The International POPs Elimination Project

Fostering Active and Effective Civil Society Participation in Preparations for Implementation of the Stockholm Convention

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Policy Brief: Hazardous waste incinerators and POPs in the Czech Republic

Position document prepared by non-governmental organisations associated with the informal "Coalition for the Stockholm Convention" under coordination of the Czech Ecological Society.

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About the International POPs Elimination Project

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

IPEP has three principal objectives:

- Encourage and enable NGOs in 40 developing and transitional countries to engage in activities that provide concrete and immediate contributions to country efforts in preparing for the implementation of the Stockholm Convention;

- Enhance the skills and knowledge of NGOs to help build their capacity as effective stakeholders in the Convention implementation process;

- Help establish regional and national NGO coordination and capacity in all regions of the world in support of longer term efforts to achieve chemical safety.

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

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

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1. Introduction: The Stockholm Convention and hazardous waste incinerators

The Stockholm Convention concerns, for the present, 12 chemical substances (or their groups) which are generally named persistent organic pollutants. Chemical substances designated "persistent" persist in nature without change for a long time. What is typical for them is that they accumulate in living (usually adipose) tissues, and are highly toxic. On the list of the Stockholm Convention, there are at present 9 substances used as pesticides, polychlorinated biphenyls produced for technical purposes, and 2 groups of substances (polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans) which are formed as unintentional by-products during industrial processes or incineration of chlorinated substances. For substances that are intentionally produced, the Convention prohibits their further production and sets a final date for elimination of their use. In the case of substances classified as unintentional by-products it stipulates the necessity of their minimization, and, if possible, full prevention of their formation. In addition to dioxins, also PCBs and hexachlorobenzene are included into this group, because these substances are also formed as unintentional by-products in various productions or in incineration processes involving chlorine.

There are a number of sources of environmental pollution by dioxins, PCBs and hexachlorobenzene. The Stockholm Convention lists incinerators among their examples in Annex C. These include hazardous waste incinerators and hospital waste incinerators. As documented below, hazardous waste and hospital waste incinerators rank among substantial sources of releases of persistent organic pollutants also in the Czech Republic. Therefore, the National Implementation Plan for Stockholm Convention Implementation should address the problem of these releases.

Although the Stockholm Convention does not explicitly prohibit waste incinerators, it prefers use of technologies which are not connected with formation or releases of persistent organic pollutants. Waste incinerators are not one of such technologies.

Annex C of the Stockholm Convention also contains a basic list of preventive measures which can be fundamentally applied to solving problems connected with the management of hazardous and hospital wastes (see the quoted part of Annex C of the Stockholm Convention).

From Annex C to Stockholm Convention:

A. General prevention measures relating to both best available techniques and best environmental practices
Priority should be given to the consideration of approaches to prevent the formation and release of the chemicals listed in Part I. Useful measures could include:
(a) The use of low-waste technology;
(b) The use of less hazardous substances;
(c) The promotion of the recovery and recycling of waste and of substances generated and used in a process;

(d) Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source;

(e) Good housekeeping and preventive maintenance programmes;

(f) Improvements in waste management with the aim of the cessation of open and other uncontrolled burning of wastes, including the burning of landfill sites. When considering proposals to construct new waste disposal facilities, consideration should be given to alternatives such as activities to minimize the generation of municipal and medical waste, including resource recovery, reuse, recycling, waste separation, and promoting products that generate less waste. Under this approach, public health concerns should be carefully considered;

(g) Minimization of these chemicals as contaminants in products;

(h) Avoiding elemental chlorine or chemicals generating elemental chlorine for bleaching.

