protection bodies the tasks and powers related to compliance with Article 3(1) of Regulation (EC) No 850/2004 (the prohibited POP substances are not allowed to be constituents of any goods, products or articles)*

The tasks and the powers should be clarified between the competent institutions, and a proposal should be developed for non-stop cooperation and continuous contacts. As this provision may affect a wide range of products and articles, its implementation should be monitored and, if necessary, the attention should be drawn to the required actions.

7.2.4 Proposals for the development of a human and food/fodder monitoring system

Objective: To identify and quantify the POP substances present in human and food/fodder samples.

- *To develop an annual inspection programme to examine the POP content of human samples (breast milk, body tissue, etc.)*

The annual inspection of human samples is required for the solid basis of reliable background data and for the environmental health monitoring of the population of sensitive areas. Only sporadic civil initiatives are known in this regard in Hungary. The WHO launched the second phase of its global initiative in 2013 with the purpose of analysing breast milk samples for POP substances. It is recommended for Hungary to participate in this international programme.

- *To examine the POP content of food and fodder products.*

Pesticide residues represent a major risk in terms of chemical food chain safety as such pesticide residues may directly or indirectly lead to human exposure. Therefore it is necessary to examine the POP content of both domestic and imported food and fodder products each year.

7.2.5 Withdrawal from production and disposal of equipment containing PCB

Objective: To identify and remove from use equipment containing greater than 0.005% PCB or volumes greater than 0.05 litres.

- *To review the domestic measures that may be taken or applied in terms of equipment containing greater than 0.005% PCB or volumes greater than 0.05 litres.*

Pursuant to Part II of Annex A to the Stockholm Convention regarding elimination, each Party, including Hungary, should make determined efforts to identify and remove from use equipment containing greater than 0.005% PCB or volumes greater than 0.05 litres by 2025. In fact, it is the future objective of the Stockholm Convention to remove all equipment containing PCB by 2025 and to dispose of their PCB content by 2028.

7.2.6 Measures for the reduction of POP emissions generated as undesirable by-products (Annex 'C' of the Stockholm Convention, Annex III of the Aarhus Protocol, Annex III of the EU Regulation)

Objective: Identification and reduction of POP compounds generated as undesired by-products.

- *Measurement of emitted POP concentrations by industrial technologies and sources from samples of air, process residue and wastewater, compilation of the measurement plan, coordination and execution of measurements, exploration of international sources*
- *Assessment of the situation of POP emission in an industry based on the measurements, and determination and imposing of necessary measures (isolation, flue gas cleaning , etc.)*
- *Making widely known of the reference documents (BREF) summarizing by sector the best available techniques (BAT) prepared and available for the industry, and, during the environmental impact assessment, expecting and then later checking. whether the industry is using them, according to IPCC guidelines.*

The costs of introducing BATs is charged to the businesses. The cost of measurements shall also be borne by the businesses, except those for which no emission threshold value is determined, because no confirmation of these by measurement is required from the operators.

The measures cover the emission of all five POP compounds regulated by the EU Regulation, including PAHs not governed by the Convention as well.

7.2.7 Measures to reduce atmospheric emissions of POPs

Objective: Identification and reduction of atmospheric POP emissions.

- *Collection of more up-to-date long term data series covering more territorial units for each of the air pollution control measures planned for the future*
- *Determination of a more accurate calculation methodology for dioxins and furans, which can help infer whether or not there are emissions derived from illegal burning in addition to the reported industrial emissions*
- *Development of a data capture methodology for pentachlorobenzene, and calculation of emission data and compilation of an inventory on its basis*
- *Strengthening of cross-border relations and cooperation, and reduction of cross-contamination between countries*

POP compounds released into the atmosphere deposit typically on the relatively quickly settling PM10, so they stay in the atmosphere for a relatively short duration. Nevertheless, the

problem of border situation between countries is a major factor in respect of this pollution, so it would be important to establish close co-operation with neighboring countries.

7.2.8 Measures to reduce releases of POP compounds into surface water, groundwater and soil

Objective: Identification and reduction of POP compounds entering the water and soil.

Specific measures for the reduction of emissions into surface and ground water:

- *Expansion of immission data collection*
- *Carrying out measurements of POP materials on sludge samples from still waters and lakes*
- *Development of a testing program, similar to the Joint Danube Survey (coordinated joint monitoring system, a joint program of monitoring for the Danube river basin, including water quality and quantity, the sediment and river ecosystem), covering POP substances as well*

Specific measures for emissions into soil:

- *Development of monitoring systems combined with the potential emissions of POP compounds and the identification of diffuse and point sources*
- *Expansion of the collection of POP compounds immission data in the framework of the TIM system, adding to the pesticide residues the compounds, which are related to industrial and residential use*

The scientific (MTA SZTAKI) and professional concept and proposal for the extension of the TIM in this direction have been completed, a feasibility study on the enforceability and funding has not yet been made.

- *Development of a single system that contains data for the POP contamination of the ground below surface by the expansion and linking of the TIM, FAVI MIR, FAVI and KÁRINFO systems*

7.2.9 Measures to reduce the POP content of abandoned stocks and waste, and for additional collection and disposal of pesticide residues containing POPs

Objective: Pursue current collection and disposal activities of pesticide residues.

