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2012 National Implementation Plan Including National Action Plan for the Stockholm Convention on Persistent Organic Pollutants and for the EU Regulation on Persistent Organic Pollutants

Austria

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Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW), Unit VI/5,
Chemicals Policy
Stubenbastei 5, 1010 Vienna

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Overall Coordination:
Dr. Helga Schrott,
DI Barbara Perthen-Palmisano
(both BMLFUW, Unit VI/5,
DI Susanna Eberhartinger-Tafill
(BMLFUW, Unit V/1)

Coordination NAP:
Dr. Brigitte Winter (EAA),
DI Susanna Eberhartinger-Tafill
(BMLFUW, Unit V/1)

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Foreword

Protection from dangerous chemicals

In the field of environmental protection, Austria is advocating ambitious goals. This is why we signed the multilateral environmental Stockholm Convention on Persistent Organic Pollutants (POPs), and ratified it as early as in 2002. Since 2009, its scope was extended from originally 12 to 22 substances. The Convention aims at the optimal protection of human health and the environment from these dangerous and persistent chemicals.

Austria submits the present 2012 National Implementation Plan, including the National Action Plan, to the 6th Conference of the Parties to this Convention, thereby fulfilling our obligations resulting from the Stockholm Convention, but also from relevant EU Regulations and from the POPs Protocol to the regional Geneva Convention on Long-Range Transboundary Air Pollution.

The Implementation Plan and the Action Plan both outline the measures that Austria has taken since 2004 in order to honour these international and European commitments or that Austria is going to take with regard to the newly-included substances. The set of measures concerns the entire range of POPs present in products, industrial emissions, water bodies, waste, contaminated sites, pesticides, food and feedstuffs all the way to measuring and monitoring. All bodies responsible in Austria cooperate in a coordinated and committed manner in order to optimally ensure the protection of the population and the environment on the basis of the precautionary principle.

The measures include pollutant monitoring in Alpine regions and grassland areas, but also the reduction of dioxin load in urban regions as e.g. caused by residential burning. It is of utmost importance to control compliance with POP bans and restrictions and to reduce pollutant input caused by recycling. The aim is to establish the use of the best available technique as a yardstick criterion. Also subsidizations have the potential of creating important leverage in order to curb the production of POP. In her cooperation with developing countries - where dangerous chemicals are a frequent matter of concern - Austria strives for the enhanced provision of technical assistance.

The present National Implementation Plan including the Action Plan for the prevention and reduction of POP is in line with our commitment to the precautionary protection of human health and the environment.

Nikolaus Berlakovich
Federal Minister for Environment

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Introduction

Persistent Organic Pollutants (POPs) are a group of chemicals exhibiting specific hazardous properties: They are poorly degradable in the environment and bioaccumulate in organisms. Most of all, almost all of these chemicals are toxic and may cause harm to human health and to the environment. Due to their properties, these substances spread via the atmosphere and waterways (oceans, rivers) as well as via migratory species and are found far off their original utilization and production sites in remote areas, e.g. the Arctic or in mountainous regions such as the Alps, in concentrations which are prone to affecting animals and plants.

As efficient measures to combat these pollutants mainly require international action, Austria has been actively involved in the further development of the Stockholm Convention on Persistent Organic Pollutants. Currently, national measures focus, on the one hand, on Alpine region and grassland monitoring and, on the other hand, on the monitoring of the reduction of dioxin load also in urban regions (e.g. caused by domestic fuel) as well as on the monitoring of compliance with bans, restrictions and on the reduction of pollutant input in the area of recycling. As regards U-POPs, the regular monitoring of conformity with the Best Available Technique (BAT) as well as generally enhanced information of the general public on POPs is strived for. In addition, stakeholders aim at identifying and making full use of subsidization measures in order to contribute to POP minimization.

The Stockholm Convention on Persistent Organic Pollutants entered into force in 2004. Austria signed the Convention in 2001 and ratified it in August 2002 (Federal Law Gazette III, No 158/2004). Currently, the number of the Parties to the Convention stands at 177. On the occasion of the 4th and 5th Conferences of the Parties, respectively, in May 2009 and April 2011, 10 substances were included in the Convention in its Annexes A (Elimination), B (Restriction) and C (POPs from unintentional production, U-POPs for short) by virtue of Decisions SC-4/10 through SC-4/18 and SC-5/3. Since the most recent inclusions, the Convention bans or restricts, pursuant to Article 3, the production, use and trade of/with 22 hazardous chemicals. Similarly - to the extent that no general or specific derogations exist – export of waste is prohibited, except for the purpose of environmentally sound disposal. The first amendment for including the “new” POPs, as they are called, entered into force for Austria pursuant to Article 22 Para 3 Subpara c on August 26, 2010; pursuant to Article 7 Para 1 Subpara b, the revised National Implementation Plan must be submitted by **August 27, 2012.** The second amendment will enter into force on October 27, 2012 and should thus be taken into consideration as well.

The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management is the contact point for matters pertaining to the Convention.

Austria shall provide a revised National Implementation Plan (NIP for short) with regard to the “new POPs”, as they are called, and/or outline the implementation of the measures contained in the current NIP and work out strategies and plans for taking further necessary measures[1]. With regard to unintentionally formed

[1] The guideline on the preparation of National Implementation Plans has been considered in this context.

substances, all Parties to the Convention shall draw up an - also updated - National Action Plan (NAP for short) as part of the revised National Implementation Plan for reducing and eliminating these by-products.

Austria is also a Party to the UNECE Convention on Long-Range Transboundary Air Pollution (LRTAP) the POP protocol of which has laid down rules for 23 substances since its overall revision in 2009. The Protocol obliges the Parties to the Convention to work out strategies and plans in order to comply with the obligations contained in the Protocol.

The Stockholm Convention as well as the POP Protocol have been implemented by way of European Regulation (EC) No 850/2004. The Regulation is updated on a regular basis. The European Union also being a Party to the Convention, it must, like all the other Parties, draw up an implementation plan. In 2011, a first revised draft Union Implementation Plan (EU Implementation Plan, EUIP) was submitted to the member states by the European Commission. Its contents have been considered to the extent possible.

The document at hand is made up of the revised National Implementation Plan and of the updated National Action Plan. As the Convention provides for the participation of all stakeholders in the preparation of the revised National Implementation Plan, content-related preliminary works took place in the framework of the national POP/PBT group which had been set up in BMLFUW, the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. Especially the Federal provinces were asked for relevant data. Until June 1, 2012, the consultation draft had been put up for Internet consultation for six weeks, offering the possibility to make comments and propose amendments. Further on, these comments were considered when working out the final version of the revised National Implementation Plan including the updated National Action Plan. The final version of the National Implementation Plan 2012 including the National Action Plan was endorsed by the Austrian Federal Government on the 14th of August 2012. Consequently it is submitted in German and English language to the Secretariat of the Stockholm Convention (in conformity with the respective obligations under the Convention) as well as to the European Commission.

1 Country baseline

In the field of environment, Austria is advocating ambitious goals. Austria has set up an e-government system which is to accommodate challenges such as sustainability, international cooperation and ongoing innovation. This also includes RIS, the Austrian Legal Information System, which is provided by the public sector and can be defined as the basic information on the Austrian legal system which is required with a view to democracy and the rule of law. The consultation draft of the revised National Implementation Plan including the updated National Action Plan had been put up for Internet consultation on the website of BMLFUW, the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management where it will be provided to the general public as a download.

Due to the country's federal structure, the tasks to be performed by state authorities are distributed among the nine Federal Austrian provinces and the government which is responsible for the entire country. This distribution of tasks covers legislation and enforcement of laws as well as financial-economy functions. In this context, the Federal provinces assume Federal-level administrative tasks by way of indirect Federal administration.

The Federal government's as well as the Federal provinces' specific competencies with regard to legislation and enforcement are set forth in the articles pertaining to legal competency which are laid down by the Federal Constitutional Law Act. Among other things, they stipulate if it is the Federal government and/or the Federal provinces which is/are responsible for legislation and/or enforcement. Accordingly, the Chemicals Act, the Water Law Act and the Waste Management Act are enforced by way of indirect Federal administration, while the 2011 Plant Protection Products Act is enforced by way of direct Federal administration.

As regards the country's geographical location, we would like to refer to the relevant chapters in the 2008 NIP. 20% of the Alps being located on Austrian territory, large parts of Austria are constituted by mountainous areas. Featuring a height of 3,798 m, the Grossglockner is the country's highest mountain. The Sonnblick observatory,

which is located at more than 3,000 m, enables monitoring by way of measurements of extremely weak concentrations of trace substances within a pure-air environment. In Austria, two thirds of the utilized agricultural area are used as grassland. Cultivating these areas in a way that is in line with the requirements of the respective site is of utmost importance. In order to monitor POPs, the extensively-used grassland areas were selected as permanent soil observation plots which exhibited no potential emission sources in their direct vicinity.

1.1 Policy framework

Since Austria's accession to the European Union on January 1, 1995, Austrian environmental policy including the protection of the environment and of human health from hazardous chemicals has been largely shaped by European environmental policy, but also by international chemicals policy. In this regard, the 2011 International Year of Chemistry provided special impulses, especially as regards the integration of POP-related conventions into the framework of the Global Chemistry Strategy SAICM and, in particular, the cooperation and coordination with the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals[2] and the Basel Convention on the Control of Transboundary Movements of Dangerous Wastes and Their Disposal[3].

The Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) has assumed a leading role in dealing with matters pertaining to chemicals. According to the current version of the 1996 Chemicals Act[4], the Federal Minister for Agriculture, Forestry, Environment and Water Management acts as the authority responsible for the EU POP Regulation 850/2004/EC on Persistent Organic Pollutants; in the field of unintentionally produced POPs (U-POPs), there are provisions setting forth mutual agreement. In the area of waste management, BMLFUW is responsible for the implementation of waste-related EU rules and is also the contact point for the Basel Convention on the Control of Transboundary Movements of Dangerous Wastes and Their Disposal.

As regards pesticides, BMLFUW relies, for plant protection products[5], on the support of BAES (Federal Austrian Office for Food Safety) and AGES (Austrian Agency for Health and Safety), and, for biocidal products[6], on the support of Umweltbundesamt GmbH, the Environment Agency Austria. In the area of water management, the POP focus is on the quality of surface and ground water. The Federal Ministry of Labor, Social Affairs and Consumer Protection (BMASK) plays a central role in health and safety at the workplace and in the use of chemicals at the workplace. The Federal Ministry of Economy, Family and Youth (BMWFJ) and BMLFUW are jointly

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2 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals (FLG (Federal Law Gazette) III No 67/2005)

3 Basel Convention on the Control of Transboundary Movements of Dangerous Wastes and Their Disposal (FLG No 229/1993, last amended by FLG III No 46/2010, last official announcement of scope of application FLG III No 77/2006 and FLG III No 119/2010)

4 Federal Act on the Protection of Humans and the Environment from Dangerous Chemical Substances (1996 Chemicals Act - ChemG 1996), FLG I No 53/1997, last amended by FLG I No 7/2012;

5 Regulation 1107/09 (EC) of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 70/117/EEC and 91/414/EEC; 2011 PMG, the 2011 Plant Protection Products Act, FLG 10/2011; Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides

6 Biocidal Products Act, FLG I No 15/2000 and EU Biocides Regulation which is to enter into force on Jan 1, 2013.

responsible for the implementation of Directive 2010/75/EU[7] on industrial emissions (Integrated Pollution Prevention and Control). Starting from January 7, 2011, its transposition into national law must be finalized within two years. This Directive converges seven Directives, among them the IPPC (Integrated Pollution Prevention and Control) Directive, three Directives on titanium oxide as well as the Directives on Volatile Organic Compounds (VOCs for short), waste incineration and large combustion plants. The transitional periods for certain existing industrial plants will expire by 2016. The primary aim is to encourage the use of Best Available Techniques (BATs for short) by e.g. using them in the course of authorization procedures. Operators are obliged to comply with precautionary measures designed to prevent pollution, to use the best available techniques as well as to prevent pollution and waste. Only in exceptional cases can the authorities lay down less stringent emission limit values, for example on the account of geographical location and local environmental conditions of the concerned site. Austria is striving for compliance with stringent requirements at a national level and to do the respective enforcement.

On agency level, Umweltbundesamt (Environment Agency Austria – EAA) monitors environmental quality and reports regularly on the state of the environment in Austria. EAA is a center of practical and scientific expertise on environmental issues. EAA prepares studies on chemicals in different environmental areas, but also provides support as regards questions concerning the REACH (see FN 17) Regulation and the CLP Regulation (EC) No 1272/2008 on the Classification, Labelling and Packaging of Substances and Mixtures[8] (REACH Helpdesk); experts also work on the preparation of BREFs (reference documents on Best Available Techniques) in the framework of the EU IPCC process. EAA is home to laboratories used for analysing environmental samples, among them the renowned dioxin laboratory.

As regards the official control of foodstuffs, the Federal Ministry of Health (BMG) draws on the support of the Agency for Health and Food Safety (AGES) which carries out examinations (analyses) and respective risk assessments of goods which are subject to LMSVG, the Food Safety and Consumer Protection Act (food, drinking water, cosmetics and articles of daily use). Together with the Provincial governors who act in the framework of indirect Federal administration and the foodstuff inspection institutions authorized according to LMSVG (FLG I No 13/2006, last amended by Federal Act FLG I No. 95/2010; AGES and three regional institutions), BMG controls and monitors goods under LMSVG with a view to protecting the health of consumers from delusion also with regard to contaminants. Official food inspection is organized in a tripartite fashion. The enforcement of controls falls within the purview of the Provincial governors, while AGES and the regional institutions are responsible for sample examination and assessment. BMG enacts sample plans by considering the agency's suggestions and after consulting with the Federal provinces; the sample plan also provides for examinations for contaminants.

Among other things, BAES and AGES deal with the approval of plant protection products the placing on the market of which is monitored by BAES. The Austrian Federal Office for Safety in Healthcare (supported by the AGES agency for Austrian Medicines and Medical Products) is responsible for the first registration and

7 Official Journal L 334 of 17.12.2010, p. 17.
8 Official Journal L 353 of 31.12.2008, p. 1.

monitoring of medicines and medical products already circulating on the market. The relevant register is kept at the Federal Office for Safety in Healthcare.

With regard to capacity-building and technical assistance, the Federal Foreign Ministry (BMeiA) is responsible for preparing relevant general guidelines and develops, jointly with BMLFUW as well as with non-governmental organizations (NGOs), the Strategic Guideline "Environment & Development". A focus of activity in this respect is the implementation of multilateral environmental agreements. A thematic field of action is constituted by sustainable chemicals and waste management (chemical safety; awareness-raising; clean production in agriculture, trade and industry; sustainable waste management).

The Austrian Development Agency (ADA) bears the main responsibility for the practical implementation of Austria's development policy for which BMeiA is responsible. Austrian Development Cooperation (Oesterreichische Entwicklungszusammenarbeit, OEZA) pursues its goals - to reduce poverty, secure peace and preserve the environment - in an international context. Policies and agenda-based provisions are coordinated with the European Union and also in international bodies (EU, UN, OECD, international financial institutions). Important cornerstones of bilateral and multilateral development cooperation are constituted by the Millennium Development Goals (MDG) and the Paris Declaration. In this framework, it evaluates projects submitted by development organizations and decides on the allocation of funds earmarked for development cooperation in the Austrian budget.

1.2 Legal background

1.2.1 International matters – Multilateral and regional agreements and strategies

For general information on the Stockholm Convention on POPs as well as on the POP Protocol of the Geneva Convention on Long-Range Transboundary Air Pollution, please see the 2008 NIP.

The **Stockholm Convention on Persistent Organic Pollutants** **(POPs)** lays down criteria and procedures establishing which additional substances are eligible for being included in the Annexes. For adding them, the following criteria must be met: persistence; bioaccumulation in the human body, animals or plants; their potential for long-range environmental transport via air, water or migratory species; and their adverse effects on human health or the environment. The scientific subsidiary body pursuant to Article 19 of the Convention, the Persistent Organic Pollutants Review Committee (POPRC for short), was established by the Parties to the Convention[9] in

[9] SC-1/7: Establishment of the Persistent Organic Pollutants Review Committee
1. The Conference of the Parties,
2. Decides to establish pursuant to paragraph 6 of Article 19 of the Convention a subsidiary body to be called the Persistent Organic Pollutants Review Committee for the purposes of performing the functions assigned to that Committee by the Convention;
3. Adopts the terms of reference of the Persistent Organic Pollutants Review Committee contained in the annex to the present decision.

order to submit suggestions to the Conferences of the Parties for including substances in the Annexes. On the occasion of the 4th and 5th Conferences of the Parties, respectively, in May 2009 and April 2011, Decisions SC-4/10 through SC-4/18 and SC-5/3 provided for an extension of the Convention by 10 substances in Annexes A (Elimination), B (Restriction) and C (POPs from unintentional production, U-POPs for short). Furthermore, POPRC has, on the occasion of its 7th meeting in 2011, endorsed the inclusion of hexabromocyclododecane (HBCDD) in the Convention and is conducting further examination work as regards the recommendation concerning the inclusion of chlorinated naphthalenes, hexachlorobutadiene (HCBD), pentachlorophenol and short-chained chlorinated paraffins, SCCPs for short. Annex G (Arbitration and Conciliation Procedures)[10] to the Stockholm Convention on POPs was officially announced in Austria in 2008.

The **Geneva Convention on Long-Range Transboundary Air Pollution** of 1983 was the first regional convention aiming at limiting air pollution. In the framework of UN ECE (LRTAP – currently: 51 Parties) it was extended by 8 protocols. One of these protocols is the POP Protocol which currently has 29 Parties. This Protocol was revised by Decision 2009/1 in December 2011 at the 27th meeting of the Parties to the Convention ("Executive Body") in order to enable the inclusion of new substances. The following substances were added to the Protocol's Annexes: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, pentabromodiphenyl ether, PFOS, polychlorinated naphthalenes and short-chained chlorinated paraffins. The revised Protocol and the amended Annexes will enter into force 90 days after ratification of the Decisions by two-thirds of the 29 member states.

The aim of the UNECE Protocol is to abandon the use and production of POPs, with several exemptions. Accordingly, the recycling of products containing pentabromodiphenyl ether and octabromodiphenyl ether will be admissible also in the future. This derogation is to be reviewed in 2013. Derogations with regard to the use and production of perfluorooctane sulfonate and short-chained chlorinated paraffins will be subject to revision in 2015. In addition, the limit values for dioxin and furan emissions stemming from new industrial plants will be made more stringent. The upper ceiling was reduced from 0.5 to 0.1 nanograms per cubic meter. Polychlorinated-biphenyl emissions will have to be registered in the future. Furthermore, the Parties to the Convention have adopted state-of-the-art guidelines for the best available technique for monitoring POP emissions.

The following substances are listed in the multilateral and regional agreements as well as in the POP Regulation (EC) 850/2004:

[10] Official announcement by the Austrian Federal Chancellor concerning the adoption of a new Annex G to the Stockholm Convention on Persistent Organic Pollutants, Federal Law Gazette No 1/2008, January 10, 2008

Table 1: POPs listed in the Stockholm Convention and in the UNECE Protocol, including the additional POPs proposed by the Parties so far.

	CAS No.	EC No.	Listed in	
Intentionally produced POPs (Annexes A, B – Stockholm Convention; Annex I,II – POP Protocol)			**Stockholm Convention**	**POP Protocol**
Aldrin	309-00-2	206-215-8	Yes	Yes
Alpha-hexachlorocyclohexane (α-HCH)	319-84-6		Yes	Yes
Beta-hexachlorocyclohexane (β-HCH)	319-85-7		Yes	Yes
Chlordane	57-74-9	200-349-0	Yes	Yes
Chlordecone	143-50-0	205-601-3	Yes	Yes
Dieldrin	60-57-1	200-484-5	Yes	Yes
Endosulfan			Yes	No
Endrin	72-20-8	200-775-7	Yes	Yes
Heptachlor	76-44-8	200-962-3	Yes	Yes
Hexabromobiphenyl (HBB)	36355-01-8	252-994-2	Yes	Yes
Hexabromodiphenyl ether and heptabromodiphenyl ether (octa BDE)			Yes, with certain exemptions	Yes
Hexachlorobenzene	118-74-1	200-273-9	Yes	Yes
Lindane (γ-HCH)	58-89-9	200-401-2	Yes, with certain exemptions	Yes
Mirex	2385-85-5	219-196-6	Yes	Yes
Pentachlorobenzene	608-93-5		Yes	Yes
Polychlorinated biphenyls (PCBs)	1336-36-3 and others	215-648-1 and others	Yes, with certain exemptions	Yes, with certain exemptions
Tetrabromodiphenyl ether and pentabromodiphenyl ether (penta BDE)			Yes, with certain exemptions	Yes
Toxaphene	8001-35-2	232-283-3		
DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane)	50-29-3	200-024-3	Restricted to certain uses	Yes
Perfluorooctane sulfonic acid, its salts and perfluorooctanesulfonyl fluoride (PFOS)	1763-23-1 307-35-7		Restricted to certain uses	Yes
Polychlorinated naphthalenes			No	Yes
Short-chained chlorinated paraffins			No	Yes, with certain exemptions

Unintentionally produced POPs (Annex C – Stockholm Convention; Annex III – POP Protocol)				
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs)			Yes	Yes
Hexachlorobenzene (HCB)	118-74-1		Yes	Yes
Polychlorinated biphenyls (PCBs)			Yes	No
Polycyclic aromatic hydrocarbons (PAHs) [1]			No	Yes

Substances not yet listed in either of the POP agreements, but formally proposed by a Party to be included in Annexes to the POP agreements for a ban or for restrictions				
Dicofol			No	Yes
Endosulfan			Already included	Yes
Hexachlorobutadiene (HCBD)	87-68-3		Yes (EU)	Already included
Hexabromocyclododecane (HBCDD)			Yes (Norway)	Yes
Pentachlorophenol			Yes (EU)	Yes
Polychlorinated naphthalenes (a group of substances containing between one and eight chlorine atoms) (PCNs)	-		Yes (EU)	Already included
SCCP-Short-chained chlorinated paraffins (chlorinated alcanes, C10-C13) (SCCPs)			Yes (EU)	Already included
Trifluralin			No	Yes

[1] For the purpose of emission inventories, the following four indicators shall be used: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene.