2. Hazardous and hospital waste incinerators in the Czech Republic

At the end of 1980s and at the beginning of 1990s, a number of hazardous waste incinerators have been built in the Czech Republic, including hospital waste incinerators having a projected theoretical capacity of 23 thousand tonnes of waste produced by hospitals. There were 220 such incinerators were in operation in 1992. Most of them were only equipped with a basic air pollution control device that removes dust particles and some of them did not even have the dust filter. A high proportion of these incinerators were closed down thanks to stricter requirements on air protection, established by the first Act on Air Protection adopted in 1991. In spite of that about 90 - 100 hazardous and medical waste incinerators were still in operation in the second half of the 1990s.[1]

With a few exceptions, none of these incinerators was able to cope with the requirement to meet the European limit on dioxin emission into the air on the level of 0.1 ng I-TEQ/m^3, established in 2000 by a new decree of the Ministry of the Environment of the Czech Republic, which entered into force on January 1, 2003. Because of that, the incinerators lobby struggled for postponing the effect of this limit to a later date. Finally, it succeeded in delaying the new limit of dioxin emissions for a large part of incinerators until January 1, 2005. In spite of that, the number of out-of-date hazardous waste incinerators has been decreasing. Since 2005, operation of 29 hazardous and hospital waste incinerators is permitted.[2] However, four of them are out of operation at present, and several further incinerators are in trial operation because they must prove efficiency of newly installed air protection devices (filters removing dioxins, continual measurements of emissions etc.).

Tables Nos. 1 and 2 document the amounts of wastes disposed of in hazardous and hospital waste incinerators, relative to the total amount of all wastes which were disposed of.

In 2001 to 2003, approximately 850 000 tonnes of waste was incinerated or energetically utilised in the Czech Republic (see Table No. 1).

[1] According to the statistical yearbook of the Ministry of the Environment (1996), 90 waste incinerators were registered in the Czech Republic in 1996. 40 of them did not meet the emission limits. The total capacity of these incinerators was 222 500 tonnes per year. The Czech Environmental Inspection Agency registered over 100 waste incineration facilities in 1997.

[2] In 2003 this number was still 52 incinerators.

Table No. 1: Waste disposal in the Czech Republic in 2001 to 2003 (in tonnes)

Method of waste disposal	2001	2002	2003
Use similarly as a fuel, incineration with utilisation of heat	704411	401209	545113
Incineration on land	125157	401669	325078
Physical and chemical methods	4439750	909391	800593
Biological methods	4439750	909391	800593
Landfilling	10484774	7731062	7231137
Use as a secondary raw material	13059980	14850206	14621551
Storing	1786275	30651	8230
Another method of utilisation/disposal	16553	1754602	2061164
In total	30839645	32037902	30936108

Source: VÚV T.G.M. - CeHo (T. G. Masaryk Water Research Institute - Centre for Waste Management)

From this amount, less than 10 % was incinerated in hazardous and hospital waste incinerators (see Table No. 2).

Table No. 2: The amount of waste incinerated in hazardous and hospital waste incinerators in 1999 to 2003 in thousand tonnes.

Year	1999	2000	2001	2002	2003
Amount	42	43		61	76

Source: Czech Statistical Office

3.0 Hazardous waste incinerators and POPs releases

According to the National Inventory of POPs, incinerators contribute to the total emissions of POPs into the air by 12.73 % in the case of PCBs and 2.63 % in the case of PCDD/Fs. However, the proportion on emissions of PCDD/Fs is being re-evaluated, and, according to verbal communication of a representative of the Czech Hydro-Meteorological Institute (ČHMÚ) in a meeting of the expert committee for the preparation of NIP in December 2003, it is at least about 10 %. The updated emission inventory of POPs has not yet been published. According to the emission inventory of 1998, the emissions from incinerators were as follows:

Table No. 3: Official emission inventory of POPs, Czech Republic, 1998

Source	***PCBs [g/year]***	***PCDD/Fs [g TEQ/year]***
Municipal	1050	0.09
Hospital and industrial	11270	7.92
Used oils	470	1.3
Incinerators total	12790	9.3

Data on total air emissions of HCB from hazardous waste incinerators are not known. Data on its releases into the other environmental components are not known either.

The following Table No. 4 comprises data on total emissions of PCBs and PCDD/Fs in 2001 to 2003.

Table No. 4: POPs emissions into atmosphere in 2001 to 2003

YEAR	***PCBs [kg/year]***	***PCDD/Fs [g TEQ/year]***
2001	96.1	190.6
2002	82.5	177.3
2003	86.6	178.3

Source: TOCOEN Report. No. 252, Brno, January 2004

The potentially high proportion of PCB emissions accounted for by hazardous and hospital waste incinerators is documented by comparing emission factors for this group of substances from the emission inventory of POPs into the air prepared as a source material for the National Implementation Plan for Stockholm Convention Implementation. This comparison is presented in Table No. 5.