- *Collection of historical POP-containing pesticide residues and packagings*

Due to the lack of funds, collection of historical POP-containing pesticide residues and packagings has not been fully completed: 14 counties were left out of the previous campaigns; Based on the data of the 2003 survey, there might still be about 200 tons of historical pesticide waste in these counties, but this estimate is made uncertain by the voluntary nature of the declaration, and the time that has passed since then.
Reassessment of stocks, completion of the collection campaign and extension to household stocks are priority tasks. Additional measures must be taken to create the resources, and attempts should be made to seek international support. If this is not an option, domestic resources must be provided.

Objective: Further increasing the rate of collection of packaging materials contaminated with pesticides.

- *Investigation of a possible application (advantages and disadvantages) and introduction of a deposit system in the case of plastic pesticide drums and barrels (so as to improve the willingness to collect)*

Collection rate of packaging materials contaminated with pesticides should be increased, given the fact that these are hazardous wastes with high polluting potential.
According to Government Decree No. 442/2012 (XII.29.) on packaging and on waste management activities related to packaging waste, effective from 1 January 2013, it should be ensured that at least 60% of the weight of packaging material placed on the market each year is recovered, and at least 55% is recycled. This general obligation also includes pesticide packaging, but in the case of packaging waste (potentially) contaminated with pesticides, safe performance of the 60% recovery can only take place in hazardous waste incinerators with energy recovery.
The introduction of a deposit on the packaging of pesticides, seeds and fertilizers will help on the one hand the recovery and safe disposal of polluted packaging materials considered hazardous waste, and the recycling of non-contaminated packaging materials on the other. With the introduction of the deposit, the official waste stream monitoring tasks are simplified, because the deposit system will help improve return rates. The contaminated packaging may be disposed of or recovered only in hazardous waste incinerators.
The recovery obligation should be extended to fertilizer sacks, which are also considered hazardous waste.

- *In respect of the compliance with the regulations, improved control of the operation of waste management facilities and equipment, which are involved in the collection, transport and handling of packaging materials contaminated with pesticides, pesticide containers and packaging materials of treated seed*

National authorities (environmental, plant protection) should cooperate in the professional work and official controls

7.2.10 Identification and remediation of contaminated sites

Objective: To identify and remedy sites contaminated with POP compounds.

- *Under the national registration of contaminated sites, the OKKP is responsible to carry out the survey, registration and risk assessment of environmental damages caused by POP substances, and to determine possible remediation activities*
- *Support the research and development of new innovative remediation technologies (fact-finding and intervention) for contaminations caused by POP substances.*
- *Create research and development grants establishing technology solutions for innovative in-situ remediation of POP compounds, and support the application of validated technologies*

7.2.11 Measures to revise the content of the information database

Objective: To ensure compliance with the reporting requirements, to develop the databases containing POP pollutants and to reduce erroneous data entry.

- *To overview the operation of all relevant environmental information systems, to tighten the rules of data entry, to create harmony between the individual systems*

To develop these databases as soon as possible and reduce false data entry to a minimum.

7.2.12 Awareness raising, role of civil organizations, dissemination of knowledge and education (Article 10 of the Stockholm Convention, Article 10 of the EU Regulation)

Objective: To raise the knowledge of the population about POP compounds and to augment environmental awareness.

- *Compilation and publication of easy to understand and technically correct documentation for the population about the characteristics of POPs, their implications and elimination*

The international POP agreements provide among other things for public information, awareness raising, freedom of access to data and informing and training of different target groups (decision-makers, managers, educators, vulnerable social groups, scientists, technicians, and workers).
Considering that the POPs are the most toxic compounds, and that 90% of these enter the body with food, and foods transfer POPs that were released into the environment many years or decades ago, it is justified to prepare for the information activities with special care and to provide adequate resources. Since the subject is rather complex and wide-ranging, well-thought-out and coordinated activities are required with the cooperation of several specialty areas and civil organizations.

7.2.13 Research and development and monitoring

Objective: To develop control programs necessary for the development of legislation on POP substances, and to conduct research.

- *To design (preferably by convening an Inter-Ministerial POP Committee meeting) a joint professional position on the occasional amendments to the Convention, the Protocol and the EU Regulation, on the inclusion of new chemical substances among the regulated substances, as well as on the regulation of certain products if they contain POPs.*
- *To develop programs and mechanisms for the collection of data on the safety of drinking water*
- *To promote research on POP substances already under control and on the so-called suspected POP substances*

The measures relating to the monitoring of emissions and the conduct of tests are formulated in paragraphs 7.2.6 and 7.2.8.

7.3 The enforceability of NIP measures and the total resource requirements of activities

The total resource requirement of measures, action plans, activities designed to reduce emissions and eliminate POPs, included in the NIP, is estimated **a total of about 3 to 4 bn HUF for the next five years** (this is proportional with similar expenses of nearby countries). The largest proportion of these expenses is made up by the investments of industrial companies that will enable them to reduce their emissions of POPs into the environment to a minimum.

This is achieved by applying the best available techniques (BATs) and best environmental practices (BEPs), which was made mandatory by law.

It can be stated on the basis of the existing domestic regulatory framework and enforcement, that a good part of the provisions of the Stockholm Convention have been fulfilled in Hungary.