1.2.2 National/European Union legislation

1.2.2.1 1996 Chemicals Act

The most important national legal instrument for dealing with chemicals is the Federal Act on the Protection of Man and the Environment from Chemicals the first version of which was adopted in 1987[11].

With the 2004 Federal Act Amending the Chemicals Act[12], the entry-into-force of the Stockholm Convention was taken into account. Pursuant to Sect 20 of the 1996 Chemicals Act, as amended, (see Footnote 4), the objective of this Federal Act is the precautionary protection of the life and health of man and the environment from direct or indirect harmful effects which may be caused by the manufacture and marketing, acquisition, use or waste treatment of substances, mixtures or articles, in particular by making identifiable and averting harmful impacts or preventing their emergence. With regard to the "import and export of hazardous chemicals, persistent organic pollutants and mercury", the Act designates the Federal Minister for Agriculture, Forestry, Environment and Water Management as the "competent authority" for the enforcement of EU Regulation (EC) 850/2004. Pursuant to Sect 20 Para 2, the Federal Minister for Agriculture, Forestry, Environment and Water Management shall stipulate the measures which are required to draw up inventories for the release into the air, water bodies or soils or for action plans or for the National Implementation Plan. To the extent that these measures concern industrial plants within the meaning of Sect 74 of the 1994 Trade, Commerce and Industry Regulation Act, Federal Law Gazette No 194, or plants subject to official monitoring according to the Mineral Raw Materials Act, the Minister is required to reach mutual agreement with the Federal Minister for Economy, Family and Youth. The 1996 Chemicals Act, as amended, furthermore integrates the Federal Act on the Implementation of the REACH Regulation (see 1.2.2.2.).

The Provincial governors are responsible for the monitoring of compliance with the provisions of the Chemicals Act and the administrative acts based on it as well as with pertinent EU legislation. In their monitoring work, they rely on persons qualified in the field and executing these functions. These chemicals inspectors, as they are called, are authorized to visit production sites and companies and to check compliance with the manufacturing, placing-on-the-market and use provisions also on the basis of written documentation and trade documents. The inspectors are authorized to draw samples, lay down procedural orders, confiscate goods on a provisional basis and to launch preliminary compulsory and safety measures.

In the framework of priorities for action which change every year, the chemicals inspectors focus, besides general enforcement, on certain areas of control. These inspectors are required to have specific expertise in the hands-on handling of chemicals and must be familiar with current legislation. To support the inspectors' work, a national coordination network was set up. The chemicals-policy unit of

[11] Federal Act of 25 June 1987 on the Protection of Man and the Environment from Chemicals (Federal Law Gazette No 326/1987)

[12] Federal Law Gazette No 98/2004

BMLFUW, the Chemicals Department of Umweltbundesamt as well as the chemicals inspectors are joined in this network which meets twice a year. At European level, the enforcement authorities cooperate in the framework of EU bodies, such as the Chemicals Legislation European Enforcement Network (CLEEN) and FORUM (Forum for Exchange of Information on Enforcement) joined in the European Chemicals Agency, ECHA for short. The Helsinki-based agency manages the registration, evaluation, authorization and restriction of chemical substances in order to ensure a uniform procedure within the European Union.

Under the lead of CLEEN, also EU-wide targeted control actions are taking place. The general objective of the CLEEN network is the advancement of cooperation of national inspection authorities, aiming at the enhanced compliance with EU legislation, in this case to Regulation (EC) No 850/2004 on Persistent Organic Pollutants. With special regard to HCB in fireworks, a project has been operational until January 2012 and will be presented at the 13th CLEEN conference in 2012. Further analyses based on samples taken by Federal-province authorities concerned PFOS in fire-fighting foams and ski waxes.

1.2.2.2 **POPs and PBTs**

a) POPs according to POP Regulation:

The key piece of legislation for implementing the Stockholm Convention and the UNECE Protocol in the EU is Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and amending Directive 79/117/EEC[13]. This Regulation entered into force on 20 May 2004. Being a Regulation, it is directly applicable in all member states, also in those which are not yet Parties to the Convention or to the Protocol.

Article 12 of the Regulation lays down reporting obligations incumbent on the member states regarding the manufacture and use (annually) and the implementation of other obligations (every 3 years). Based on that, the European Commission draws up a synthesis report.
The Regulation is updated on a regular basis. Commission Regulations include the list of substances which are subject to the waste-management provisions pursuant to Article 7 and lay down the details of waste treatment as well as limit values for the concentration of the substances listed in Annex IV for the purposes of Part 2 of Annex V to Regulation (EC) No 850/2004[14].

On August 26, 2010, the amendments agreed in the course of the 4th Conference of the Parties entered into force by virtue of Commission Regulations (EU) No 757/2010 and (EU) No 756/2010, respectively, for the field of waste management[15]. These

[13] OJ L 229 of 29.6.2004, p. 5., as amended by Commission Regulation (EU) No 519/2012, OJ L 159 of 20.6. 2012, p.1.

[14] Commission Regulation (EC) No 1195/2006 amending Annex IV, OJ L 217/1 of 8.8. 2006 and Commission Regulation (EC) No 172/2007 amending Annex V, OJ L 55/1 of 23.2. 2007 and Commission Regulation (EC) No 304/2009 amending Annexes IV and V of Regulation (EC) No 850/2004 of the European Parliament and of the Council as regards the treatment of waste containing persistent organic pollutants in thermal and metallurgical production processes;

[15] Commission Regulation (EU) No 757/2010, OJ L 223/29 of 25. 8. 2010 amending Annexes I to III and Commission Regulation (EC) No 756/2010, OJ L 223/20 of 25. 8. 2010 amending Annexes IV and V;

"new" POPs are PBDEs, i.e. 4 polybrominated diphenyl ethers, α-hexachlorocyclohexane (HCH), β-HCH and γ-HCH (lindane), perfluorooctane sulfonic acid, its salts and perfluorooctanesulfonyl fluoride (PFOS) as well as pentachlorobenzene. Part of these substances has been widely used in pesticides as well as in products destined for consumers. PFOS was also used in fire-fighting foams and in the field of metal coating for the purpose of mist suppression. The use of PFOS is merely restricted in the EU, as it is still possible to make use of exemptions by way of derogations.

To the extent that PFOS emissions released into the environment are minimized, their manufacturing and placing on the market is admissible, provided that the member states report to the Commission every four years on the progress reached in eliminating PFOS (2014):

a) Until August 26, 2015: wetting agents for controlled electroplating systems;
b) Photoresists and antireflective coatings for photolithography processes;
c) Photographic coatings applied to films, papers and printing plates;
d) Mist suppressants for non-decorative hard chromium (IV) plating in closed loop systems;
e) Hydraulic fluids for aviation.

Austria makes use of the derogations concerning b) and d) and referred to the fact that further articles, i.e. PFOS-contaminated X-ray films, are still in use in Austria.

The EU notified the Secretariat of the Stockholm Convention of the above-mentioned general derogations as well as of certain specific derogations in the field of galvanics and referred to the fact that, in the EU, all derivatives are also covered by the restriction[16].

By virtue of the Regulation, the manufacturing, placing-on-the-market and use of intentionally produced POP substances listed in the Convention and in the Protocol is prohibited. General and specific exemptions from these bans are restricted to a minimum. All remaining stockpiles which are not admissible for use shall be treated as hazardous waste. In general, waste shall be treated in such a way that its POP content is destroyed or irreversibly transformed.

On the other hand, the Regulation obliges the member states to set up and keep comprehensive inventories on the release of unintentionally formed process-borne U-POPs such as dioxins, furans, PCBs and polycyclic aromatic hydrocarbons (PAHs) and to submit their National Action Plans with regard to measures minimizing the entire release of these substances to the Commission and to the other member states. The Action Plan shall also include measures for the enhanced development of materials serving as a substitute or of modified materials as well as measures with regard to products and processes preventing the formation and release of POPs. Waste producers and owners are obliged to take measures to prevent the contamination of waste with POP substances. To a large extent, the waste control measures comply with those contained in the Stockholm Convention; in some aspects, they are more explicit. Low POP concentration limits were adopted by way

[16] "The EU restriction is not limited to PFOS, its salts and PFOS-F but covers all PFOS derivatives defined as $C_8F_{17}SO_2X$, X= OH, metal salt (O-M^+), halide, amide, and other derivatives including polymers."

of Council Regulation (EC) No 1195/2006 (see Footnote 14). Waste containing a POP content exceeding these limits must generally be disposed or recovered in such a way as to destroy or irreversibly transform the POP content. Annex V to the POP Regulation lays down maximum permissible POP concentration limits for waste which are disposed by way of an environmentally preferable procedure (e.g. underground storage in salt caverns) instead of being destroyed or irreversibly transformed. The Regulation also contains several general provisions regarding the implementation of the Convention. In 2009, the Commission drew up a synthesis report.

b) PBTs according to REACH Regulation:

The **REACH Regulation** (Regulation (EC) No 1907/2006 of the European Parliament and of the Council)[17] was adopted in December 2006 by the European Parliament and by the Council and has been in force since June 1, 2007. One of the most recent amendments, i.e. Commission Regulation (EU) No 253/2011 of 15 March 2011 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) as regards Annex XIII, provides that, for the identification of PBT or vPvB substances[18], as they are called, all information included in the technical dossier shall be used in an integrated manner**.**

The REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) system requires companies producing or importing more than one ton of a chemical substance during one year to have these chemicals registered in a central database. REACH has given more responsibility to industry as regards the handling of chemicals-based risks and for the provision of safety information on the substances involved. This information is then handed down the supply chain. The REACH Regulation aims at the further development of the state of knowledge on chemicals' properties and on the load emanating from them as well as at improved risk management in the area of chemical substances.

Substances of very high concern are subject to an authorization procedure. The Regulation may serve to draw up dossiers for substances exhibiting POP properties which would have to be notified to the Secretariat of the Stockholm Convention. A substance of very high concern (SVHC) listed in Annex XIV shall, pursuant to Article 56 of this Regulation, not be placed on the internal market after a "sunset date". Most recently, HBCD, a substance with candidate status under the Convention, was added to the list of POPs by virtue of Commission Regulation (EU) No 143/2011. According to Article 56 Para (6) Subpara (b) of REACH, mixtures are only registered starting from a concentration of the substance in the amount of 0.1 %.
Currently, the European Chemicals Agency holds the meetings of a PBT expert group which was convened in early 2012 for the first time; Austria is involved in the work of this group, carrying out substance assessments to identify the existence of PBT or vPvB properties (see Footnote 18).

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[17] Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, OJ L 396, 30.12.2006, p.1.

[18] PBT: persistent, bioaccumulative, toxic - vPvB: very persistent and very bioaccumulative

1.2.2.3 Import and export of dangerous chemicals (PIC)

Another key EU legal instrument is the Regulation on the export and import of dangerous chemicals (EC) 689/2008[19], implementing the obligations of the Rotterdam Convention for the Application of the PIC Procedure (PIC = Prior Informed Consent) for certain hazardous chemicals and pesticides in international trade. In Annex V, it provides for an export ban of POP substances listed in the Stockholm Convention, unless the less stringent version of the PIC procedure is applicable due to numerous derogations. The recast of this Regulation, which is applicable as of 1st March 2014, entered into force in 2012.

1.2.2.4 Pesticides

The EU Regulation concerning the placing of plant protection products on the market[20] divides the European Union into three regions in which uniform authorizations are respectively applicable. Austria, Belgium, Germany and the Netherlands make up for the "Center" zone. The criteria to be met for authorization were made more stringent: As a rule, substances regarded as very hazardous shall not be awarded renewed authorization after their current authorization has expired. The exclusion criteria first and foremost concern substances which are, according to EU classification, in all likelihood or verifiably carcinogenic, mutagenic or harmful to the human reproduction system. Also the authorization of substances which may damage the human and animal hormone system as well as of POPs will not be renewed. Basically, a plant protection product may only be authorized if its active substances have been approved, except for an emergency situation, i.e. if a "measure appears necessary because of a danger which cannot be contained by any other reasonable means".

The Biocides Regulation provides for a Community authorization according to uniform standards. This is to include, for the first time, products treated with biocides within the scope of application of the Regulation. The Regulation on the making available on the market and the use of biocidal products refers to insecticides, disinfectants and repellents. The provisions on a prohibition of inclusion of highly dangerous biocidal agents in an EU list of permitted agents (Annex I) are supplemented with a view to integrating environmental criteria (PBT, vPvB and POP properties) into the Regulation text as additional exclusion criteria. Starting form 2013, the Regulation will also provide for an authorization at EU level (in addition to the products authorized at a national level). It is expected to enter into force as of September 1, 2013, partly with transitional provisions.

[19] Official Journal L 204 of 31.7. 2008, p. 1; recast Regulation (EU) No 649/2012, OJ L 201 of 27.7. 2012, p. 60.

[20] Regulation No 1107/09 (EC) of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC OJ L 309, 24. 11. 2009, p. 1.

1.2.2.5 **Industrial emissions**

With regard to **unintentionally formed POPs**, the Industrial Emissions Directive 2010/75/EU[21] , which entered into force on January 6, 2011 and must be transposed into national law by January 7, 2013, is of particular relevance. This IED Directive replaces Directive 2008/1/EC (IPPC Directive)[22] covering the major stationary industrial emission sources of U-POP. The European BAT (Best Available Technique) reference documents (BREFs) contain best available techniques. The BAT conclusions shall be applied with binding effect. Gewerbeordnung 1994, the 1994 Industrial Code, (GewO 1994), Federal Law Gazette No 194, regulates, among other things, the building, operation, ongoing monitoring and abandoning of plants serving the purpose of exercising a trade (Industrial Plant Law) and is thus one of the key pieces of Austrian industrial-plant-related environmental legislation. The most recent amendment was effected by virtue of Federal Act FLG I No 66/2010, and entered into force on August 19, 2010.

E-PRTR, the comprehensive European Pollutant Release and Transfer Register, (http://prtr.ec.europa.eu/), covers all unintentionally formed POPs listed in Regulation 850/2004. In Austria, some 80 SMEs are listed in the PRTR; these companies have not reported any emissions in 2007, 2008 and 2009; thus, no data are available on diffuse sources in this respect.

In 2009, a national database was set up on pollutants in surface waters, comprising data from E-PRTR companies, sewage-treatment plants with a capacity of more than 2,000 of population equivalent and waste-incineration plants with a capacity of more than 2 tons of waste/hr. There is evidence that some companies release POPs into surface waters.

The Waste Incineration Directive (Directive 2000/76/EC[23]), which has merged into the IED Directive, covers all waste incineration facilities and thus refers to a major source of POPs formed as byproducts. It fixes emission limit values for dioxins/furans in the air (0.1 ng of I-TEQ/cu m) and in water (0.3 mg/l). Furthermore, the Directive on Large Combustion Plants (Directive 2001/80/EC[24]), which has also been made a part of the IED Directive, is relevant from a POP emissions point of view. Directive 2000/53/EC[25] on end-of-life vehicles imposes the separation of hazardous components from the vehicle before shredding of the carcass and an adequate disposal of the shredder residues. The Directives of the European Parliament and of the Council on waste electrical and electronic equipment (Directive 2002/96/EC[26]) and on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Directive 2002/95/EC[27]) establish the mandatory separation of PCB-containing components to ensure their adequate disposal as well as the restriction of use of certain hazardous substances in electric and electronic equipment. The **RoHS** Directive on the restriction of the use of certain hazardous

21 http://ec.europa.eu/environment/air/pollutants/stationary/ied/legislation.htm
22 OJ L 24, 29.01.2008, p. 8.
23 OJ L 332, 28.12.2000, p. 91.
24 OJ L 309, 27.11.2001, p. 1.
25 OJ L 269, 21.10.2000, p. 34. Directive last amended by Commission Decision 2002/525/EC (OJ L 170, 29.6.2002, p. 81).
26 OJ L 37, 13.2.2003, p. 24.
27 OJ L 37, 13.2.2003, p. 19.

substances in electric and electronic equipment 2011/65/EU (recast)[28] aims at reducing the amount of hazardous substances in electrical and electronic equipment, among them also PBB and PBDEs.

As they potentially also cause significant pollution of ambient air, PAHs are the only POPs subject to air-quality target or limit values according to EU legislation. The fourth Directive under the EU Ambient **Air Quality** Assessment and Management Framework Directive 96/62/EC (Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air[29]) lays down an air-quality target value for benzo[a]pyrene as a marker for PAHs.

With regard to the prevention of the accident-caused release of dangerous substances from industrial plants, Council Directive 96/82/EC[30] on the control of major-accident hazards, the Seveso-II Directive, as it is called, is an important piece of EU legislation.

1.2.2.6 Water bodies

The strategy with regard to the release of POPs into water bodies is laid down by the Water Framework Directive (Directive 2000/60/EC[31]). POPs are included in the list of priority substances in order to be subject to EU-wide environmental quality standards and emission controls. The Quality Target Ordinance/Chemical Condition of Surface Waters (FLG No II 96/2006 - QZV Chemie OG) has been in force since January 1, 2011.

Table 2: Substances regulated in the entire EU

Parameters	**CAS No.** [1)]	**AA EQS** [2)] **(µg/l)**	**MAC EQS** [3)] **(µg/l)**	**PHS** [4)]
Aldrin	309-00-2	Σ 0.01	n/a	
Brominated diphenyl ethers	32534-81-9	0.0005	n/a	X
p,p´-DDT	50-29-3	0.01	n/a	
DDT total		0.025	n/a	
Dieldrin	60-57-1	Σ 0.01	n/a	
Endosulfan	115-29-7	0.005	0.01	X
Endrin	72-20-7	Σ 0.01	n/a	
Hexachlorobenzene	118-74-1	0.01	0.05	X
Hexachlorocyclohexane	608-73-1	0.02	0.04	X
PAHs	-	0.002 – 2.4	0.1 - 1	X
Pentachlorobenzene	608-93-5	0.007	n/a	X

[28] OJ L 174 of 1.7.2011, p.88.
[29] OJ L 023, 26.1.2005, p. 3.
[30] OJ L 10, 14.1.1997, p. 13. Directive last amended by Commission Decision 98/433/EC (OJ L 192, 8.7.1998, p.19).
[31] OJ L 327, 22.12.2000, p. 1.

Table 3: Substances relevant at national level

Parameters	**CAS No.** [1)]	**AA EQS** [2)] **(µg/l)**
Chlordane	57-74-9	0.002
Heptachlor	76-44-8	0.004

Table 4: POPs suggested for revision of list of priority substances

Parameters	**AA EQS** [2)]		**PHS** [4)]
	Water [µg/l]	**Biota [µg/kg]**	
PCDDs, PCDFs, PCBDLs	?	4.10^{-3} TEQ	x
Heptachlor/heptachlor epoxide	$2.1.10^{-7}$	$6.7.10^{-3}$	x
Perfluorooctane sulfonic acid and its salts (PFOS) and perflurorooctanesulfonyl fluoride	$6.5.10^{-4}$	9.1	x
Polybrominated diphenyl ethers (Penta and octabromo DPEs)	$4.9.10^{-8}$	0.0085	x
Polychlorinated biphenyls (PCBs)	?	?	x

1) Chemical Abstracts Service No.
2) Annual-Average EQS
3) Maximum-Admissible-Concentration EQS
4) Priority Hazardous Substance

As regards **water pollution**, the 1959 Water Law Act (WRG)[32] sets forth, in its determination of objectives outlined in Sect 30, that all water bodies, including groundwater, shall be kept clean and protected in such a way:

1. That human and animal health cannot be jeopardized,
2. That an adverse effect on the landscape and other palpable damages can be prevented,
3. That deterioration is prevented and the state of aquatic ecosystems and of the terrestrial ecosystems and wetlands directly depending on them is protected and improved with regard to their water balance,
4. That sustainable water use is promoted on the basis of a long-term protection of existing resources,
5. That an improvement of the aquatic environment, e.g. by way of specific measures for the step-by-step reduction of discharges, emissions and losses of hazardous substances, is ensured.