Table No. 5: Examples of Air Emission factors for PCBs releases used in the Czech POPs emissions inventory [3]

Release source category	SNAP	PCBs emission factors for air releases [mg.t^{-1}]
Ore sintering plants	30301	1.18280
Steel smelting	40203	0.00000
Steelworks	40207	0
Cast iron production	30303	0.13590
Coke production	40201	0
Cement production	30311	0
Leaded glass production	30317	0
Municipal waste incineration	90201	5.8000
Hazardous waste incineration	90202	331.3050
Medical waste incineration	90207	15.0250
Sewage sludge incineration	90205	5.4000

According to measurements of dioxin content in ash, slag, and fly ash, authors of the study "Toxic waste from incinerators - a dangerous neighbour" tried to estimate their total amount produced by hazardous waste incinerators:

"In the incinerator in Lysá nad Labem, the concentration of dioxins in front of the filter was measured, and it was 9.515 ng TEQ/m^3. This level corresponds to an emission factor of 145 000 ng TEQ/t of waste. In the case of worse incinerators, this emission factor can be significantly higher (ca 20-times). An estimate of the total production of dioxins by hazardous waste incinerators ranges from7.5 to 15 g TEQ/year. The calculation carried out according to the manual of UNEP (UNEP 2003) would result in the value of 2.5 to 41 g TEQ/year. However, this manual does not take into account the high concentrations of dioxins in fly ash measured in specific cases from the Czech Republic. Instead, its authors based their calculation on their experience with technologically more advanced types of incinerators from Germany.

The content of dioxins in slag produced by incinerators in the Czech Republic is in the order of magnitude of tenths of grams to several grams TEQ."

Due to the absence of measurements, it is impossible to carry out similar estimates for polychlorinated biphenyls and hexachlorobenzene.

Some hazardous waste incinerators in the Czech Republic also produce waste waters from flue gases treatment. The content of POPs in these waters has not yet been measured.

[3] Holoubek, I. et al., 2004. Návrh národního implementačního plánu pro implementaci Stockholmské úmluvy v České republice. (Draft National Implementation Plan for Stockholm Convention Implementation in the Czech Republic). TOCOEN Report No. 252, Brno, January 2004.

3.1 The problem of management of solid wastes from hazardous and hospital waste incinerators

A study of the Arnika Association "Toxic waste from incinerators - a dangerous neighbour" showed selected cases of management of residues from incinerators in the Czech Republic. The report illustrated that movement of these wastes is not sufficiently controlled and that there do not exist sufficient measures preventing spreading of dioxins into the environment.

Fly ashes from incinerators are still used in a number of construction materials and in various reclamation mixtures. Certificates on them are in contradiction with new technical instructions for assessment of conformity of construction products according to Government Order No. 163/2002 Coll. which sets technical requirements on selected construction products. Because of that, they should be re-evaluated. The certificates should be also in accordance with Regulation of the European Parliament and Council No. 850/2004 on persistent organic pollutants. According to this regulation, it will be necessary to decontaminate solid hazardous wastes from incinerators exceeding certain limit values, before their disposal to a hazardous waste landfill.

The Draft National Implementation Plan for Stockholm Convention Implementation states that even landfilling untreated fly ashes from incinerators represents a risk for the future and creates new burdens that will have to be decontaminated in the future.

4.0 Alternatives to incineration of hazardous wastes

A broad spectrum of hazardous wastes ends up in hazardous waste incinerators. In the future, the best solution is to avoid, to the maximum possible extent, use of substances which, in wastes, represent serious risks for human health and the environment. Adoption of a stricter system for control of marketed substances, known under abbreviation REACH, could help that.

For a high proportion of currently produced hazardous wastes, there exist other, and often more environmentally sound, methods of disposal, either recycling or elimination of their hazardous properties by other technologies. If certain technologies are used, new toxic substances are not produced in such quantities as in the case of incineration. It is not possible to briefly describe all these methods in the limited space. Because of that, we will mention at least solutions for some groups of wastes which end up, for example, in incinerators in Ostrava and Lysá nad Labem, and we will show possibilities of other solutions of their disposal here.