In particular groundwater as well as spring water shall be kept clean so as to be able to use it as drinking water.

It is the objective of the Act to prevent Austria from having to resort to the treatment of groundwater in order to produce drinking water. To reach this objective, comprehensive measures have been taken, such as:

[32] FLG No 215/1959 last amended by FLG I No 14/2011

- Uniform monitoring program for groundwater resources all over Austria, with some 2,000 sampling points and four samplings per year;
- Provisions as well as consulting in the field of water-body protection;
- Rehabilitation works and landfill requirements which are conducive to the protection of groundwater.

One of the measures to ensure an agriculture which is committed to the protection of water bodies according to the Austrian Water Law Act and to the EU Nitrate Directive is the Austrian Drinking Water Ordinance – TWV (FLG II No 304/2001: FLG II No 254/2006 FLG II No 121/2007) according to the Food Safety and Consumer Protection Act – LMSVG (FLG I No 13/2006, last amended by Federal Act FLG I No. 95/2010). The water must comply with the minimum requirements for microbiological and chemical parameters laid down in the Drinking Water Ordinance.

Water-body protection, i.e. the analysis and assessment of the chemical and ecological status of lakes, running waters and groundwater as well as the monitoring of sewage-treatment plants and industrial waste water falls within the purview of the Provinces by way of indirect Federal administration.

1.2.2.7 **Waste**

The Federal Act amending the 2002 Waste Management Act (2010 Amendment to the Waste Management Act), FLG I No 9/2011, entered into force as of February 16, 2011, transposing into national law the new Waste Framework Directive 2008/98/EC, which replaced the Waste Framework Directive, Directive 2006/12/EC, the Hazardous Waste Directive and the Waste Oils Directive. Thus, more responsibility has been placed on waste producers and waste owners. A 5step waste hierarchy has been introduced instead of a 3step waste hierarchy. It sets priorities relating to reuse and recycling targets as well as prevention.

The Federal Austrian Waste Management Plan 2011 (BWPL), which is in line with the new Waste Framework Directive and contains a programme on waste prevention, is available.

The Waste Management Act also includes fundamentals on the collection, coordination and financing of waste electrical and electronic equipment as well as adaptations to the Waste Shipment Regulation (Council Regulation (EC) No 1013/2006 on shipments of waste[33]). The adaptations concern, in particular, the notification documents (documents to be attached, payment of security), the possibility of prior consent within the meaning of Art 14 of the Waste Shipment Regulation, sanctions and control.

Council Regulation (EC) No 1013/2006 constitutes the cornerstone of the transposition of the Basel Convention and of OECD Council Decision C (2001)107 fin., as amended, (two-list system “Green and amber waste lists”), into European Union law. A bilateral “Agreement between the governments of the Republic of Austria and the Federal Republic of Germany on the Transboundary Shipments of Waste according to Article 30 of Regulation (EC) No 1013/2006 of the European

[33] OJ L 190, 12.7.2006, p. 1.

Parliament and of the Council of 14 June 2006 on Shipments of Waste" was officially announced by virtue of FLG III 72/2009. This Agreement provides for some reliefs for certain waste shipments in the border region between Austria and Germany, respectively (cf., for example, the special location of Kleinwalsertal valley), e.g. for excavated soil and construction debris as well as for waste electric equipment (official announcement in FLG on June 26, 2009).

Another key legal instrument is Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)[34]. It is the objective of this Directive to fully dispose equipment containing PCBs and PCTs as fast as possible. For equipment the PCB filling volume of which exceeds 5 cu dm, this objective had to be reached by the end of 2010. This Directive also lays down the requirements for environmentally-sound PCB disposal.

The handling of **POP waste** is set forth in the 2002 Austrian Waste Management Act[35] in its amended version, FLG 9/2011. The Act contains general provisions on the prevention, collection and treatment of waste as well as provisions for treatment plants and, in particular, specific basic obligations to be met by waste owners with regard to the treatment of hazardous waste streams. One basic element is the 5-step waste hierarchy (waste prevention, preparation for reuse, recycling, other recovery (e.g. energetic recovery) and disposal).

The POP Regulation (EC) No 850/2004, as amended, brought about an adaptation of the POP waste provisions. In accordance with the POP Regulation, waste containing POPs must be burnt or the POPs must be destroyed by an equally efficient method, according to Sect 16 Para 4 of the 2002 Waste Management Act. Also the underground deposition in safe, deep, hard rock formations, salt mines or landfills destined for hazardous waste according to Annex V Part 2 of the EC POP Regulation (note: the options mentioned are not available in Austria) was enabled by virtue of Sect 16 Para 4 of the 2002 Waste Management Act.

The ROHS Directive has been transposed by way of the Waste Electric Equipment Ordinance, FLG 2005/121, as amended; this Ordinance also sets forth rules for POPs (Ban of placing on the market of electric equipment containing more than 0.1% of PBBs or PBDEs per homogenous material).

The Austrian Waste Treatment Obligations Ordinance, FLG II No 459/2004, as amended, in the version of FLG II No 363/2006, requests the separation of PCB-containing components and plastics with bromated flame retardants from waste electric equipment. Furthermore, it expressly lays down that recycling of plastic and wood casings with additives containing heavy metals or with halogenated additives (these are, e.g. also bromated flame retardants) shall only be permitted in those cases in which the relevant substances or additives have to be added to new products due to technical requirements (e.g. fire safety). Thus, as regards recovery in the electronics industry, an admissible limit value for the sum of PBDEs of 0.1 % shall be admissible, while for recovery options used in other areas, 0.1% are respectively

[34] OJ L 243, 24.9.1996, p. 31.
[35] 2002 Waste Management Act; Federal Law Gazette No 102/2002

applicable for tetra, penta, hexa and hepta BDE within the meaning of the EC POP Regulation No 757/201 (Annex I).

The EU End-of-Life Vehicles Directive was transposed into Austrian law by way of the Ordinance on the Waste Prevention, Collection and Treatment of End-of-Life Vehicles (End-of-Life Vehicles Ordinance)[36]. In this context, pollutant restriction and provisions regarding the pollutant removal in end-of-life vehicles before recovery/shredding were laid down.

The Ordinance on the Separation of Construction Waste entered into force on January 1, 1993. The Construction Waste Separation Ordinance, FLG 1991/259, requires the separation, separate storage and treatment of hazardous waste as opposed to non-hazardous waste in the realization of construction or demolition works (e.g. PCB-containing sealing compounds, insulation material with prohibited brominated flame retardants). Due to the ban to landfill hazardous waste as well as waste exhibiting a calorific value of more than 6,000kJ/kg, it has been ensured that these wastes are subject to (thermal) treatment. Currently, an "Ordinance on Recycling Material and Environmentally-Sound Dismantling" is in the pipeline which will be put up for consultation still in 2012. Among other things, the Ordinance shall provide for largely mandatory pollutant investigation prior to dismantling and could be regarded as one of the measures to reduce POP release (see p. 268 of the Federal Austrian Waste Management Plan 2011 (BWPL)).

1.2.2.8 **Food and feedstuffs**

Regarding POPs in foodstuffs, only very few POPs (dioxins, PCBs and PAHs) are covered by Regulation (EEC) No 315/93 of 8 February 1993 laying down Community procedures for contaminants in food (OJ No L 37 of 13 February 1993), last amended by Regulation (EU) No 835/2011 of 19 August 2011 amending Regulation (EC) No 1881/2006 as regards maximum levels for polycyclic aromatic hydrocarbons in foodstuffs (OJ No L 215 of 20 August 2011); the Directive on undesirable substances in animal feed (Directive 2002/32/EC), however, covers almost all listed substances as well as most potential POPs. The 1999 Feedstuffs Act (Federal Act on the Production, Placing on the Market and Use of Feedstuffs, Compounds and Additives - FMG 1999), last amended by FLG I No 87/2005 respectively the 2012 Feedstuffs Ordinance (FLG 216/2010, Ordinance of the Federal Minister for Agriculture and Forestry, Environment and Water Management Enacting Provisions for the Implementation of the 1999 Feedstuffs Act), lay down respective limit values for dioxins and certain pesticides in some products destined for animal **feed**, supplementary feedstuffs and feedstuffs. According to the 2012 Feedstuffs Action Plan and the sampling plan for 2011-2015, the targeted samples are distributed in the framework of feedstuff inspection as follows:

- Feedstuff samples: appr. 2,500;
- Samples drawn by Federal offices: appr. 1,700;
- Samples drawn by Federal provinces: appr. 800

The Federal provinces take part in sampling so that 800 out of overall 2,500 samples are directly obtained in the agricultural holdings.

[36] FLG II No 407/2002 ias amended byf FLG II No 179/2010

In the analysis of feedstuff samples, there is a focus on:

- Illegal substances such as hormones, medicines as well as banned and authorized additives such as pesticides;
- PCBs and dioxins;
- Heavy metals;
- Animal constituents;
- Salmonella;
- GMOs.

Official samples are analyzed by the Austrian Agency for Health and Food Safety (AGES) and Umweltbundesamt , the Environment Agency Austria. The latter also houses the national reference laboratory for analyzing dioxins and PCBs as residues in live animals and animal products[37].

In 2001, the Commission adopted a Communication on a **Community Strategy on Dioxins, Furans and Polychlorinated Biphenyls**[38] in response to a series of severe incidents in connection with feedstuff and food contamination. The aims of the Strategy are to assess the state of the environment and of the ecosystem, curb human exposure to dioxins and PCBs in the short term, bring down human exposure to safe levels in the medium and long term, and to reduce the impact of dioxin on the environment. The Strategy does not include any proposals on amending the legal provisions; yet some other measures, among them an appropriate enforcement of current EU legislation (in particular, of the Directive on PCB disposal and the IPPC Directive), are being proposed. The Strategy as such constitutes an EU-wide action plan for reducing and eliminating these POP releases.

The measures destined for the short-term reduction of human exposure comprise the creation of legal provisions fixing limit values for the concentrations of dioxins, furans, and dioxin-like PCBs in food and feedstuffs. In order to prevent new releases and to combat the level of contamination that is already present in the environment, the Strategy proposes measures for the identification of emission sources, the control of emissions and the control of environmental quality. Furthermore, the Strategy highlights the need for research, for imparting information to the general public and for the development of a common methodology for continuous monitoring. An assessment of the environmental measures proposed in the Strategy takes place in the new context of the implementation of the POP Regulation.

1.2.2.9 Development cooperation strategy

In 2001, the European Commission adopted a **Strategy for the Integration of the Environment into** Community **Economic and Development Cooperation**. This environmental integration strategy outlines how, in the broader context of poverty reduction, Community economic and development cooperation can best assist developing-country partners in responding to the environmental challenges they are currently facing. This includes specific accompanying environmental initiatives as well

[37] Council Directive (EC) 96/23 of 29 April 1996 on measures to monitor certain substances and residues thereof in live animals and animal products, last amended by Regulation (EC) No 882/2004 of the European Parliament and of the Council of 29 April 2004, OJ L 191 of 28.5.2004, p. 1

[38] COM(2001) 593 fin

as the integration of the environment, as an object of protection, into all existing instruments and programs. At policy level, this means making use of synergies existing between poverty reduction and the environmental field. A more consistent and enhanced integration with trade, agricultural, fisheries, transport and energy policies is of utmost importance. At operational level, improved dialog with the partner countries during programming with regard to the support of countries and regions offers opportunities for the integration of environmental considerations into development cooperation in order to bring the human-health and environmental risks emanating from POPs down to a minimum.

2 Assessment of regulatory framework and of state of the environment

2.1. Intentionally produced POPs

2.1.1 POPs subject to a ban

Provisions of the Convention:

Article 3 of the Convention provides for a ban of the production, use, import and export of POPs which are produced intentionally and listed in Annex A to the Convention.

The following substances were added to the list of banned substances in 2009 and 2011, respectively:
Chlordecone, α-, β- and γ-hexachlorocyclohexane (lindane and isomers), hexabromobiphenyl, pentachlorobenzene and the brominated flame-retardant mixtures penta and octa BDE. For the latter, however, certain derogations do apply with regard to the recycling of products. Starting from October 27, 2012, the provisions shall apply for endosulfan, an insecticide, which was added to Annex A in May 2011.

POPs listed in Annex B are subject to certain restrictions; derogations are defined in the text in detail. In addition to DDT, which had already been on the list, Annex B now contains certain perfluorinated tensides, i.e. the group of perfluorooctane sulfonates (PFOS and its salts and PFOSF – perfluorooctanesulfonyl fluoride). For certain purposes and specific exemptions, the use of these substances is possible. Parties to the Convention making use of specific derogations must, however, have themselves registered with the Secretariat of the Convention; the specific exemptions are mentioned in a special register which is publicly accessible (Register of Specific Exemptions). The use of general exemptions must be notified. In line with Part III of Annex B, the production and/or use of PFOS and PFOSF must be notified to the Secretariat which lists this information in a public register (Register of Acceptable Purposes).

Moreover, the Parties to the Convention shall take measures in order to prevent the placing-on-the-market of new chemicals exhibiting POP properties and, to the extent possible, also of chemicals currently in use. In the EU, this objective is to be reached through the work of the PBT group under the REACH Regulation (as regards PBTs, see 1.2.2.2., Point b).

Provisions of the POP Protocol:

According to Article 3 of the Protocol, each Party to the Convention must take appropriate measures in order to prevent the production and use of the chemicals listed in Annex I. The substances listed in Annex II – DDT and PCBs – are to be subject to restrictions. Potential derogations for use are available in the Annexes to the Protocol.

2.1.1.1 **Pesticides**

As outlined in the 2008 NIP, the POP pesticides listed in the POP Conventions had been banned in Austria already before the country's accession to the EU or had no longer been in use, respectively. The use of endosulfan, which was the last substance to be added to the list, as a plant protection product is prohibited, as the agent was not included in Annex I to the Plant Protection Product Directive 91/414/EEC[39].

Table 5: Amounts of endosulfan sold

Year	Amount in kg
1994	5800.18
1995	5476.50
1996	5246.80
1997	4273.40
1998	3496.00
1999	4657.00
2000	4696.40
2001	5209.80
2002	3210.22
2003	3010.90
2004	2839.80
2005	3688.97
2006	2879.00
2007	0
2008	0
2009	0
2010	0

Sales figures have continuously decreased.

[39] COMMISSION DECISION of 2 December 2005 concerning the non-inclusion of endosulfan in Annex I to Council Directive 91/414/EEC and the withdrawal of authorizations for plant protection products containing this active substance (2005/864/EC)

For POP residues in foodstuffs and drinking water, detailed provisions are applicable. The maximum residue levels are set forth in the Residues Control Ordinance[40] and in the Drinking Water Ordinance[41]. The control of feedstuffs, in particular as regards dioxin and PCB contamination, is regulated in the Feedstuffs Act[42] and in the 2010 Feedstuffs Ordinance[43]. Foodstuff inspection falls within the competence of the Federal Ministry of Health and is enforced by the Provincial governors by way of indirect Federal administration (Provincial food inspection authorities), involving the food inspection authorities authorized in accordance with LMSVG (AGES and three regional institutions). Feedstuff control is within the competence of BMLFUW in cooperation with the Federal Office for Food Safety (BAES) and the Agency for Health and Food Safety (AGES). Primary-production-level feedstuff inspection falls within the purview of the Federal provinces. Ongoing control of drinking water is the responsibility of the operators of water-supply plants in the framework of self-monitoring. They are monitored and controlled by the official food inspection authorities of the Federal provinces.

In addition to the routine monitoring of foodstuffs, also for chemical contaminations (see 2011-2015 Foodstuff Control Plan[44]), the first targeted monitoring for POPs was carried out in 2010. In this context, samples of meat (sheep's liver), eggs, cheese, vegetables and ready-made meals were drawn. The focus here was to sample produce from higher-lying regions, such as Alpine pastures, as there was evidence from the MONARPOP project that POP exposure mounts with increasing altitude. The samples were mainly checked for potential contamination with dioxins and PCBs. In the framework of the 2010 monitoring, no sample had been found fault with; evaluation of the 2011 follow-up action has not yet been completed.

2.1.1.2 **Industrial chemicals**

Polybrominated diphenyl ethers (BDEs):

In 2008, penta and octa BDE, both brominated flame-retardant mixtures, were included in the Stockholm Convention. They were mainly used as flame retardants in electronic equipment and in plastics. In Austria, these substances are regulated by the Waste Electric Equipment Ordinance, FLG II No 121/2005, as amended (in force since April 30, 2005). One of the salient points of the Ordinance is a ban of certain environmentally hazardous substances (e.g. lead, mercury, cadmium, and certain flame retardants) during production as well as placing-on-the-market of electric and electronic equipment. Now, the POP Regulation 850/2004, as amended, also provides for a total ban of the production and use of penta and octa DBEs.

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40 Ordinance by the Federal Minister for Health and Women on Control Measures Concerning Certain Substances and their Residues in Live Animals and Foodstuffs of Animal Origin (2006 Residues Control Ordinance) FLG II No 110/2006, as amended

41 Ordinance by the Federal Minister for Social Security and Generations on the Quality of Water for Human Consumption (Drinking Water Ordinance) FLG II No 304/2001, as amended

42 Federal Act on the Production, Placing on the Market and Use of Feedstuffs, Compounds and Additives (1999 Feedstuffs Act) FLG I No 139/1999, as amended

43 Ordinance by the Federal Minister for Agriculture, Forestry, Environment and Water Management Enacting Provisions for the Enforcement of the 1999 Feedstuffs Act (2010 Feedstuffs Ordinance) FLG II No 316/2010

44 2011-2015 Multiannual Integrated Control Plan Austria pursuant to Art 41 et sequ. of Regulation (EC) 882/2004

EAA has already conducted several studies on the presence of BDEs in the environment. On behalf of BMLFUW, these data are now being converged and will be made available to the POP Review Committee of the Stockholm Convention in 2012.[45]

In the framework of the ROHS Directive on the restriction of the use of certain hazardous substances in electric and electronic equipment 2011/65/EU (recast), samples of new electric equipment (household equipment, toys) have been drawn since 2008. In this context, the limit values were found to have been exceeded for the first time.

Hexachlorobenzene (HCB):

HCB was used in firework rockets for the creation of certain color tones. Austria has focused its respective control activities on HCB over the last years and has inspected imported products as well as products manufactured in Austria several times and thus also contributed to an EU-wide control focus in the framework of the CLEEN network. Meanwhile, the success of these control activities has become palpable: In 2011, no exceedance could be detected. The controls shall, however, be continued.

Polychlorinated biphenyls (PCBs):

With the Austrian Ordinance on the Ban of Halogenated Substances, FLG No 210/1993 (Halogenated Substances Ordinance) and the Waste Management Act, as amended, the Austrian legal system contains a plan for decontamination and disposal of PCB-containing equipment. According to Sect 16 Para 2 Subpara 2 of the 2002 Waste Management Act, PCB-containing waste must be immediately handed over to an authorized waste collector or processor. Waste processors must not store waste for more than one year for the purpose of disposal according to Sect 2 Para 7 Subpara 4 of the 2002 Waste Management Act.

The 2002 Waste Management Act (Sect 16 Para 2) provides for the obligation of thermal disposal of PCB-containing waste (with a total content exceeding 30 ppm). Alternative disposal techniques are admissible to the extent that, when compared to incineration, equivalent rules for the protection of the environment and the state of play of technology are complied with.

Furthermore, the separation from other substances for the purpose of recovery is not admissible according to the 2002 Waste Management Act, as amended. If PCB-containing components/equipment are/is part of other devices, these/this shall be removed and collected separately, provided that the involved effort is reasonable. The treatment obligations applicable for PCB-containing electric equipment and other PCB-containing waste were made more specific in Sects 25 et sequ. of the Waste Treatment Obligations Ordinance, FLG II No 459/2004 as amended by FLG II No 363/2006.

[45] "Parties and observers are invited to submit the information on BDEs pursuant to paragraph 2 of parts IV and V of Annex A to the Convention and on their experience in implementing the Committee's recommendations on BDEs and PFOS, its salts and PFOSF set out in the annex to decision POPRC-6/2. Deadline 31 July 2012"

The 2011 Federal Waste Management Plan, Volume 1, pp. 153 provides for rules and measures concerning the treatment of PCB-containing waste.
As regards PCB/PCT-containing waste, an annual volume of overall 110 tons has been registered.

2.1.2 POPs subject to a restriction

Annex B contains the substances which are subject to a restriction. For such a chemical included in Annex B, a production-specific, use-specific derogation or acceptable purpose may apply.

DDT:

In Austria, DDT has no longer been in use since the 1970s; also its use had been banned by way of the Plant Protection Products Prohibition Ordinance. A background paper of EAA (2007) informs of the hazards harbored by DDT use, in particular in the combat of malaria, and of alternative options.

PFOS:

Perfluorooctane sulfonic acid, its salts and perfluorooctanesulfonyl fluoride were primarily used as impregnation agents for textiles, leather and paper, but also in fire-fighting foams. Furthermore, they are also used for many industrial processes. For the following areas, their production or use is still permissible according to Paragraph 1 of Part III of Annex B as acceptable purpose, provided that certain conditions are met:

- Wetting agents for controlled electroplating systems (until August 26, 2015);
- Photoresists and antireflective coatings for photolithography processes; photographic coatings applied to films, papers and printing plates;
- Mist suppressants for non-decorative hard chromium (IV) plating in closed loop systems;
- Hydraulic fluids for aviation.

Emissions shall, however, be reduced to a minimum and the Best Available Techniques (BATs) shall be applied. The aim in this context is the step-by-step abandonment of use.

Special controls concerning PFOS in products were carried out with regard to:

- Fire-fighting foams;
- Ski waxes.

Controls of carpets, textiles and floor coverings are in the planning stage.

In line with the provisions of the POP Regulation, resorting to derogations as regards mist suppressants and galvanics was reported to the European Commission. Similarly, it was announced that PFOS-containing X-ray films are still in use.

Since June 27, 2011, the use of perfluorooctane sulfonic acid and its derivatives (PFOS) C 8 F 17 SO 2 X (X = OH, metal salts (O-M +), halides, amides and other derivatives including polymers) in fire-fighting foams has been banned according to Regulation (EC) No 850/2004 on Persistent Organic Pollutants. This ban is based on Commission Regulation (EU) No 757/2010 of August 24, 2010.

Samples drawn by the competent Provincial authorities were primarily checked for compliance with applicable bans.

As it is no longer permitted to use PFOS-containing fire-fighting foams, compliance with this ban was monitored by drawing samples. Yet there is evidence that PFOS-free foams may contain other fluorinated tensides instead. Also these substitute materials are either not degradable or are degraded to form stable PFCs. Overall, none of these substances could be detected. In addition, there are plans to cooperate with the Austrian Federal Fire Brigade Federation to monitor compliance with this ban and/or work towards minimizing the use of the substitute materials.

As regards ski waxes, some products, yet none of the precursors were analysed. The products themselves were not found fault with.

Concerning PFOS monitoring in foodstuffs, the European Commission, in its Recommendation 2010/161/EU, refers to the fact that also these substances should be analyzed. This is why also PFOS and PFAS were included in the control of foodstuffs. In this context, PFOS values are far below the recommended intake values.

2.2 Unintentionally formed POPs – National Action Plan (NAP)

A) Introduction

Article 5 of the Stockholm Convention commits the Parties to the Convention to prepare an Action Plan two years after the entry-into-force of this Convention at the very latest[46], describing and outlining unintentionally formed POPs (according to Annex C) in greater detail. Moreover, Article 5 provides for regular review (revision) of the Action Plan and of the successful implementation of the obligations under the Convention every 5 years. This chapter contains the summary of the revised Action Plan. For more detailed information, please see the long version.

Annex C currently contains the following unintentionally released chemicals: polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), hexachlorobenzene (HCB), pentachlorobenzene (PeCB) and polychlorinated biphenyls (PCBs).

[46] National Action Plan Pursuant to Article 5 of the Stockholm Convention on POPs and Article 6 of the EU POP Regulation, First Review, 2012; EAA , Vienna 2012

Moreover, the National Action Plan deals with the release of the polycyclic aromatic hydrocarbons (benzo(a)pyrene, benzo(b)fluoranthene, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene), as these are listed in the EU POP Regulation (EC) No 850/2004.

The National Action Plan is part of the National Implementation Plan according to Article 7 of the Convention and shall contain strategies for reducing or eliminating the release of the chemicals listed in Annex C (including PAHs) as well as a timetable. The National Action Plan is to indicate the possible need for action and contain source inventories and emission estimates for these chemicals. The plan identifies priorities for action e.g. for those source categories for which the reduction or elimination of releases seems most cost-efficient. Moreover, it contains release inventories for the chemicals listed in Annex C. The term of “release” covers POP emissions into the air, water bodies and soil as well as releases via waste, residues and products.

The revision of the National Action Plan contains an update of the source inventories and emission estimates (base year: 2004). This is the basis for proposing tools and measures designed to result in the reduction of POP releases. The efficiency of the legal provisions applicable so far as well as the use of BATs (Best Available Techniques) and BEPs (Best Environmental Practices) in the source categories of the Stockholm Convention (according to Annex C) are reviewed. Moreover, there are recommendations on how to implement BATs and BEPs. Furthermore, still existing data gaps are identified and proposals for improving data quality are worked out.

A source inventory for emissions of PCDD/F, PAHs and HCB into the air may be drawn up, which is not possible for PCBs on account of a lack of data.
Only few data are available on the release of POPs into water bodies and waste. As regards waste, an estimate can solely be made for PCDD/Fs. For lack of available data, no source inventories can be drawn up for PCBs concerning air, water, soil, waste and products.

Direct release of POPs into the soil is effected via the source category “open burning of waste, including burning on landfill sites” (this also includes the open burning of biogenic materials such as straw). Yet POPs can also be released into the soil, if process residues are fed back into the environment (example: using ash from small scale residential combustion sources or biomass plants for fertilization).

Releases caused by accidents or emanating from contaminated sites are not dealt with in the National Action Plan. They may, however, be considerable in the case of fires on landfill sites or temporary waste storage facilities.

Moreover, the National Action Plan contains several literature data on POP contents in cement, pulp and paper.

In 2011, EAA analyzed cardboard boxes made from recycled paper for potential contamination with PCDD/Fs by printing colors. No contamination could be detected.

B) Air emission inventory

General trends

Due to the legal provisions on the reduction of emissions from industrial processes and waste incineration, PAH, PCDD/F and HCB emissions significantly decreased between 1985 and 1994. In 1995 and 1996, emissions rose, yet continually declined again until 2001.
From 2000 to 2005, PAH and HCB emissions went up slightly; since 2006, a decrease has become noticeable. Between 2001 and 2002, PCDD/F emissions declined sharply due to reduction measures carried out in a sinter plant.

On account of lower economic activity in the crisis year 2009, PAH, HCB and PCDD/F emissions plummeted significantly.

Dioxins and furans (PCDD/Fs; I-TEQ)

In 2009, 35.7 g of PCDD/F (I-TEQ) were emitted from the source categories outlined in Annex C to the Stockholm Convention. According to Österreichische Luftschadstoffinventur (OLI), the Austrian Air Emissions Inventory, PCDD/F air emissions in 2009 were calculated to be 36.0 g (I-TEQ). This difference has resulted, on the one hand, from the wider scope of application of OLI, and, on the other hand, from partly updated emission factors used for this report.

Only a few source categories are key contributors to the emission of dioxins and furans; with 70 %, the lion's shares in this context are constituted by residential combustion sources, and thermal processes in the metallurgical sector with 13 %. Other polluters are motor vehicles (3.4 %), biomass combustion (8.3 %) and the industrial use of fossil fuels (3.1 %) (See Figure A and Tables 6 and 7).

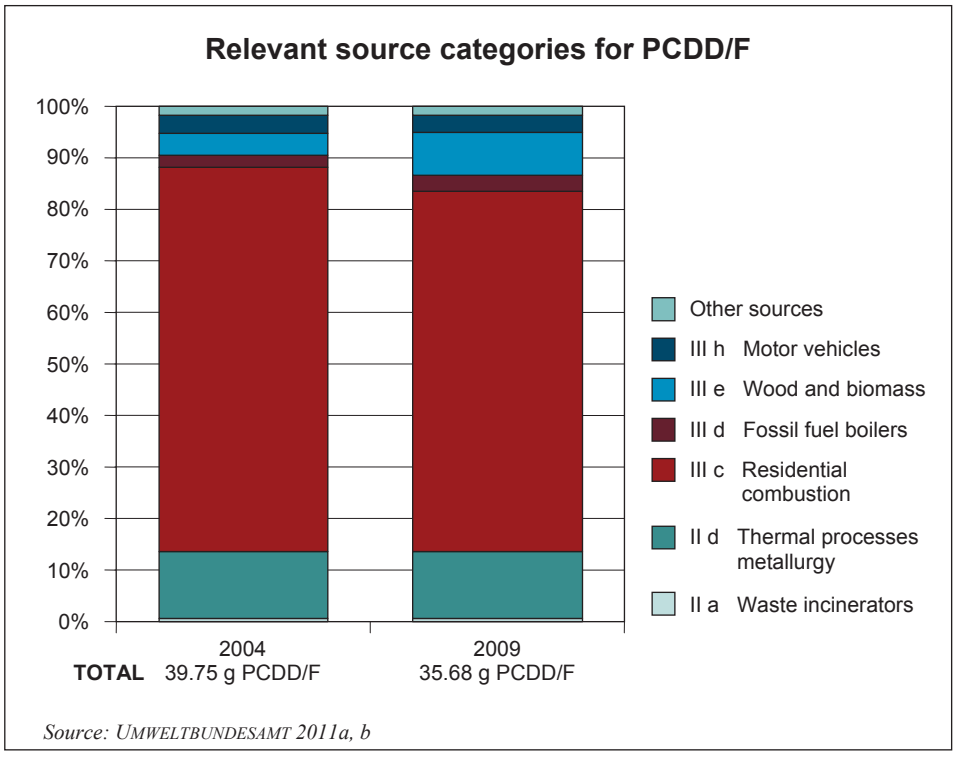


Figure A: Relevant source categories for PCDD/F.

Table 6: PCDD/F emissions from source categories Part II for 2004 und 2009 (EAA 2011a, b).

Source categories Part II	**2004 [g I-TEQ]**	**2009 [g I-TEQ]**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or sewage sludge	0.230	0.229
Cement kilns firing hazardous waste*	0.116	0.131
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching **	IE	IE
The following thermal processes in the metallurgical industry:		
(i) Secondary copper production	0.279	0.279
(ii) Sinter plants in the iron and steel industry	3.106	2.538
(iii) Secondary aluminium production	1.813	1.813
(iv) Secondary zinc production	NO	NO
Total (Part II)	5.544	4.990

* Total PCDD/F emissions from Austrian cement kilns
** Process emissions only; PCDD/F emissions from combustion processes are dealt with in the relevant source categories of Part III.
NO: not occurring – Emission source not existent in Austria
IE: included in other emission source

Table 7: PCDD/F emissions from source categories Part III for 2004 and 2009 (EAA 2011a, b).

Source categories Part III	**2004 [g I-TEQ]**	**2009 [g I-TEQ]**
Open burning of waste*	0.222	0.136
Thermal processes in metallurgical industry not mentioned in Part II	0.198	0.190
Residential combustion sources	29.564	24.931
Fossil fuel-fired utility and industrial boilers	0.974	1.117
Firing installations for wood and other biomass fuels	1.644	2.957
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.154	0.164
Motor vehicles, particularly those burning leaded gasoline	1.453	1.200
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end-of-life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste-oil regeneration plants refineries	NO	NO
Total (Part III)	34.208	30.694

* Without burning of landfill sites and accidental fires
NA: not applicable
NE: not estimated
NO: not occurring

Hexachlorobenzene (HCB)

In 2009, 38.2 kg of HCB were emitted (see Figure B and Tables 8 and 9). The main source category in this context is residential combustion sources with a share of 86.4 %, followed by thermal processes in the metallurgical sector (mainly sinter plants) with a share of 8.7 %. The share of all remaining source categories is below 1 %.

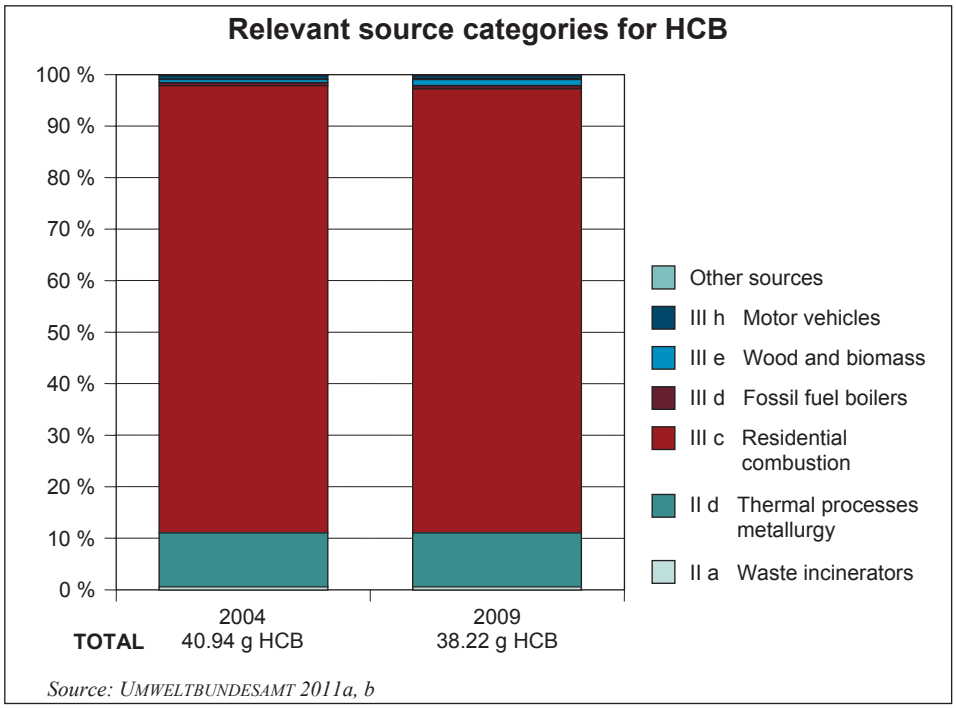


Figure B: Relevant source categories for HCB.

Table 8: HCB emissions from source categories Part II for 2004 and 2009 (EAA 2011a, b).

Source categories Part II	**2004 [kg HCB]**	**2009 [kg HCB]**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or sewage sludge	0.290	0.247
Cement kilns firing hazardous waste*	0.017	0.020
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching **	IE	IE
The following thermal processes in the metallurgical industry:		
(i) Secondary copper production	0.091	0.091
(ii) Sinter plants in the iron and steel industry	3.261	2.926
(iii) Secondary aluminium production	0.907	0.907
(iv) Secondary zinc production	NO	NO
Total (Part II)	4.566	4.189

* Total PCDD/F emissions from Austrian cement kilns
** Process emissions only; HCB emissions from incineration processes are dealt with in the relevant source categories of Part III.
IE: included elsewhere
NO: not occurring

Table 9: HCB emissions from source categories Part III for 2004 and 2009 (EAA 2011a, b).

Source categories Part III	**2004 [kg HCB]**	**2009 [kg HCB]**
Open burning of waste, including burning of landfill sites	0.044	0.027
Thermal processes in the metallurgical industry not mentioned in Part II	0.016	0.014
Residential combustion sources	35.515	33.012
Fossil fuel-fired utility and industrial boilers	0.194	0.198
Firing installations for wood and other biomass fuels	0.287	0.511
Specific chemical production releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.031	0.033
Motor vehicles, particularly those burning leaded gasoline	0.291	0.240
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end-of-life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste-oil refineries	NO	NO
Total (Teil III)	36.377	34.035

NA: not applicable

NE: not estimated

NO: not occuring

Polychlorinated biphenyls (PCBs)

Due to limited availability of qualified data releases of PCB could not be calculated.

Polycyclic aromatic hydrocarbons (PAHs)

In 2009, 7,462 kg of PAHs were emitted. The main PAH emission sources are residential combustion sources with a share of 69.7 % as well as motor vehicles with a share of 24.2 % in total emissions (see Figure C and Tables 10 and 11). Other important polluters are the open burning of waste (2.5 %) as well as sinter plants (1.9 %).

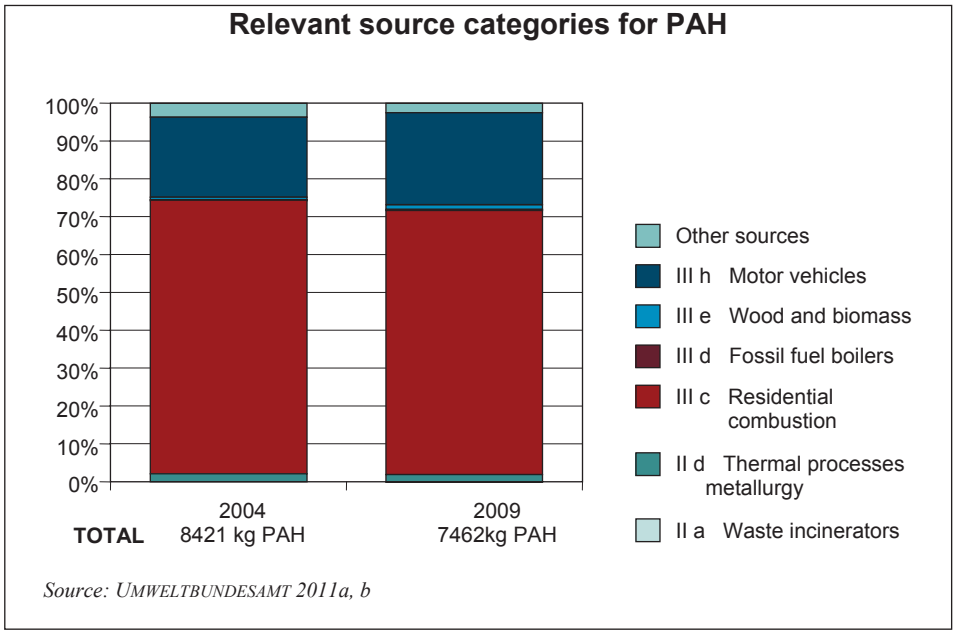


Figure C: Relevant source categories for PAH.

Table 10: PAH emissions from source categories Part II for 2004 and 2009 (EAA 2011a, b).

Source categories Part II	**2004 [kg PAH]**	**2009 [kg PAH]**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or sewage sludge	24.1	11.5
Cement kilns firing hazardous waste*	3.2	3.7
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching **	IE	IE
The following thermal processes in the metallurgical industry:		
(i) Secondary copper production	NE	NE
(ii) Sinter plants in the iron and steel industry	156.5	140.9
(iii) Secondary aluminium production	NE	NE
(iv) Secondary zinc production	NO	NO
Total (Part II)	183.8	156.1

* Total PAH emissions from Austrian cement kilns
** Process emissions only; PAH emissions from incineration processes are dealt with in the relevant source categories of Part III.
IE: included elsewhere
NE: not estimated
NO: not occurring

Table 11: PAH emissions from source categories Part III for 2004 and 2009 (EAA 2011a, b).

Source categories Part III	**2004 [kg PAH]**	**2009 [kg PAH]**
Open burning of waste, including burning of landfill sites	304.1	183.5
Thermal processes in the metallurgical industry not mentioned in Part II	2.9	2.8

Residential combustion sources	6,080.0	5,198.3
Fossil fuel-fired utility and industrial boilers	16.5	27.1
Firing istallations for wood and other biomass fuels	47.0	89.1
Specific chemical production processes in the course of which unintentionally formed persistent organic pollutants are released, in particular in the course of the production of chlorophenols and chloranil	NA	NA
Crematoria	<0.1	<0.0
Motor vehicles, particularly those burning leaded gasoline	1,777.9	1,805.6
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end-of-life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste-oil refineries	NO	NO
Total (Part III)	8,228.3	7,306.3

NA: not applicable.
NE: not estimated
NO: not occurring

Pentachlorobenzene (PeCB)

In 2009, 21.28 kg of PeCB were emitted (see Figure D and Tables 12 and 13).