4.1 Hospital wastes

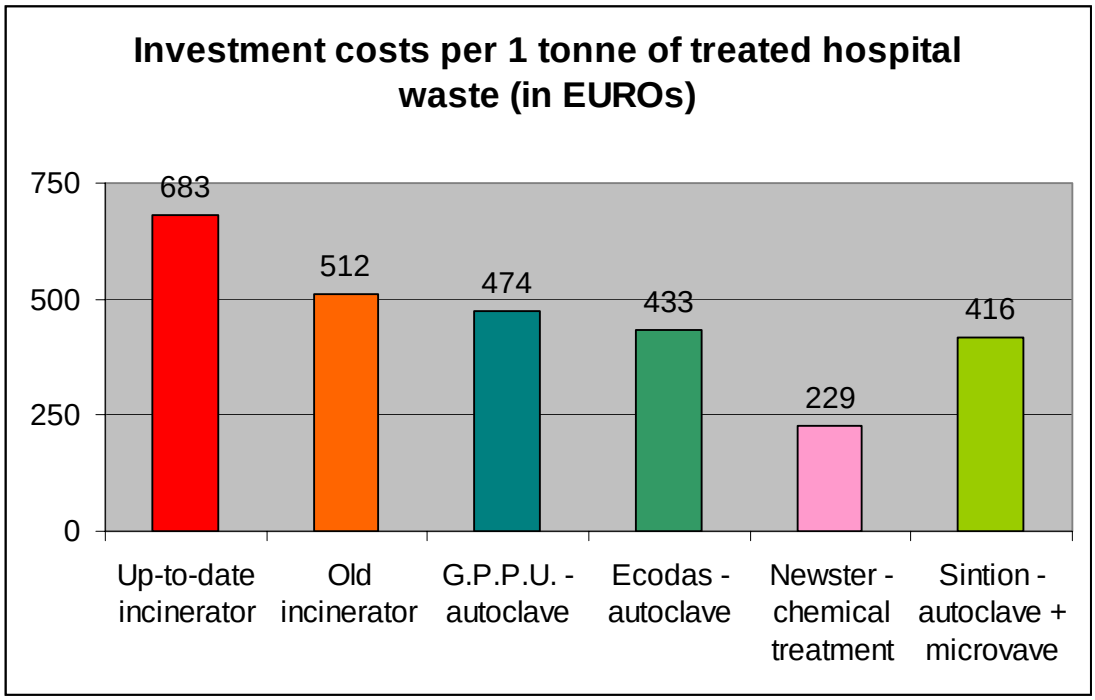
Hospital wastes represent a high proportion of wastes which end up in the incinerator in Lysá nad Labem. In 2002, this was 80.5 tonnes from 1275 tonnes of incinerated waste. In 2003, this was already 466 tonnes from 3257 tonnes of wastes treated by the incinerator.

Together with the international network Health Care Without Harm, the Arnika Association issued the Czech translation of the report "Non-combustion Technologies for Treatment of Hospital Wastes" describing technologies available on the European market and representing alternatives to incineration of hospital wastes. These are, for example, technologies using hot air or hot steam, or, optionally, short-wave electromagnetic radiation (used also in microwave ovens) in order to eliminate pathogens and thus to rid the waste of infectivity. These technologies show also comparable efficiency concerning reduction of volume of the waste, because the incinerators also produce, by incineration of about 1 tonne of hospital waste, up to 400 kg of ash, slag and fly ash containing toxic substances.

If the percentage of waste separation increased in our hospitals, as required by the law, this would decrease the total amount of waste classified as hazardous because of its infectivity. Infectious are only, for example, bandages, used infusion sets, hypodermic syringes and other similar medical materials and tools. However, paper waste, plastic packaging of drinks and remains of foodstuffs out of infectious department, and a whole spectrum of wastes similar to the ones produced also in households, are not infectious. It is estimated that infectious waste forms, at the most, 17 % of all wastes produced by the health services.