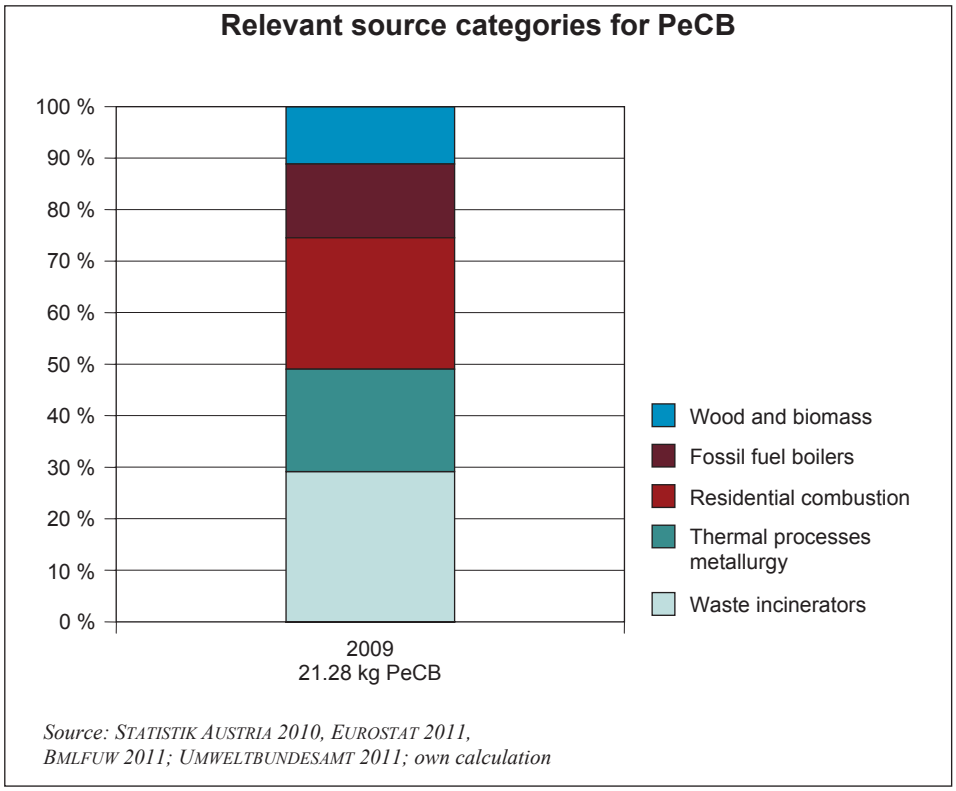


Figure D: Relevant source categories for PeCB.

Table 12: PeCB emissions from source categories Part II for 2009 (Statistik Austria 2010, Eurostat 2011, BMLFUW 2011; EAA 2011, calculation according to NAP).

Source categories Part II	**2009 [kg PeCB]**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	6.21
Cement kilns firing hazardous waste	NA
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching	NA
The following thermal processes in the metallurgical industry:	
(i) Secondary copper production	NA
(ii) Sinter plants in the iron and steel industry	4.2
(iii) Secondary aluminium production	NA
(iv) Secondary zinc production	NO
Total (Part II)	10.41

NA: not applicable

NO: not occurring

Table 13: PeCB emissions from source categories Part III for 2009 (Statistik Austria 2010, Eurostat 2011, BMLFUW 2011; EAA 2011, calculation according to NAP).

Source categories Part III	**2009 [kg PeCB]**
Open burning of waste, including burning of landfill sites	NA
Thermal processes in the metallurgical industry not mentioned in Part II	NA
Residential combustion sources	5.5
Fossil fuel-fired utility and industrial boilers	3.0
Firing installations for wood and other biomass fuels	2.37
Specific chemical production processes releasing unintentionally formed persistent organic pollutants , especially production of chlorophenols and chloranil	NA
Crematoria	NA
Motor vehicles, particularly those burning leaded gasoline	NA
Destruction animal carcasses	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA
Shredder plants for treatment of end-of-life vehicles	NA
Smouldering of copper cables	NO
Waste-oil regeneration plants	NO
Total (Part III)	10.87

NA: not applicable NO: not occurring

C) Water emissions inventory

In Austria, POP releases into water are recorded in two different registers:

- In the European Pollutant Release and Transfer Register – EPRTR, all point sources and emissions into surface waters are recorded for basically all POPs. In day-to-day practice, most industries are, however, only subject to a reporting obligation if certain production capacities or emission thresholds are exceeded. Due to the company structure prevalent in Austria (mainly small and medium-sized companies), only some 80 plants emitting releases into waters or wastewater are listed in the PRTR. In 2007, 2008 and 2009, no POPs emissions were reported. And, as of yet, no data on diffuse sources are available in PRTR.

- In 2009, a national emission inventory was set up as part of WISA, the Austrian Water Information System according to Sects 59 and 59a of the 1959 Water Law Act, as amended, see Footnote 32. This inventory comprises the following point sources: plants according to PRTR, urban waste water treatment plants with a capacity of more than 2,000 population equivalents and waste incineration plants with a capacity of more than 2 t of waste per hour. There are no release thresholds with regard to the reporting obligation. Yet in day-to-day practice, the lower limit results from the limit of determination of the respective method of analysis and from the waste-water discharge. During the first reporting period (2009), only basic waste-water parameters were retrieved. The second, more comprehensive reporting cycle followed in 2010; part of the results has been analyzed in 2011.

In 2007 and 2008, additional data on POP releases into water bodies were collected in the course of the set-up of a national emission inventory. Intake and outlet of 15 urban waste-water treatment plants featuring different capacities, purification techniques and waste water compositions were checked for appr. 70 substances. The analysis program did not only comprise priority substances and certain other substances according to the daughter directive 2008/105/EC of the Water Framework Directive, but also pollutants exhibiting national relevance according to the Austrian Quality Target Ordinance/Chemical Condition[47]. DDT, chlordane, aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene and pentachlorobenzene were not found in untreated waste water. PAHs were only found in untreated waste water, with one exception. In effluents, only PBDEs (< ng/l) and lindane (γ-hexachlorocyclohexane – ng/l) were detected. The use of lindane had been permitted until January 1, 2008 for some selected minor applications.

Concerning contaminated sites it can be concluded that underground pollution by PAH causes in general only local impacts to soil and groundwater. Depending on the specific situation and on the manner in which the concerned area is utilized, potential risks for human health and for the ecosystem must be analyzed and eventually prevented. The Austrian Register of Contaminated Sites contains only very few sites contaminated with the pollutants PCDD/Fs, HCB and PCBs; data on the extent of the

[47] Ordinance of the Federal Minister for Agriculture, Forestry, Environment and Water Management on the Determination of the Target State of Surface Waters (Quality Target Ordinance/Chemical Condition of Surface Waters – QZV Chemie OG) FLG II No 96/2006 ; amended by FLG II No 267/2007 and FLG II No 461/2010

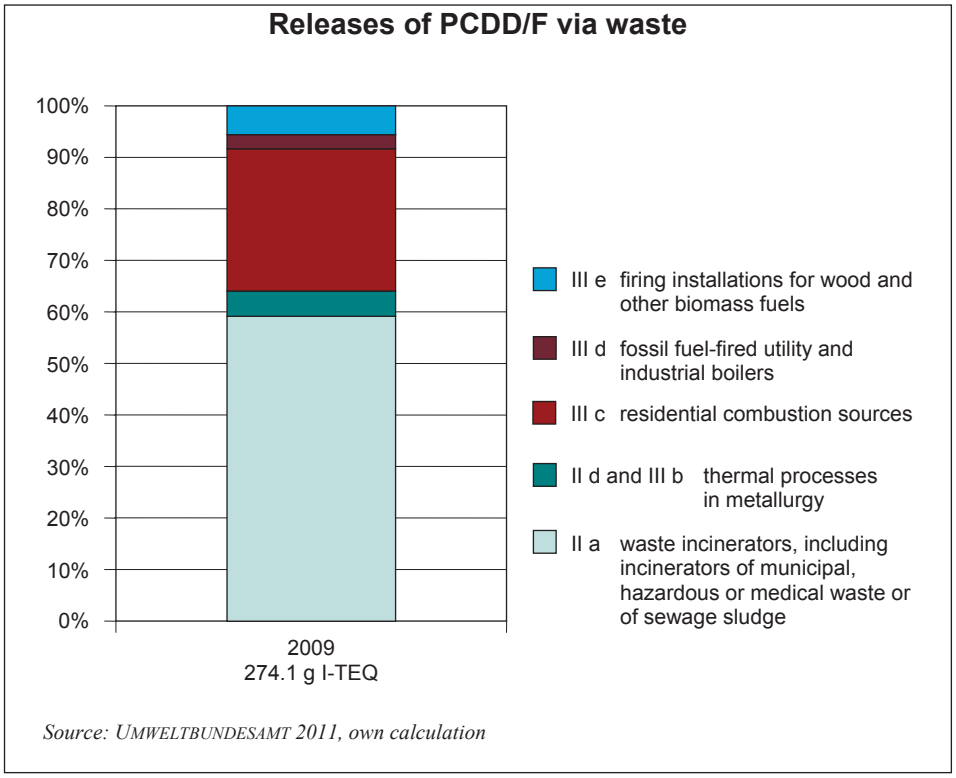
contamination or on the impact on the environment are not available (see Chapter 2.4).

D) waste Inventory of releases via residues and waste

An inventory of releases can only be drawn up for PCDD/Fs and PeCB.

Dioxins and furans

Since 2004, dioxin and furan release via waste and residues has basically remained the same. In 2009, overall 274.1 g of PCDD/F I-TEQ (in 2004: 267.1 g) were emitted, i.e. the seven-fold amount of emissions released into the air. In this context, solid waste from waste incineration account for the lion's share (59%); also the share of waste from residential sources (28%) is considerable. Other sources are: waste from thermal processes in the metallurgical industry as well as from the use of fossil fuels and biomass (see Figure E).



Note: Total releases may be higher since for many source categories (e.g. the metallurgical sector) which have the potential of POPs releases via waste qualified emission factors are not available.

Figure E: Releases (although hardly bio-available) of PCDD/F via waste.

However, there are distinct differences to other releases concerning uptake by organisms and impacts on human health: The overwhelming majority of waste is deposited on landfill sites. This is why bioavailability of the potentially contained POPs is no longer existent, provided that the landfills were properly built and are properly operated.

As a rule, waste incineration residues are disposed on landfills (landfills for residual waste, mass waste or underground storage sites). 87% of PCDD/F releases occur via fly ash, which is often sent to underground disposal.

Extremely high PCDD/F concentrations are found in soot released from small combustion sources. It is assumed that a major part of this soot is disposed via household waste. During the thermal treatment of such household waste, POPs are either oxidized or – if they are captured in the ashes – sent to landfills. Also during the mechanical-biological treatment of household waste, POPs eventually end up in the waste fraction which is subject to final storage on the landfill site.

Waste from metallurgical industry which is potentially contaminated to a certain extent is either fed back into the process or subject to external treatment/disposal. There exist major data gaps with respect to concentrations of POPs and treatment of POP containing waste types.

Fly ash from thermal power plants is used in the cement and construction material industries, while fly ash stemming from the incineration of biomass must be disposed on landfills.

Waste getting into the environment may lead to POP release: Ashes from small scale firing istallations (potentially containing considerable amounts of POPs) can e.g. be used for fertilization or for applying it to the streets in winter. In addition, coarse ashes from biomass plants are used as compost additives. Due to considerable data gaps as regards POP-concentration levels in ashes from residential combustion sources, making reliable release estimates is fraught with uncertainty. What is decisive for the level of POP concentrations in ashes is, in particular, the different type and quality of fuels (moisture content, ash content, calorific value, chlorine content), the combustion system used as well as the amount of waste burnt with it.
These releases may, however, become relevant, if part of the residues/waste is fed back into the environment (e.g. if ash is used for fertilizing home gardens).

Pentachlorobenzene (PeCB)

In 2009, overall 3.08g of PeCB were emitted, i.e. appr. one seventh of emissions released into the air. The lion’s share in this context (81%) is accounted for by solid waste from waste incineration. Other sources are: waste from thermal processes in the metallurgical industry and the use of fossil fuels and biomass (see Figure F and Table 14). Yet mention should be made of the fact that only few data are available for PeCB release levels.

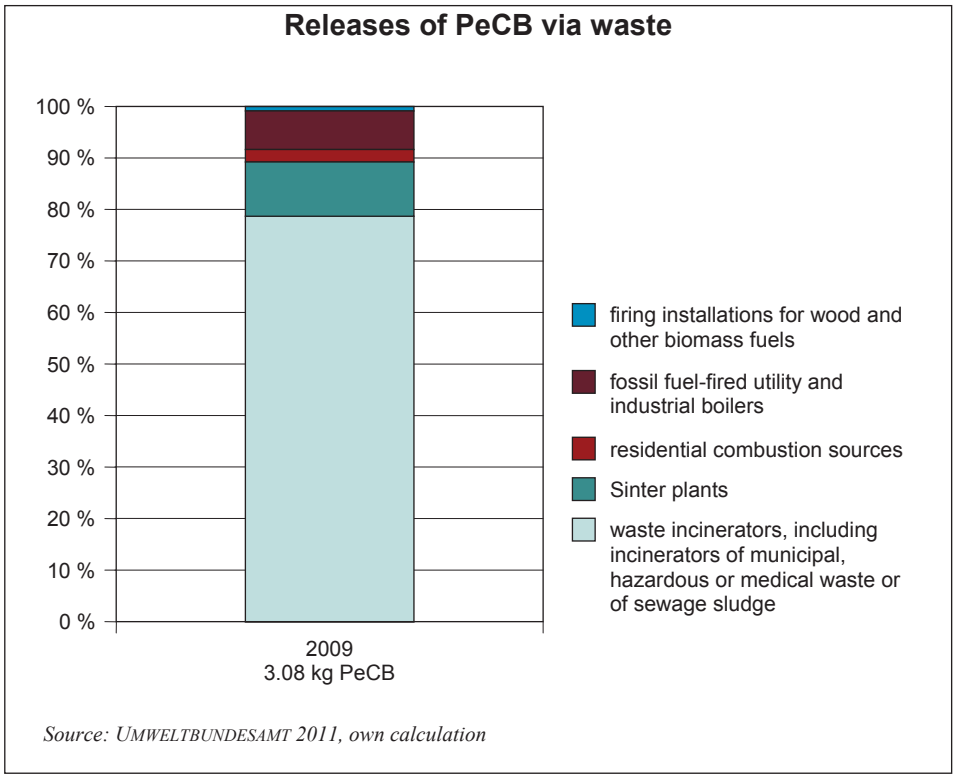


Figure F: Releases of PeCB via waste.

Table 14: PeCB discharge into waste for 2009 (calculations according to NAP)

Source category	**2009 [kg PeCB]**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	2.42
The following thermal processes in the metallurgical industry:	
(ii) Sinter plants in the iron and steel industry	0.33
Residential combustion sources	0.07
Fossil fuel-fired utility and industrial boilers	0.23
Firing installations for wood and other biomass fuels	0.03
Total	3.08

E) Releases via products

The need for action with regard to POPs contained in products results, among other things, from Annex C Part V A (g) of the Convention ("minimization of these chemicals as contaminants in products"). The literature provides several data on PCDD/F contents in cement, pulp and paper (see Table 15). No data are available for other POPs. Releases via products are, however, not relevant for most of the source categories.

Table 15: PCDD/F contents in cement, pulp and paper. Calculations are based on literature data (Karstensen 2006[48], UNEP 2005[49], Gruber 1996[50]).

Product	**Release (g I-TEQ/a)**
Cement	4.02
Paper	4.98
Exported pulp	0.123 Releases via pulp occur only via export; Releases via pulp which is not exported is included in the figure for paper

As there have been no changes with regard to the production mode, the extent of PCDD/F levels released via cement, pulp and paper have remained the same since 2004.

PCDD/F contents in cement are low and can be explained by the fact that filter dusts from clinker production (average PCDD/F concentration: 6.7 ng I-TEQ/kg) are added to the product and, moreover, also secondary raw materials (e.g. fly ash, gypsum from flue-gas desulphurization) are used. It is also possible that the cement clinker itself is contaminated with PCDD/Fs (on average: 0.9 ng I-TEQ/kg of clinker) (Karstensen 2006). Bioavailability of POPs bound in the cement is, however, very low.

Austria has been actively involved in the revision of the Dioxin Toolkit (UNEP 2005, see FN 50 and 77). The current draft stipulates the following: “Due to the long residence times in the kiln and the high temperature which is required to manufacture these products, the formation of dioxins in the course of this process is at a relative low level”.[51] Cement kilns firing hazardous waste constitute a source category according to Annex C Part II litera (b) of the Convention on Emissions from PCDD/Fs (Tab. 6), HCB (Tab. 8), PAHs (Tab. 10) and PeCB (Tab. 12). Thus, the quantification of the different POPs in environmental media as well as in residues and products is desirable.

With regard to pulp and paper, it is possible that PCDD/F are introduced into the products via the bleached (Kraft-) pulp and via the recycled papers. In the reference year 2009, the total production of pulp in Austria was 1.514 kt (2004: 1.509 kt). 24% of this amount were produced according to the sulphite technique, using TCF (Total Chlorine Free) bleach, while 26% were produced according to the sulphate technique with ensuing ECF (Elemental Chlorine Free) bleaching; 32% are unbleached Kraft-pulp, and 18% textile-based pulp (AUSTROPAPIER 2009[52]).

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48 KARSTENSEN, K.H. (2006): Formation and Releases of POPs in the Cement Industry, Second Edition. Sintef 2006.

49 UNEP (2005): Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases; 2nd Edition, February; also see FN 77

50 GRUBER, L; MEISBURGER, M; WOLZ, G; SANTL, H. (1996): Dioxine in der Papier- und Zellstoffherstellung *(Dioxins in Paper and Pulp Production)*. VDI reports No 1298.

51 Quotation from Dioxin Toolkit (2012 draft) Chapter 4 Mineral Products
“This section summarizes high-temperature processes in the mineral industry. Raw materials or fuels that contain chlorides may potentially cause the formation of PCDD/PCDF at various steps of the processes, e.g., during the cooling phase of the gases or in the heat zone. Due to the long residence time in kilns and the high temperatures needed for the product, emissions of PCDD/PCDF are generally low in these processes.”

52 AUSTROPAPIER (2009): Die österreichische Papierindustrie 2009 *(The Austrian Paper Industry in 2009)*. Annual report.

The calculation of releases from pulp is based on the following emission factors: 0.5 µg/t for bleached Kraft-pulp and 0.1 µg/t for other pulps (UNEP 2005). Accordingly, the release of PCDD/Fs via pulp was 0.28 g in 2009.

Pulp (domestic or imported), wood pulp and recovered paper (deinked or not deinked) are used as raw materials for paper production. Thus, also the input via imported pulp is to be considered. In 2009, appr. 690,000 t of bleached (Kraft-) pulp were imported, partly from countries which still use chlorine for bleaching pulp (AUSTROPAPIER 2009). For calculating the PCDD/F content, an emission factor of 0.5 µg/t is assumed for 10% of imported goods, while for the major part of the imported pulp an emission factor of 0.1 µg/t is assumed. This makes for a total import of 0.096g I-TEQ via pulp. Conversely, some 0.123 g I-TEQ were exported in 2009. The input of PCDD/F via wood pulp was calculated on the basis of an emission factor of 0.1 µg/t, resulting in a total input of 0.044 g I-TEQ.

In addition, also the POP input via recycled paper (particularly via impurities contained in the inks used) is relevant. Deinking reduces PCDD/F concentrations by a factor of 3 (appr. 40% of recovered paper in Austria is deinked) (GRUBER 1996). Comparably high concentrations of up to 12 ng/kg were found in packaging papers and cardboard in the early 1990s. In general, a sharp decline was registered between 1989 and 1994; ever since, concentrations have been decreasing only slightly. Based on these studies as well as on the emission factors given in the UNEP Dioxin Toolkit (UNEP 2005), PCDD/F concentration in waste paper was estimated to be at 3 µg/t without deinking and at 0.99 µg/t for deinked paper. This results in an average emission factor of 2.18 µg/t for waste paper and a total release level of 4.98 g I-TEQ (reference year: 2004).

Various scientific publications have shown that waste paper potentially contains significant traces of PCDD/Fs which are caused by impurities through printing colours (e.g. pigments). In 2011, EAA drew random samples of cardboard boxes known to be produced from waste paper and checked it for PCDD/F content. Comparing new, unprinted folding-box boards to printed boxes from the collection of waste paper, no indications were found that PCDD/Fs were introduced by way of printing colours. The PCDD/F contents found in the cardboard samples were in the 1.2-to-1.9-ng-TEQ/kg range (Umweltbundesamt 2011c).

In 2010, Austropapier, the Association of the Austrian Paper Industry, provided new data on the PCDD/F content of certain types of product, with the aim of optimizing the emission factors mentioned in the Dioxin Toolkit (UNEP 2005). The thus derived emission factors would reduce the total release of PCDD/Fs via paper products by a factor of 3. Although it is still unclear to which extent these data are representative, this information is provided to the Dioxin Toolkit experts in order to discuss a review of existing emissions factors.

As a result, 2011 saw a renewed calculation of PCDD/F releases via paper:

Table 16: Releases of PCDD/F via products (calculation according to NAP on the basis of Austropapier statistics and the submitted analysis results)

Product	Production (t/a)	Emission factor (µg TEQ/t)	Releases (g PCDD/F TEQ/a)	Percentage (%)
Newsprint paper	299,205	0.068	0.02	1.2
Printing and writing paper				
- Deinked	902,421	0.068	0.06	3.7
- Made from pulp	1,346,070	0.050	0.07	4.0
Folding-box cardboard	487,214	0.723	0.35	21.1
Packaging papers	676,177	1.141	0.77	46.2
Kraft paper				0.0
- with recovered paper	374,855	0.858	0.32	19.3
- only from pulp	250,743	0.050	0.01	0.8
Thin and special papers				0.0
Sanitary paper	128,660	0.068	0.01	0.5
Others	126,896	0.050	0.01	0.4
Packing and special board	13,299	0.858	0.01	0.7
Market pulp - Exported	95,471	0.070	0.01	0.4
Market pulp (ECF-bleached)	313,818	0.090	0.03	1.7
Total	**5,014,829**		**1.67**	**100.0**

F) Evaluation of the efficiency of legal provisions and strategies with regard to the obligations under the Stockholm Convention and the EU POP Regulation

As already set forth in the 2008 National Action Plan, Austria complies with the requirements under the Stockholm Convention and under the EU POP Regulation already now. Nevertheless, further effort is required, as the Stockholm Convention aims at the “continuing minimization of POP releases”.
POP emissions from major stationary (industrial) sources have been dramatically reduced over the last years. Between 2004 and 2009, emissions declined further, which is, however, partly due to less pronounced economic activity in 2008 and 2009. If, however, further development concerning the state of play of technology should result in lower emissions or even a complete prevention of these emissions, policy stakeholders are called upon to react to that and to respectively adapt the relevant legal provisions (e.g. by fixing more stringent emission limit values).

As a rule, the 2008 NAP conclusions shall continue to apply also for the years to come:

Accordingly, small residential combustion plants which are responsible for 70% of PCDD/F, 86.4% of HCB, and 69.7% of PAH emissions into the air were identified as major source of emission as early as in 2008. All possible measures must be examined and exploited in order to prompt a reduction of these POP emissions.
Further necessary action concerns awareness-raising to encourage “low emission” incineration in household stoves or, for example, with regard to the use of ashes and soot from small combustion plants e.g. as fertilizers. In this context, an important campaign was launched as early as in 2009 and 2010 (see below).

Currently, several comprehensive and cross-sectoral measures and tools are developed in Austria in order to comply with different national and international commitments. These measures (which are e.g. contained in the 2007 Climate Strategy[53]) aim at the reduction of greenhouse gases, NOx and particulate matter. This can partly contribute to an indirect reduction of POP releases (e.g. by reducing energy consumption or by fixing more stringent air emission limit values for dust). Other measures, such as the enhanced use of biomass in small scale firing installations will, however, also result in an increase of POP emissions.
Besides, it is important to obtain improved knowledge in areas in which, up to now, reliable data have been available only to a very limited extent. This is why, in the following, specific proposals for studies e.g. with regard to POP concentrations in certain wastes or further monitoring activities were formulated.

Handling of PeCB emissions: It is a well-known fact that measures aiming at the elimination of PCDD/Fs also lead to a minimization of PeCB. This information is also contained in Annex V to the Stockholm Convention on POPs and, in particular, in the guidelines on best available techniques and best environmental practices. It is thus not necessary to take specific measures with regard to PeCB.

Evaluation of 2008 NAP and further need for action (according to Sect 20 Para 2 of the 1996 Chemicals Act, as amended)

The 2008 National Action plan already outlines a series of measures aiming at the minimization of POPs and designed to generate more information on POPs in the environment.

Measures combating the release of POPs from source categories

[53] Adaptation of Austrian climate strategy to achieve the 2008-2012 Kyoto objective; is currently being revised – Working title “Climate Strategy for 2013-2020”

Table 17: Overview of measures proposed in the 2008 NAP and current state of implementation

National Acts and Ordinances	POP-relevant contents	Comment/Concrete steps	Current status
Act on Emissions of Boiler Plants (FLG I No. 150/2004); Clean Air Ordinance for Boiler Plants (FLG No. 19/1989 as amended by FLG II No. 2005/55); both as amended by Emission Measurement Ordinance (FLG II No.153/2011)	ELVs for dust, CO, Corg, NOx	Adaption to BAT required	Adaptation effected by way of the Act on Emissions of Boiler Plants as amended
1994 Industrial Code (GewO 1994) and Ordinances according to Sect 82 Para 1 of GewO 1994, for example, Ordinance Enacted by the Federal Minister for Economic Affairs on the Limitation of the Emission of Air-Polluting Substances from Plants Used for the Sintering of Iron Ores – Sinter Plant Ordinance (FLG II No 163/1997)	ELVs for various air pollutants, e.g. dust, PCDD/Fs	Continuous evaluation with regard to BAT	Routine Evaluation
Combustion Plants Ordinance, FAV in short (FLG II No 331/1997)	ELVs for dust, CO, Corg, NOx	Adaption to BAT required (more stringent ELVs for dust)	The measure was implemented by way of FAV (FLG II No 312/2011) in 2011.
Waste Incineration Ordinance (FLG II No 389/2002)	ELVs for dust, CO, Corg, NOx, heavy metals, PCDD/Fs	More stringent ELVs desirable for coincinerators	Amendment of Waste Incineration Ordinance FLG II No 476/2010, but without more stringent ELVs for dust
Water Law Act and Ordinances	ELVs for AOX and POX as well as for specific POPs in industry-specific Waste Water Emission Ordinances		
Waste Water Emission Ordinance Flue Gas Treatment (FLG II No 271/2003)	ELVs for PCDD/Fs	Continuous evaluation with regard to BAT	No amendment
Waste Water Emission Ordinance Coal Processing (FLG II No 346/1997)	ELVs for PAHs	Continuous evaluation with regard to BAT	No amendment
Waste Water Emission Ordinance Plant Protection Products (FLG No 668/1996)	ELVs for AOX and specific POPs	Continuous evaluation with regard to BAT	No amendment

National Acts and Ordinances	POP-relevant contents	Comment/Concrete steps	Current status
Quality Target Ordinance Surface Waters (FLG II No 96/2006)	Environmental Quality Standard (EQS) for HCB	Environmental Quality Standard (EQS) for PAHs have been determined for the entire EU in 2008.	Amendment of Quality Target Ordinance (FLG II No 461/2010) according to Directive 2008/105/EC
Landfill Ordinance (FLG No 39/2008)	Limit values for PAH concentrations in waste		Amendment of Landfill Ordinance FLG II No 185/2009 and FLG II No 178/2010
Compost Ordinance[54] (FLG II No 292/2001)	Limit values for POP concentrations in composts	Continuous evaluation of limit values required	No amendment
Sewage Sludge and Compost Ordinances of the Federal provinces	Limit values for POPs	Continuous evaluation of limit values required	No amendment; some Austrian provinces limit POP in sewage sludge
Soil Protection Acts of the Federal provinces: Burgenland Soil Protection Act Provincial Law Gazette No 87/1990 Lower Austrian Soil Protection Act Provincial Law Gazette No 6160-0 Upper Austrian Soil Protection Act Provincial Law Gazette No 63/1997 Salzburg Soil Protection Act Provincial Law Gazette No 80/2001 Styrian Agricultural Soil Protection Act Provincial Law Gazette No 66/1987		Elaboration of target values for organic pollutants (including polybrominated diphenyl ethers, perfluorinated tensides and pesticides) is expedient for minimizing soil contaminations.	No amendment
Ambient Air Quality Act (IG-L)	Sect 21 of IG-L: Authorization to issue ordinances	Check if generally-binding ELVs are required for crematoria in an Ordinance according to Sect 21 of IG-L	Not implemented, no general requirements for crematoria
Legal acts of the Federal provinces regarding residential combustion sources		Agreement according to Sect 15a of B-VG, the Federal Constitutional Law Act, on the placing on the market and review of combustion installations Timetable: earliest-possible transposition of this agreement into Provincial law	The agreement was signed in 2011.

[54] Ordinance of the Federal Minister for Agriculture and Forestry, Environment and Water Management on Quality Requirements Placed on Composts Made from Waste (Compost Ordinance) pursuant to the Waste Management Act, as amended

National Acts and Ordinances	POP-relevant contents	Comment/Concrete steps	Current status
Federal Air Pollution Prevention Act[55] aiming at the preservation of the natural air composition to an extent ensuring the lasting protection of health and animal and plant life to the extent possible	Prohibition of burning of biogenic materials – many exemptions possible	Review of derogations	Integration of prohibition into Federal Air Pollution Prevention Act - BLRG
Authorization procedures	POP-relevant contents	Comments/Concrete steps	
Landfills	Fire-prevention requirements	Implementation of efficient fire-prevention measures for landfills and temporary waste-storage facilities	No new information

ELV: Emission Limit Value BAT: Best Available Technique

To accommodate for the challenge of residential combustion facilities causing 70 % of PCDD/F emissions into the air, the the Federal Ministry of agriculture and forestry, environment and water management published a booklet entitled "Richtig heizen" (Proper Heating) in 2010 in cooperation with the Federal Chimney Sweepers' Guild, the Austrian Tile Stove Association, the Austrian Medical Chamber and the Association of Doctors for a Healthy Environment, providing information on the impact of emissions from household stoves on human health and the environment and on how to minimize these emissions through proper handling. The booklet was distributed via chimney sweepers and medical doctors. In addition, a website was set up (www.richtigheizen.at), providing further information on the proper use of stoves and on legal matters.

Moreover, the swift implementation of the following measures is of utmost importance:

- Implementation of the requirement according to Sect 15a of B-VG, the Federal Constitutional Law Act, agreed between the Federal government and the Federal provinces dealing with joint quality standards for the promotion of the erection and rehabilitation of residential buildings for the purpose of greenhouse-gas-emission reduction;
- Efficient promotion of exchange of coal-fired stoves;
- Regular review and improvement of subsidization criteria for biomass combustion plants (including agricultural facilities of that kind) with regard to operating conditions, energy efficiency (including distance-heating systems), fuel quality and ELVs for dust
  → Dust ELVs were amended in 2007 and 2009
- Continuation of information campaigns on the prevention of waste incineration in small scale firing installations;
- Continuation of information campaigns on the disposal of soot and ashes from small scale firing installations;

[55] Federal Act on the Incineration of Materials Outside Facilities (Federal Air Pollution Prevention Act - BLRG), FLG I No 137/2002, last amended by FLG I No 50/2012

- Implementation of appropriate measures ensuring compliance with the target value for benzo(a)pyrene in ambient air (1 ng/cu m) (target value will be transformed into limit value as of December 31, 2012).
  → Different measures taken by the Federal provinces

There is only an insufficient amount of data available for the sources mentioned in the following. In order to be able to estimate the pertinence of these sources and to complete the Austrian source inventories, the measures mentioned below seem to be necessary, or, at least, desirable. More often than not, implementation of these measures will, however, depend on their financial viability:

- Analysis of emission scheme of small combustion plants (esp. burning of straw and cereals)
  → Partly yet unknown as regards POPs; a project ("EnEmTech") dealing with the analysis of different emission parameters in residential combustion facilities is currently in the pipeline;
- Emission measurements at motor vehicles and review of emission factors in order to facilitate more accurate trend forecasts
  → The Handbook on Emission Factors for Road Traffic (HBEFA) provides emission factors for the most-commonly-used types of vehicle (passenger cars, light-weight and heavy-weight utility vehicles, buses and coaches as well as motorcycles), broken down by emission plans as well as by different traffic situations. HBEFA provides emission factors for all regulated pollutants as well as for a series of non-regulated pollutants, including CO2 and fuel consumption. The "HBEFA 3.1" version is the most recent version available. Passenger-car emission factors have been completely revised (new scheme approaches, broader empirical bases, new emission measurements). For calibrating the scheme, modal emission measurements (in the time range of seconds) up to Euro 4 have been used. Emission factors for future concepts (Euro 5, 6) were estimated on the basis of future legislation.
- Improvement of quality of data on POP releases from landfills and abandoned industrial sites as well as contaminated sites (e.g. PAH content in landfill gas);
- Assessment of POP contamination and treatment of waste and residues from non-ferrous metals and secondary steel production and sinter plants
  → No new assessment
- Determination of POP concentrations in waste from small combustion plants (households, services, agriculture) getting into the environment in all likelihood (e.g. bottom ash and fly ash);
- Determination of POP concentrations in waste from boilers fired with fossil fuels (including co-incineration of waste) entering other production processes or getting into the environment in all likelihood (esp. fly ash from co-incinerators);
- Determination of POP concentrations in waste from biomass combustion plants entering other production processes or getting into the environment in all likelihood (e.g. bottom ash);
- Determination of concentrations of PCDD/Fs and relevant precursor substances in bleached Kraft pulp (imported as well as domestically-

produced), paper (packaging paper, cardboard, paper containing waste paper), colours and printing colours as well as in deinking sludge

→ In 2011, EAA conducted a general study on the estimation of potential PCDD/F inputs into cardboard products via printing colours. The results of this limited study provided no evidence that there is a PCDD/F contamination caused by the printing colours currently in use.

- Quantification of POP contents in filter dust from cement clinker production
  → Quantification in accordance with EAA , the Cement Industry Division represented in the Austrian Federal Economic Chamber and other stakeholders; support in the revision of the Dioxin Toolkit as regards "Mineral Products"
- Quantification of POP emissions (esp. PCDD/Fs and PCBs) from Platformer 3 of the Schwechat-based OMV refinery
  → Quantification not yet conducted

Data on POP emissions released into the environment

Table 18: Concrete measures for improving the data available for POP emissions into the environment

Concrete steps	**Timetable**
Improving data quality for HCB and PCB releases into the air (e.g. by planning and implementing measurement programs at priority sources, such as e.g. residential combustion sources and industrial processes)	Review of available (literature) data, identification of potentially relevant sources
Set-up of monitoring programs close to POP-relevant sources	Identification of relevant sites Sampling and measurement (winter/summer)
Continuation of spruce-needle monitoring close to POP sources	Continuous sampling

Data on POP concentrations in the environment

Table 19: Concrete measures for improving the data available for POP concentrations in the environment

Concrete steps	**Timetable**
Continuation of monitoring of ambient air and deposition at Alpine peaks (Sonnblick)	Continuing sampling and analysis
Monitoring of ambient air and deposition of POPs in the border region between Austrian and the Czech Republic	2011/12 sampling and analysis
Development of transfer factors for enhancing the knowledge on interactions between POP concentrations in the environment and bioavailable concentrations	Set-up of scientific panel

Concrete steps	Timetable
Development and/or adaptation of passive sampling methods for improving data comparability	Selection and development of methods/instruments, pilot study, evaluation of pilot study and selection of suitable methods
Implementation of a national monitoring program for investigating the distribution of POP deposition	2008 – Selection of relevant sites 2009 – Implementation

2.3 Stockpiles and wastes

Article 6 of the Convention deals with the reduction or prevention of releases from POP stockpiles and wastes. The Parties to the Convention shall ensure that stockpiles and wastes are handled so as to protect human health and the environment. Stockpiles as well as products and articles in use (mainly PCB-containing equipment) must be identified and handled in a safe, efficient and environmentally-sound manner. The POP content of waste must be destroyed or irreversibly transformed. Other methods of disposal may only be pursued if the POP content is low or if the destruction does not constitute the environmentally-preferable option.

In addition to the more general obligations concerning waste management, a provision on the destruction of POP waste by way of incineration was added in Austria by way of the Amendment to the 2002 Waste Management Act[56].

The Waste Framework Directive 2006/12/EC[57] (amended by 2008/98[58]) and the EU Directive on Hazardous Waste 91/689/EEC[59] both introduced a set of provisions in order to ensure that wastes and stockpiles are handled in an environmentally-sound manner. Besides other measures, this covers the promotion of waste prevention, provisions for the classification of hazardous waste, the obligation to collect waste, to have it packaged and labelled appropriately, to draw up waste management plans, to issue permits for disposal and recovery plants and to ban the unchecked disposal of waste.

Article 5 of the EU POP Regulation 850/2004/EC provides that stockpiles are treated as waste. Owners of stockpiles exceeding 50 kg and consisting of POPs or containing POPs shall notify the competent authority on the type and scope of these stocks. The stockpiles must be handled in a safe, efficient and environmentally-sound way. Member States are obliged to monitor the use and treatment of notified stockpiles.

According to Austrian legislation, certain waste stockpiles which are destined for final disposal must be completely removed within one year.

[56] FLG I No 102/2002 as amended by FLG I No 2/2008
[57] OJ L 114, 27.4.2006, pp. 9–21
[58] OJ L 312 of 22.11.2008, pp. 3 - 30
[59] OJ L 377, 31.12.1991, pp. 20–27

While POPs in the construction industry (especially PCBs, but also brominated flame retardants) will constitute a major issue in the future, there is hardly any information available on stockpiles. In the field of waste, an Ordinance on Recycled Construction Materials and Environmentally-Sound Decommissioning is currently in the pipeline.

With regard to waste disposal, Article 7(2) of EU POP Regulation No 850/2004/EC sets forth that the persistent-organic-pollutant content must be destroyed or irreversibly transformed. According to Annex V to this Regulation, the following disposal or recovery measures, as laid down in Annexes IIA and IIB to Directive (EC) 2008/98 on waste, are permitted for the following purposes:

D9 Physico-chemical treatment;

D10 Incineration on land, and

R1 Use principally as a fuel or other means to generate energy, excluding waste containing PCBs.

R4 Recycling/reclamation of metals and metal compounds from iron and steel making processes such as dusts or sludge from gas treatment or mill scale or zinc-containing filter dusts from steels works, dusts from gas cleaning systems of copper smelters and similar waste and lead-containing leaching residues of the non-ferrous metal production. PCB-containing waste is exempted.

The operations are restricted to processes for the recovery of iron and iron alloys (blast furnace, shaft furnace and hearth furnace) and non-ferrous metals (Waelz rotary kiln process, bath melting processes using vertical or horizontal furnaces), provided that the facilities met as minimum requirements the emission limit values for PCDDs and PCDFs laid down in Directive 2007/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste, whether or not the processes are subject to that Directive, and without prejudice to the other provisions of Directive 2000/76/EC and to the provisions of Directive 96/61/EC.

Yet Regulation (EC) No 850/2004, as amended, also provides for the possibility to resort, in exceptional circumstances, to a handling of waste which is different from the destruction or irreversible transformation of the waste POP content. This derogation may only be applied if certain conditions are met:

- The waste owner has provided evidence to the competent authority that the measure constitutes an activity which is environmentally preferable to the destruction or irreversible transformation of the waste;
- The activity is in line with relevant EU legislation;
- The concerned Member State has informed the other Member States and the Commission of the authorization granted to it and also of the pertinent substantiation.

By virtue of this derogation, the Regulation only allows for the permanent storage in safe, deep, underground, hard rock formations and salt mines or on landfills destined for hazardous waste (for POP waste: below a certain limit value, provided that - to the extent that this is technically feasible - the waste is solidified or partly stabilized).

Moreover, the EU has fixed, by virtue of Council Regulation (EU) No 172/2007[60] , last amended by Commission Regulation (EU) No 756/2010, concentration limits, limiting the possibility to resort to this derogation (see Table 20). Waste exceeding these limit values may only be handled by destroying or irreversibly transforming their waste POP content, and not by way of a process which would be environmentally preferable to the two previous procedures.

Table 20: Concentration limits for POP waste

Substance	**Maximum concentration limits**
Aldrin	5,000 mg/kg
Chlordane	5,000 mg/kg
Dieldrin	5,000 mg/kg
Endrin	5,000 mg/kg
Heptachlor	5,000 mg/kg
Hexachlorobenzene	5,000 mg/kg
Mirex	5,000 mg/kg
Toxaphene	5,000 mg/kg
Polychlorinated biphenyls (PCBs)	50 mg/kg
DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane)	5,000 mg/kg
Chlordecone	5, 000 mg/kg
Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDFs)	5 mg/kg
alpha-, beta- and gamma-HCH total	5,000 mg/kg
Hexabromobiphenyl	5,000 mg/kg
Pentachlorobenzene	5,000 mg/kg

Though listed, tetra, penta, hexa and hepta BDE as well as perfluorooctane sulfonic acid and it derivatives (PFOS) have not yet been subject to a limit value. Thus, the relevant national provisions shall apply.

2.4 Contaminated sites

Article 6 (1) e of the Convention stipulates that the Parties shall develop appropriate strategies for identifying areas contaminated by POPs. If these sites are remediated, such remediation shall be conducted in an environmentally-sound manner.

The **Austrian Contaminated Sites Remediation Act (ALSAG**[61]) constitutes the legal basis for keeping the Register of Potentially Polluted Sites (Verdachtsflaechenkataster) and the Register of Contaminated Sites (Altlastenatlas) as well as, generally, for the financing of the remediation of contaminated sites.

[60] Commission Regulation (EC) No 172/2007 amending Annex V, OJ L 55/1 of 23.2.2007

[61] Federal Act of 7 June 1989 on the Financing and Implementation of the Remediation of Contaminated Sites, FLG No 299/1989 as amended by f FLG I No 15/2011

Currently, more than 90 % of all abandoned sites in Austria are recorded. The completion of the recording of abandoned sites is scheduled for 2012.