A much lower capacity of facilities disinfecting hospital waste and decreasing its volume would then be sufficient for treatment of infectious waste after separation of the non-infectious component (which can be recycled similarly as in the case of municipal waste). The waste would then be landfilled, similarly as the waste from incinerators, but it would not contain toxic substances produced by its incineration.

For the purpose of documentation only: One of possible facilities for treatment of hospital waste includes autoclaves supplied by the company Ecodas and operated in France, Poland or Hungary. The technological part of one such facility in Poland having a capacity of 300 tonnes per year cost 130 000 EUR (~ 4,25 million CZK). In contrast, the Ministry of Health proposed to allocate 50 million CZK from the state budget for support of a selected incinerator in the Region of Central Bohemia in order to complete its technology by filters and other devices to meet standards of the European Union. The following graph shows investment costs in EUR per one tonne of treated waste (installed capacity) for various facilities for the treatment of hospital wastes. With the exception of microwave technology of the company Meteka, incinerators are the most expensive solution. Operating costs of incinerators are 3 to 4-times higher in comparison with autoclaves.



4.2 Waste oils

Waste oils are another kind of waste that should be treated by alternative methods. One source of our information on the possibilities of their treatment is the study Proposal of the National Plan of Hazardous Waste Management prepared in 2001 by the company DHV for the Ministry of the Environment of the Czech Republic.

Waste oils can be treated and reclaimed. They can be processed into industrial oils or machining emulsions. Reclamation of transformer oils was carried out in 2001 by two mobile reclamation units of the company ORGREZ. The treated oils were reused as transformer oils. This is practically a non-waste technology during which no losses of oil occur.

In the middle of 2002, operation of a reclamation unit of the company B+S Reclaim with the capacity of 30 000 tonnes of waste oil per year started. In addition to this reclamation unit, two reclamation units in the area of north Moravia are planned to be built, namely a reclamation unit of the company TRANSKOREKTA having capacity of 25 to 30 000 tonnes per year, and further a reclamation unit of the company DETOX (having lower capacity).

Incineration of waste oils should not be necessary in the future. The incineration of waste oils is not also the goal of the European Union strategic plans for this waste.

The incinerator in Lysá nad Labem incinerated over 31.5 tonnes of various waste oils in 2002, and over 45.5 tonnes in 2003.

4.3 Contaminated soils

Of the various hazardous wastes which end up in incinerators, contaminated soil or even masonry from knocked down buildings seems to be most senseless. According to a press release of the Region of Central Bohemia[4], for example soil from Milovice and a concrete floor from Mratín, contaminated by polychlorinated biphenyls, were decontaminated this way. They were incinerated in the SPOVO Ostrava hazardous waste incinerator. According to one of the scenarios, also masonry from buildings contaminated by dioxins from Spolana Neratovice should end up in the same incinerator.

The incinerator in Lysá nad Labem incinerated almost 700 tonnes of contaminated soils in 2003. This is one fifth of the annual capacity of the incinerator.

Through incineration of contaminated soils, the amount of wastes produced by incinerators themselves (ash, slag, fly ash) increases, and, in the case of incineration of soils containing persistent organic pollutants, the efficiency of their decomposition is not monitored.

A large number of alternative treatment methods for contaminated soils exist not taking into consideration landfilling. Physical, chemical and biological methods of soil treatment are widespread. Specifically, in the case of treatment of masonry and soils contaminated by dioxins in Spolana Neratovice, one of non-combustion technologies - BCD - has been chosen. The technology called Gas Phase Chemical Reduction (GPCR), which should be used for treatment of the old environmental burden in Chemko Strážské resulting from former production of polychlorinated biphenyls, can be considered as a still more suitable method. From the point of view of the Stockholm Convention, preferential use of these methods is highly desirable, as a matter of course under conditions under which further POPs are not formed.

Bioremediation of PCBs from contaminated soils is described in one of the chapters of "Introductory National Inventory of POPs in the Czech Republic", prepared by an expert team. This is a process which could be used in combination with the above-mentioned non-combustion technologies for decontamination of soils contaminated by POPs.

[4] Press release of the Region of Central Bohemia of October 5, 2004