Remediation is generally financed by way of the contaminated-site levy which is especially earmarked for the purpose and collected by the customs offices. Registration for the contaminated-site levy is done electronically; the competent Ministry of Finance (BMF) allocates a Contaminated Site Identification Number (Altlastenidentifikationsnummer, AIN) to operators, for each registered office and site.

The following activities are, for example, subject to mandatory contribution (Contaminated Site Levy) for the purpose of financing, securing and remediating contaminated sites:

- Landfilling of waste;
- Backfilling of uneven terrain or adapting terrain with construction debris or recycling materials that are not quality-assured;
- Shipment of waste (e.g. construction debris or recycling materials that are not quality-assured) for the purpose of landfilling or backfilling beyond the Federal territory;
- Storage of waste beyond the deadline for temporary storage (for the purpose of removal: longer than one year, for the purpose of recycling: longer than three years);

The 2011 Amendment laid down exemptions from mandatory contribution in the case of:

- Steel-mill slags in road construction, provided that
  - They are used to produce a base course;
  - They are used only to the extent that is technically required and
  - Quality is ensured by way of a quality-assurance system.
- Demolition waste which is confirmed by the municipality:
  - Building erected before 1955;
  - Major part of these wastes recycled;
  - Less than 200 t.

According to Sect 18 of ALSAG, the remediation of contaminated sites the polluter of which can no longer be held accountable falls within the competence of the Federal government.

The procedures necessary for the efficient treatment of contaminated areas can be subdivided into the following steps: identification, investigation, assessment, securing/remediation.

a) Identification:

The Provincial governments are responsible for identifying potentially polluted sites (landfills and industrial or commercial plants in operation or abandoned before July 1, 1989). All available information (site, ownership, site history, potential pollutants, hydrological and geological information) must be submitted to BMLFUW and is recorded by EAA in the Register of Potentially Polluted Sites.

b) Investigation

For site assessment, more detailed information is required. Depending on the site conditions, groundwater, soil, soil vapors, waste and gas releases emanating from the soils must be analyzed. Site selection for the purpose of investigation is based on a prioritization procedure designed to identify the probability of severe hazards.

c) Assessment

If the assessment concludes that the site poses a major environmental and human-health hazard, it is included in the Ordinance on the Register of Contaminated Sites as a contaminated site ("considerably contaminated site, exhibiting significant risks to the environment and human health"). The area is then classified depending on how (primordially) urgent its securing or remediation is considered.

d) Securing/Remediation

The securing measures are designed to prevent the further spread of pollutants. As the source of the contamination is not removed, regular inspection or further safeguards are required.
Remediation covers the removal of the source of contamination and thus the elimination of its impact on the environment (e.g. by immobilizing pollutants or by the total decommissioning of a waste disposal facility).

According to a recent report by EAA on the Register of Potentially Polluted Sites and on the Register of Contaminated Sites[62] as of January 1, 2012, there are more than 62,913 registered abandoned landfills and abandoned sites in Austria. The Register of Potentially Polluted Sites lists 2,034 potentially polluted sites. For overall 259 sites, a considerable environmental risk has been identified so far. For appr. one third of the cases, subsoil contamination with PAHs was found. Basically, most of these sites are abandoned gas works or tar-processing companies. 143 sites have not yet been remediated or secured. At overall 157 sites (116 considerably contaminated sites, 41 potentially polluted sites), securing or remediation measures have already been completed.

ALSAG does not list POPs as a separate list of pollutants. Thus, no finally valid information can be provided on the areas contaminated with POPs. Yet it is valid to conclude that the applicable procedures also cover the identification of areas contaminated by POPs.

As regards soil protection in general, the sewage-sludge and compost ordinances appendant to the Provincial soil-protection legislation need regular evaluation of limit values. It would make sense to fix target values for organic pollutants (including polybrominated diphenyl ethers, perfluorinated tensides and pesticides) in order to reduce soil contamination.

[62] S. Granzin;M. Valtl; Verdachtsflächenkataster und Altlastenatlas *(Register of Potentially Polluted Sites and Register of Contaminated Sites)*; as of January 1, 2012; Umweltbundesamt Rep-0379

The Amendment to the 2004 Austrian Ordinance on Fertilizers[63] has fixed a limit value of 0.1 mg/kg of dry mass for perfluorinated tensides (PFTs), expressed as the sum of perfluorooctane acid (PFOA) and perfluorooctane sulfonate (PFOS).

2.5 Information exchange/Public Information

According to Article 9 of the Convention, each Party to the Convention shall, to the extent possible, get involved in the exchange of information with regard to the reduction or prevention of POPs or their alternatives.

In Article 10 of the Convention, the Parties have committed themselves to raising awareness in the general public as well as to the provision of information on POPs. Each Party to the Convention shall enable and facilitate the integration of the general public. This also entails the creation of options to get involved in the implementation of the Convention.

In Austria, consultation of and communication with the stakeholders and the authorities is part of the legislative process. All pieces of legislation must undergo a public consultation process. This is why also the Draft National Implementation Plan (including the Draft National Action Plan) was submitted to the involved Federal-government and Provincial authorities as well as to different stakeholders[64] by way of a general consultation procedure. In a second step, draft recipients were asked to provide their statements.

Austria being a party to the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters[65], access to environmental information is part and parcel of basic rights in Austria.

The results from the POP studies and monitoring projects, such as MONARPOP and projects on human biomonitoring, the monitoring of water quality as well as on POPs in grassland soils and also information on the subject of “Heating Properly”, can be accessed by the general public on the respective websites and/or are available for download.

2.6 Monitoring and research/Efficiency evaluation

According to Article 11 of the Convention, the Parties promote and conduct appropriate monitoring and research with regard to POPs and their alternatives as well as with regard to potential POPs by way of national and international programs and networks. Areas involved comprise e.g. sources and releases, presence and concentration in the environment and the impact on human health and on the environment.

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63 Ordinance of the Federal Minister for Agriculture and Forestry, Environment and Water Management Enacting Provisions for the Enforcement of the 1994 Fertilizers Act, FLG II No 100/2004, last amended by FLG II No 162/2010

64 Such as e.g. business federations, women’s organizations, organizations taking care of children’s health (see Art 7 Para 2 of the Stockholm Convention)

65 Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters Including Explanatory Remarks; Federal Law Gazette III, No 88/2005

2.6.1 POPs in the Alpine region (MONARPOP up to 2007 and continuation[66])

As early as in the 1990s, EAA ushered in the investigation of POP concentrations in remote Austrian Alpine regions[67]. While POP concentrations in the Arctic region had been fairly well investigated, these studies, in the course of which several analysis methods (analyses of POPs and other organic chemicals in spruce needles and in the topsoil) had been developed further for this purpose, produced first results for a region which is right at the heart of Europe – the Alps. On the basis of these studies, EAA and BMLFUW, in cooperation with government bodies and scientific institutions in Germany, Italy, Slovenia and Switzerland, launched a much broader study on the subject. Part of the MONARPOP (Monitoring Network in the Alpine Region for POPs and others) project was funded by the European Fund for Regional Development (EFRE) via the "Alpine Space" INTERREG program, while another part was funded by national governments (in Austria: also by the Provincial governments) and institutions. MONARPOP was the first monitoring program to investigate the entire Alpine area. www.monarpop.at provides the results of the project to the general public. After 2007, continuous measurements had been conducted up until 2010. Cooperation with the Federal provinces was again enhanced in 2011.

MONARPOP is also part of the Global Monitoring Plan of the Stockholm Convention, providing a framework for the recording of comparable monitoring data from all UN regions as well as, by virtue of Decision SC4/31, on the regional and global long-range transport as well as archives with environmental samples. The Global Coordination Group also does research on climate and meteorological trends.

In the framework of MONARPOP, POP contents in the air, i.e. pollutant concentration expressed per cu m of air, and deposition levels expressed as pollutant input per sqm and day, are measured.

As regards the results of the monitoring of POP concentrations in the air and of POP depositions at Alpine peaks (MONARPOP and continuation), complete annual measurements are available for almost all POPs, starting from the beginning of 2006. With the POP monitoring carried out at Alpine peaks, Austria is in a position to contribute well-founded information on the significance of the 10-year development of the input of all POPs. Austria strives for the continuation of the monitoring of ambient air and of the deposition at Alpine peaks (Sonnblick).

2.6.2 Human biomonitoring

In the international arena, the procedure applied for the detection of environmental chemicals and/or their metabolites in the body is referred to as Human Biomonitoring (HBM). It constitutes a tool for retrieving the individual internal exposure of a human being to chemicals. Urine, blood, hair, but also tissue samples are used as a matrix for analysis. Moreover, comprehensive studies have provided the framework for capturing exposure trends, identifying locally-exposed groups and assessing the

[66] Further details on MONARPOP are also available on the www.monarpop.at website.
[67] EAA studies - POP in emittentenfernen Waldgebieten *(POPs in Woodland Far Away From Emission Sources)*

efficiency of chemicals-policy measures (restrictions or bans). Yet it is not possible to establish a cause-and-effect relationship to health impacts.

In the period of 2008 to 2011, a BMLFUW-commissioned HBM study[68] was conducted in Austria, with the aim of examining, for the first time, a representative study population for industrial chemicals and organic heavy-metal compounds. The criteria for selecting the substances were, besides their wide-spread use, toxic properties and properties of concern.

Polybrominated diphenyl ethers are technical mixtures of multiply brominated diphenyl ethers which are added to plastic products in order to provide them with flame-retardant properties. Due to the different number and organization of bromine atoms at diphenyl ether, 209 different congeners are possible. Depending on the synthesis technique used, these substances are subdivided into penta, octa, and deca PBDEs, with deca PBDE being the most important congener from an economic point of view. PBDEs are used as flame retardants for plastics and textiles in the electronics, electrics, construction, transport and textile industries. They can be added to plastics in concentrations of up to 15 percent by weight (PU foams: up to 30 %). Due to their problematic properties, the technical mixtures penta and octa BDE have been banned in the EU since 2003. Despite the ban, impurities may occur in products in the amount of up to 0.1 percent by weight. In 2005, Europeans consumed overall 463,800 t of flame retardants, 50,000 t (appr. 11 %) thereof being brominated flame retardants. Currently, deca BDEs are among the most-commonly-used brominated flame retardants the harmlessness of which is increasingly challenged. Environmental media exhibit significantly higher concentrations of deca BDEs when compared to other brominated diphenyl ethers.

In 2009, blood, urine and hair samples were drawn for the Austrian HBM study. The voluntary, randomly-selected subjects were from five Austrian regions (Vienna, Linz, Ried, St. Pölten, and Tamsweg), the participants being, respectively, the mother, her child as well as the child's father or the mother's partner living in one household. The mothers' average age was appr. 38 years, and that of the partners appr. 40 years. The children were between 6 and 11 years old, with 29 boys and 23 girls participating.

Besides the samples, load factors as well as exposure indicators were collected via a questionnaire; also a colour vision test was carried out.
As blood samples were only taken from adult study participants, data for exposure to polybrominated diphenyl ethers are only available for adults. The samples were analyzed in the accredited testing facility of EAA . Analytical results were compared with values available in the literature and statistically evaluated by using the answers from the questionnaires.

[68] EAA (2011): Hohenblum, P.; Hutter, HP.; Schadstoffe im Menschen.*(Human Pollutant Exposure)*. Reports, Vol. REP-0324. EAA, Vienna.

Table 21: PBDEs in plasma, entire study population (in ng/l).

PBDE	Number of samples	Number > LOQ	Min	Max	MV	50th perc.	95th perc.
#153	99	80	Non-detectable	36	8.0	5.5	9.1
#197	86	45	Non-detectable	27	6.0	5.8	8.3

Overall 18 congeners of the polybrominated diphenyl ethers (PBDEs) were analyzed in the blood samples. 16 out of these 18 were detected in at least one sample. Congeners #153 and #197 were measured most frequently (in 80 out of 99 and 45 out of 88 samples, respectively); the other congeners were detected sporadically. The median of the #153 concentrations was 5.5 ng/l, while that of #197 was 5.8 ng/l.

It is known from environmental samples that PBDEs occur in high concentrations e.g. in household dust.

In 2012, also the results of another human biomonitoring project (UMUKI) will be published, examining the concentration of pollutants in mother/child pairs. Preliminary information is already available at http://www.um-muki.eu/.

2.6.3 Household dust

Household dust serves as an indicator for the indoor exposure to chemicals. In order to find out which pollutants are present in household dust and to which extent, EAA conducted a BMLFUW-commissioned household-dust survey in 2003/04[69]. To this end, overall 22 household-dust samples were drawn from apartments close to road traffic and from apartments farther away from road traffic. In addition, two samples from offices were taken.
The samples were e.g. analyzed for PBDEs and checked for polycyclic aromatic hydrocarbons by way of a screening technique.

Results of this survey

Table 22: Concentrations of some selected polybrominated diphenyl ethers[70]

PBDE	Dim.	Number	Number > LOQ	Min.	Max.	MV	Median	90th perc.
# 47	µg/kg	23	23	0.29	160	24	8.4	62
# 99	µg/kg	23	23	0.50	240	34	9.6	100
# 183	µg/kg	23	22	Non-detectable	360	23	3.2	28
# 209	µg/kg	11	10	3.8	170	35	22	57

[69] EAA (2004): Uhl, M.; Hohenblum, P. & Scharf, S.: Hausstaub, ein Indikator für die Innenraumbelastung *(House Dust As An Indicator for Indoor Exposure)*. Reports, Vol. BE-258. EAA, Vienna.

[70] BDE-47: Tetrabromodiphenyl ether
BDE-99: Pentabromodiphenyl ether
BDE-153 and 154: Hexabromodiphenyl ether
BDE-175 and 183: Heptabromodiphenyl ether

Of the 21 surveyed congeners of the brominated diphenyl ethers, two congeners (# 11 and # 166) were detected in none of the samples. 9 congeners were found in all surveyed samples. The highest concentrations were found in congeners # 183, # 99, # 209 and # 47. The congener which is most wide-spread on a global level, i.e. congener # 209 (decabromodiphenyl ether), was determined in all samples in the highest median concentration (22 µg/kg). Similar concentrations are also detected in sewage sludge.
When compared to the data found in the relevant literature, these values are much lower.

Polycyclic aromatic hydrocarbons

Results of this survey (2004):

Table 23: Overview of concentration levels of some EPA-PAHs (Parameters in mg/kg)

PAH	Number	Number > LOQ	Range	MV	Median	95th perc.
Naphthalene	10	10	0.02 - 0.72	0.12	0.04	0.72
Phenanthrene	10	10	0.03 - 0.39	0.17	0.15	0.39
Fluoranthene	10	10	0.03 - 0.65	0.19	0.12	0.65
Pyrene	10	10	0.02 - 0.37	0.11	0.06	0.37
Chrysene	10	10	0.02 - 0.4	0.11	0.05	0.4
Benzo(b)fluoranthene	10	9	0.02 - 0.66	0.17	0.13	0.66
Benzo(a)pyrene	10	10	0.02 - 0.30	0.09	0.06	0.3
Indeno(1,2,3-cd)pyrene	10	9	0.02 - 0.72	0.18	0.07	0.52

Overall, 16 PAHs were detected. Acenaphthene and acenaphthylene were found in less than half of the samples in qualitative terms. As a rule, benzo(a)pyrene (BaP) is used as a lead substance for PAHs. BaP is classified as having a cancerogenic effect on humans. The presence of BaP in concentrations of > 10 mg/kg of household dust is considered undesirable, and experts recommend measures minimizing exposure (HEUDORF, 1999). In this survey, no sample exhibited a value of 10 mg/kg of BaP or more.

As children represent a part of the population which is extremely vulnerable, EAA conducted a project in 2006-2008 aiming at the analysis of the exposure to chemical substances potentially affecting children's health in nine selected Austrian all-day schools[71]. To this end, air, particulate matter and household dust, as well as children's (6 to 9 years old) hair and teeth were examined for a series of indoor and health-related substances and correlated with the state of their health and their cognitive performance.

[71] EAA (2008b): Hohenblum, P.; Kundi, M.; Gundacker, C.; Hutter, H.P.; Jansson, M.; Moosmann, L.; Scharf, S.; Tappler, P. & Uhl, M.: LUKI – Luft und Kinder. Einfluss der Innenraumluft auf die Gesundheit von Kindern in Ganztagesschulen. *(Children and Air. Impact of Indoor Air on Children's Health in All-Day Schools)*. Long version. Reports, Vol. REP-0182. EAA, Vienna.

Of the analyzed PCBs (Nos 28, 52, 101, 138, 153, 180 and 194), PCBs Nos 101, 138, 153 and 180 which were above the quantification limit were found in 4 respectively 5 out of 14 school dust samples.

Table 24: POPs detected in schools' house dust

PCBs in mg/kg House dust	**Number**	**Number>LOQ**	**Min**	**Max**	**Med**	**MV**
PCB No 101	14	4	0	0.03	-	-
PCB No 138	14	5	0	0.07	-	-
PCB No 153	14	5	0	0.05	-	-
PCB No 180	14	5	0	0.05	-	-
PBDE in µg/kg House dust						
# 47	14	13	23	1,100	60	160
# 99	14	13	39	970	72	150
# 183	14	13	2.4	6.1	3.9	3.9
# 209	14	13	210	2,300	780	1,200

Comparing the PBDE values found in school dust (see FN 70) with those for the household-dust study conducted by EAA (see FN 69), it was shown that most of the measurement values are 10-fold compared to the ones in the mentioned survey. This is mainly due to the fact that public buildings are governed by stringent requirements on fire prevention or on the flammability of materials, while less stringent provisions apply for private households.

Table 25: Selected PBDEs compared to the house-dust study conducted by EAA (Parameters in µg/kg):

PBDEs	**Median house-dust study**	**Median school-dust study**
#47	8.4	60
#99	9.6	72
#153	2.2	6.5
#183	3.2	3.9
#196	3.6	4.4
#203	3.6	42
#209	22	780

These results prove that it was right to introduce PBDE bans and restrictions by way of Regulation (EC) No 850/2004. Also hexabromodiphenyl-ether, heptabromodiphenyl-ether, tetrabromodiphenyl-ether and pentabromodiphenyl-ether derivatives are contained in Annex I to Regulation (EC) No 850/2004. Commission Regulation (EU) No 757/2010, OJ L 223/29 of 25 August 2010 amending Annexes I

to III lays down in this context what is to be regarded as trace contamination. National measures focus on the control of compliance with these bans and restrictions.

2.6.4 POPs in grassland soils

As has been shown by the MONARPOP project, persistent organic pollutants are even detectable in remote regions (see Chapter 2.6.1.; EAA 1998, 2000, 2002). Up to now, only insufficient data have been available to answer the question if ubiquitous exposure to organic pollutants also exists at grassland sites which are far away from emission sources.

This is why a set of studies conducted by EAA from 2008 to 2010[72] aimed at the determination of the exposure of uncontaminated grassland soils to organic pollutants which also harbor international significance on account of their toxicity and persistence in the environment.

For this purpose, extensively-used grassland sites were selected in the Federal provinces of Burgenland (BGL), Carinthia (KTN), Upper Austria (OOE) and Styria (STM) and soil samples were taken. The samples of the top soil layer were analyzed for the following substances or groups of substances: organochlorine compounds (aldrin, cis-, trans-chlordane, dieldrin, endrin, mirex, heptachlor, hexachlorobenzene, hexachlorobutadiene, pentachlorobenzene, endosulfan, sum of DDT and its metabolites, α-, β-, γ-, δ-HCH), polychlorinated biphenyls (PCBs), dioxins, furans and DL-PCBs, polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ethers (PBDEs), 4nonylphenol and bisphenol A, nitrophenols, chlorophenols, phthalates, organotin compounds, Hydrocarbon Index, inorganic pollutants, general soil parameters (pH value, humus content, texture, carbonate content)).

The results of this study confirm that also on extensively-used grassland soils persistent organic pollutants are found, some of them in considerable concentrations (e.g. PCDD/Fs). This holds true for substances the use and production of which has already been banned for several years or decades in many countries (e.g. individual pesticides), but also for the *"upcoming pollutants"*, as they are called, (e.g. flame retardants, phthalates, chlorophenols) the environmental relevance of which has been on the rise at an international level.

This means that the study provides a first glimpse on the detectability and dimensions of selected organic pollutants. It is not possible to treat more complex evaluations with regard to the correlations between individual soil parameters or between the groups of pollutants here, yet they would represent a significant step forward in order to check the retention and properties of these substances.

In the part of the study which was finalized last, the project scope was extended by another ten sites, especially by considering soil plots under permanent observation in

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[72] EAA (2010): Freudenschuß, A. & Offenthaler, I.: Organische Schadstoffe in Grünlandböden – Teil 3. (*Organic Pollutants in Grassland Soils – Part 3).* REP-268. EAA, Vienna, ISBN: 978-3-99004-069-0.
EAA (2008): FREUDENSCHUß A., OBERSTEINER E. & UHL M.: ORGANISCHE SCHADSTOFFE IN GRÜNLANDBÖDEN. *(ORGANIC POLLUTANTS IN GRASSLAND SOILS).* REPORTS, VOLUME 0158 EAA , VIENNA, ISBN: 3-85457-955-1.
A fourth study on the subject with a focus on PBDEs and PFOS has already been completed and will be published soon.

the Western Federal provinces, and by selected investigation parameters (e.g. upcoming pollutants). Thus, a broader data basis was created for the assessment of organic pollutants in grassland soils, mainly for the monitoring of POPs under the Stockholm Convention to which Austria has committed itself.

For all substance groups, the random sample – three grassland soils from Salzburg, Tyrol and Vorarlberg, respectively, and one soil from Lower Austria – exhibited insignificant average concentrations when compared to other surveys.

Still, individual sites stood out on account of markedly-increased contents of one or more of the pollutants. This was the case for the pollutant group of polychlorinated dibenzodioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), and, for Tyrol and Vorarlberg, also for polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs) as well as for perfluorinated tensides (PFTs). Among chloropesticides, many compounds could only be detected in exceptional cases, among them lindane and DDT including its isomers, as well as cyclodiene.

Among the surveyed sites, one industrially-affected permanent-observation soil plot stood out – as had been expected – on account of its increased pollutant concentrations. In this respect, it is especially the PCB and PCDD/F levels (which were markedly increased when compared to the background monitors) which are toxicologically relevant. Also DDT and its derivatives attained concentrations which were markedly higher at this point than at the other sites. Despite its remote location, another site exhibited unexpectedly high concentrations of numerous groups of substances – PAHs, PCBs, some PFTs, some PCDD/Fs, several PBDEs and the surveyed PBB congener 153. One site located in the Eastern part of Austria stood out on account of its considerable levels of perfluorooctane acid (PFOA), with the other pollutant levels being at under-average level. The project is being continued in 2012. In the course of current surveys, soils located in agglomerations are analyzed, with a focus on polybrominated diphenyl ethers.

2.6.5 POPs in outdoor air

In Austria, the concentration of benzo(a)pyrene (B(a)P) in PM10 is determined at 24 measuring points according to the Ambient Air Quality Act (IG-L) by the offices of the Provincial governments and by EAA. Moreover, EAA in Illmitz measures the concentrations of benzo(a)anthracene, benzo(j)fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene and indeno(1,2,3-c,d)pyrene in PM10. The results of the measurements are published in the annual reports of the monitoring network operators as well as in the annual report for all of Austria[73]. In 2010, the target value of 1 ng/cu m set forth in the 4th directive[74] and in IG-L[75], respectively, was exceeded mainly in Alpine valleys and basins.

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[73] EAA (2011a): Spangl, W. & Nagl, C.: Jahresbericht der Luftgütemessungen in Österreich 2010. *(2010 Annual Report on Air-Quality Measurements in Austria)*. Reports, Vol. REP-0326. EAA, Vienna..
EAA (2011b): Spangl, W.; Nagl, C. & Moosmann, L.: Jahresbericht Hintergrundmessnetz *(Annual Report on Background Monitoring Network)*. EAA 2010. Reports, Vol. REP-0325. EAA, Vienna..

[74] Directive (EC) 2004/107 of the European Parliament and of the Council of 15 December 2004 relating to arsen, cadmium, mercury, nickel and polycylic aromatic hydrocarbons in ambient air. OJ L 23/3 of 26. 1. 2005.

The available measuring data provide but an incomplete picture of B(a)P exposure for all of Austria; yet they show that the parts of the country which are situated south of the main ridge of the Alps are affected by the highest B(a)P exposure levels.
It is assumed that the main source of B(a)P is wood heating systems. Industrial emissions, such as those possible, for example, in Arnoldstein, Linz or Donawitz, do probably not constitute a major part of B(a)P levels.

2.6.6 Other monitoring projects

The National Action Plan includes an account of POP-relevant monitoring activities carried out by EAA. Data are available, in particular, on deca BDE, which is not yet governed by any restrictions according to the Stockholm Convention.

The dioxin laboratory of EAA is a specialized department of the Accredited Testing Facility for Environmental, GMO and Fuel Analysis, specializing in the analysis of organic pollutants, in particular dioxins and dioxin-like PCBs. Its work does not only include mere analysis, but also sampling as well as the development of analysis methods for all environmental media, consumer goods, and food and feedstuffs (for example the development of active air samplers for the MONARPOP project). Other POP monitoring programs include regular control of air pollutants in major Austrian cities and at some industrial sites as well as a smaller project on POPs in soil samples. The results of the work of the dioxin laboratory were also made part of the "Dioxin Toolkit"[76] (Recommendations on Measuring and Estimating Dioxin Emissions) for the Stockholm Convention. The expert group set up in the framework of the Stockholm Convention does not only deal with the Toolkit, but also with recommendations on BATs/BEPs.

Also the Austrian Federal provinces carry out POP monitoring programs and have respective laboratory facilities at their disposal. Accordingly, the Federal province of Salzburg carried out monitoring studies for standardized kale plants from 1995 to 1998 in the Salzburg city region. Subsequently, from 2007 to 2008, a supra-regional project was conducted in Salzburg together with Bavaria on the analysis of pollutant exposure along major transit routes ("Kleines" and "Großes deutsches Eck"). For this study, also PAH and heavy-metal concentrations present in standardized plant cultures (kale and perennial ryegrass) were examined.

2.7 Technical assistance

In Article 12 of the Convention, the Parties have committed themselves to providing timely and appropriate assistance to developing countries and countries with

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[75] Ambient Air Quality Act (IG-L; FLG I 115/1997 as amended): Federal Act on the Protection from Immissions by Air Pollutants, Amending the 1994 Industrial Code, the Act on the Control of Air Immissions for Steam Boilers, the Mineral Raw Materials Act (FLG I 38/1999), the Waste Management Act and the Ozone Act.

[76] Under the Stockholm Convention, the Parties to the Convention have committed themselves to identifying the sources of releases of unintentionally formed POPs. Not all countries which are Parties to the Convention are able to conduct accurate measurements for all sources. The "Dioxin Toolkit" provides an overview of the methods available for estimating the extent of potential dioxin sources and thus gives the countries the opportunity to provide comparable source inventories.

economies in transition, and to helping them in building their capacities for the implementation of the obligations incumbent on them under the Convention. Under the Convention, the Parties shall provide technical assistance and promote technology transfer, if possible via regional centres.

In Austria, the general policy on development cooperation is formulated by the Federal Ministry for European and International Affairs (BMeiA). The Austrian Development Agency (ADA) is responsible for practical implementation (review of projects, allocation of funding).

It is essential to view the subject in the context of the Strategic Approach on International Chemicals Management, SAICM[77]. Including sound chemicals management in the development agenda would, thus, also contribute to the implementation of the Stockholm Convention.

[77] Key SAICM documents are: the Dubai Ministerial Declaration, the Overarching Policy Strategy, OPS, and the Global Plan of Action, GPA. For more detailed information on SAICM, see the www.chem.unep.ch/saicm/ website.

3 National Implementation Plan Activities

3.1 Policy statement

Austria has been proactively involved in the negotiations of the COPs on the Stockholm Convention on Persistent Organic Pollutants. Yet also the participation in the expert groups of the Stockholm Convention (POP Review Committee, POPRC) and of the POP Protocol (POP Task Force), working out recommendations on the inclusion of new POPs and requirements for practical implementation, is still high on the agenda. Already over the last years, Austrian experts have contributed to the Convention, e.g. as regards the evaluation of hexachlorocyclohexane in the POP Review Committee, the evaluation of endosulfan in the UNECE POP Protocol Task Force, in the framework of the Global Monitoring Plan, and in the revision of the Dioxin Toolkit (one of the expert meetings dealing with the Toolkit review took place in Vienna). Furthermore, the laboratory of EAA is designated by UNEP as reference laboratory for the Global Monitoring Plan. [78]
Next year, EAA will carry out, also on the basis of experiences gained so far, the evaluation of polychlorinated naphthalenes and hexachlorobutadiene as well as the evaluation of endosulfan and DDT alternatives for the European Commission.

In line with the precautionary principle, new chemicals exhibiting POP-like properties and not yet included in the Stockholm Convention shall not be authorized for production or use, which is the task of REACH. So, at EU level, the PBT group is responsible for filtering out new POPs. This is why potential POPs and/or PBT substances are to be retrieved and examined at an early stage in products, yet also in environmental compartments in order to obtain information on their presence in due time. At national level, Austria has restricted the content of PAHs in shooting discs (> 10mg/kg) since March 1, 2003 to contribute to the reduction of PAH input into the environment[79]. This amendment was included in the 2003 Chemicals Ban Ordinance (Sect 17c)[80].

Releases of unintentionally formed POPs have already been considerably reduced over the last years. Austria is determined to continue to work towards further reductions of releases and to enact reduction measures for POP-emitting facilities which are in line with the state of play of technology (for more detailed information, see Chapter 2.2. – National Action Plan as well as pursuant to IED Directive BAT).

Complete annual measurements have been available for almost all POPs from the beginning of 2006 as a result of monitoring measurements of POP air concentrations and POP depositions found at Alpine peaks (MONARPOP (end of 2007) and continuation). The results for the last years (up to 2010) are currently being evaluated, yet the time series is still too short to derive significant trends. These MONARPOP air and deposition measurements at Alpine peaks have been set in motion in order to monitor POP inputs, to be able to deduce trends in the future and thus also obtain efficiency control according to Article 16 of the Stockholm

[78] http://chm.pops.int/Implementation/GlobalMonitoringPlan/AdditionalResources).
[79] Shooting Discs Ordinance, FLG II No 420/2002
[80] FLG II No 2007/114

Convention on POPs. Already now, these data are made part of the Global Monitoring Plan of the Convention. In a few years' time – provided that funding of this POP monitoring at Alpine peaks will be continued – Austria and its partners will be in a position to provide highly sound information, for the Alpine area, on the significance of the 10-year development of the input of all POPs.

The impact of POPs not being solely confined to the local area, but making itself felt all over the globe, Austria has, by providing technical assistance and information exchange, been committing herself to assisting developing countries and countries with economies in transition.

3.2 Implementation strategy

The following subchapters are based on the structure of previous chapters and outline the **Implementation strategy to meet the obligations of the Stockholm Convention** in greater detail. Each subchapter describes concrete steps in the process. The timetable given in Subchapter 3.2.8. provides for a summary of these steps and places them in a time context.

The measures of the National Implementation Plan and of the National Action Plan shall be stipulated by the Federal Minister for Agriculture, Forestry, Environment and Water Management. Many of these steps can only be taken in cooperation with other ministries, the Federal provinces and further contact points also in civil society and industry which are, thus, regarded as important contributors in the course of the consultation procedure, but also within the SAICM platform. So, for example, agreement must be reached with the Federal Minister for Economy, Youth and Family for measures concerning industrial plants[81]. Coordination remains with BMLFUW as well as, in particular, with the national POP contact point.

Coordination of assessment and update falls within the purview of BMLFUW in cooperation with the POP/PBT group (see Chapter 3.2.5.) and the SAICM Platform for International Chemicals Management. This platform is an interministerial coordination group with the task of informing the stakeholders and of developing the Austrian positions as regards environmental conventions in the area of "chemicals", in particular for the Rotterdam, Stockholm and Mercury Conventions as well as for SAICM.

3.2.1 Intentionally produced POPs

Concrete steps:

Sampling activities and focus on examining products for POPs/ PBTs and potential "new" POPs are extended; possibly to textiles and other fabrics. National measures focus on the control of compliance with bans and restrictions.

[81] Within the meaning of Sect 74 of the 1994 Industrial Code, FLG No 194/1994

3.2.2 Unintentionally formed POPs

For catalogue of measures, see NAP and NAP summary in Chapter 2.2.

3.2.3 Stockpiles and wastes (Article 6)

Federal Austrian Waste Management Plan 2011 (BWPL):

The current European Commission study on construction debris considers the NIP as a “prevention plan”. As a high exposure of buildings can be assumed, this area must be treated with utmost care.

Products already circulating on the market, yet containing POPs, must, on the one hand, be notified respectively, yet must, on the other hand, be monitored as to their end-of-life disposal. Having the objective of waste prevention in mind, the recycling option is not of primary importance; there shall be an enhanced focus on the limit values stipulated for products.

As regards endosulfan, a reduction of sales figures between 1992 and its ban in 2006 can be assumed. The situation of stockpiles shall be reviewed further.

3.2.4 Contaminated sites

In this respect, it shall be considered to which extent the existing system also covers “new POPs” (BDEs, PFOS).

3.2.5 Information exchange/Public information

The exchange of information called for in the Convention will continue to fall within the competence of the national contact point in BMLFUW which is best placed to forward potential information requests coming from other Parties to the Convention to the respective experts.

It is furthermore necessary to enable the exchange of information between the competent authorities and POP experts. Up to now, the Austrian POP/PBT[82] group already held 8 meetings which had been organized by EAA and BMLFUW. It is necessary to continue these meetings in order to ensure fruitful and efficient cooperation of all persons dealing with POPs for updating the NIP and for providing targeted information to the general public via the website.

[82] The internal meetings were attended by representatives of different divisions of BMLFUW as well as representatives of different specialized departments of EAA and of the Agency for Health and Food Safety.

Concrete steps:

- Regular meetings of the POP/PBT group in May and December (after the Conferences of the Parties and the meetings of the POP Review Committee of the Stockholm Convention);
- Continuation of the POP website in the framework of the "Environment" section of the BMLFUW website (www.lebensministerium.at/umwelt/chemikalien/ueber-einkommen-int/pop-uebereinkommen.html), with all downloads being up to date;
- Information available on EAA- (http://www.schutz-vor-umweltschadstoffen.info/) and AGES websites (www.ages.at/ages/ernaehrungssicherheit/rueckstaende-kontaminanten/dioxine-und-pcb/) concerning technical details;
- Movie-short projects involving adolescents at a school, dealing with the subject of POPs:
  Movie shorts - made by adolescents for adolescents - as selected educational material. The project is being developed in cooperation with the Forum for Environmental Education and with the competent divisions of BMLFUW (Div. II/3 Sustainable Development and Environmental Subsidization Policy and Div. VI/5 Material-Related Environmental Protection).
- CIRCA site "POP Impact": password-protected platform for information exchange on the subject of POPs;
- POP microsite for the general public (Joint initiative of EAA and Div. VI/5 of BMLFUW);
- Update and continuation of booklet, website and poster put up in medical doctors' practices on the subject of "Heating properly".

3.2.6 Monitoring and research/Efficiency evaluation

The MONARPOP project is the most comprehensive POP project conducted in recent years. As the project is also part of monitoring programs carried out in the context of the efficiency evaluation of the Stockholm Convention, the project needs a certain level of continuity, especially with regard to active air sampling also at high-altitude sites. There are plans underway to carry out a follow-up project with an extended scope. Apart from this major project, BMLFUW will continue to cooperate with EAA (laboratory) and AGES with regard to contributions to the work of the POP Review Committee, the development of the Dioxin Toolkit and the BAT/BEP guidelines, and the effectiveness evaluation.
As regards the follow-up of Decision SC 5/12, Austria is listed in the BAT/BEP register of the Stockholm Convention on POPs.

Concrete steps:

- ➢ Developing a model for ensuring uninterrupted funding of the MONARPOP follow-up project for a 10-year series

3.2.7 Technical assistance

The issue of capacity building, technical assistance and technology transfer has to be viewed in the context of SAICM implementation in Austria and of the inclusion of a sound chemicals management into the objectives defined for development cooperation.

Concrete steps:

- Continuous monitoring of further development of multilateral funding of chemistry and waste cluster (Keyword: FOCW and synergies).

3.2.8 Timetable

For unintentionally formed POPs, see Chapter 2.2. - National Action Plan and the measures outlined therein.

Timetable	Concrete steps	Stakeholders
2012 ongoing	**3.2.1.** **Intentionally produced POPs:** **Control**	
	Products: - HCB samplings/fireworks & PFOS samplings/fire-fighting foams & PFC samplings/ski wax, outdoor apparel; PBDE samplings;	CLEEN
	- Expiry of PFOS exemption (COM letter): Identify readiness of companies to replace;	Cooperation with Austrian Federal Economic Chamber
	- Reference to CiP (Chemicals in Products) project under SAICM	BMLFUW SAICM platform
	U-POPs: **Implementation**	
	- Priority of timely implementation of IED Directive, especially mandatory environmental audits for IPPC facilities	BMWFJ, BMLFUW
	- Catalogue of measures: see NAP and NAP summary in Chapter 2.2.	EAA on behalf of BMLFUW
	- Support of Dioxin Toolkit revision	BMLFUW, EAA
	- Participation in joint BAT/BEP Toolkit expert group	BMLFUW, EAA Laboratory
	3.2.4.Contaminated sites:	
	Reference to new POPs – mainly PBDEs and PFOS (+derivatives)	BMLFUW, EAA

Timetable	Concrete steps	Stakeholders
	3.2.7. Technical assistance: Identification of status quo concerning SAICM (and POP) activities; Update of strategic guideline	 Cooperation with Ministry for European and Foreign Affairs and ADA
	3.2.3. Stockpiles/Wastes: Endosulfan; Waste catalogue: also carpets etc. containing PFOS and PBDEs considered hazardous waste; POPs in the field of construction (especially PCBs, but also brominated flame retardants) – Ordinance on Recycled Construction Materials and Environmentally-Sound Decommissioning	 BMLFUW, AGES BMLFUW
	3.2.5. Information exchange/Public information: Consultation; Continuation of POP website in the framework of BMLFUW website; microsite of EAA ("Schadstoff & Mensch"/"Humans & Pollutants"); Movie-short project with adolescents in Austrian grammar school	 Consultation circular BKA (Federal Chancellery); Organized by POP contact point EAA together with Forum for Environmental Education
	2.6. **MONITORING:** - 10-year MONARPOP series; - Continuing human biomonitoring talks; - Monitoring of grassland and, in the following, monitoring of soil	
PBTs under REACH	**1.2.2.2. b:** **PBT group:** Continuously active participation / Substance assessment	 EAA on behalf of BMLFUW
2012-2014 **Additional POPs such as SCCPs**	 **Mining:** Review	 BMWFJ, Montanuniversität Leoben (Leoben University of Mining)

Timetable	Concrete steps	Stakeholders
Review continued		CLEEN, Federal provinces
PFOS in textiles	Sampling of outdoor apparel	VKI (Austrian Consumers' Association), EAA , Federal provinces
POP monitoring	Completion of data in the environmental media air, water, soil, food and feedstuffs	BMLFUW, EAA , AGES, Federal provinces
Further measures on new POPs under the Stockholm Convention and/or under the POP Protocol as well as on POP candidate substances	Review of national situation as regards the extended POP Protocol (hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, pentabromodiphenyl ether, PFOS, polychlorinated naphthalenes and short-chained chlorinated paraffins); Ratification of revised Protocol and amendment of Annexes; After European Commission has been notified: submission of data to DG Environment and to the Secretariat, respectively.	BMLFUW

4 Annex

4.1 Abbreviations

ADA	Austrian Development Agency
AGES	Österreichische Agentur für Gesundheit und Ernaehrungssicherheit, Austrian Agency for Health and Food Safety
BAES	Bundesamt für Ernaehrungssicherheit, Federal Austrian Office for Food Safety
Basel Convention	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
BAT	Best Available Technique
BEP	Best Environmental Practice
BMLFUW	Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
BWPL	Bundesabfallwirtschaftsplan, Federal Austrian Waste Management Plan
CLEEN	Chemicals Legislation European Enforcement Network
CLRTAP	Convention on Long-Range Transboundary Air Pollution
DDE	Dichloro-diphenyl-dichloroethylene (major metabolite of DDT)
DDT	Dichlor-diphenyl-trichloroethane
ECHA	European Chemicals Agency
EAA	Umweltbundesamt GmbH, Environmental Agency Austria
ELV	Emission Limit Value
FN	Footnote
FOCW	Consultative Process on Financing Options for Chemicals and Waste
HCB	Hexachlorobenzene
HCH	Hexachlorocyclohexane
IPPC	Integrated Pollution and Prevention Control
NIP	National Implementation Plan
NAP	National Action Plan
PAHs	Polyaromatic hydrocarbons
PBTs	Persistent, bioaccumulative and toxic chemicals
PBBs	Polybrominated biphenyls
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PCTs	Polychlorinated terphenyls
PeCB	Pentachlorobenzene
PFOS	Perfluorooctane sulfonic acid
PFOSF	Perfluorooctanesulfonyl fluoride
POPs	Persistent Organic Pollutants
PSM-VO	Pflanzenschutzmittelverbots-Verordnung, Austrian Ordinance on the Ban of Certain Plant Protection Products
SAICM	Strategic Approach to International Chemicals Management

SCCPs	Short-chained chlorinated paraffins
UIP	Union Implementation Plan
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organization
vPvBs	Very persistent and very bioaccumulative chemicals

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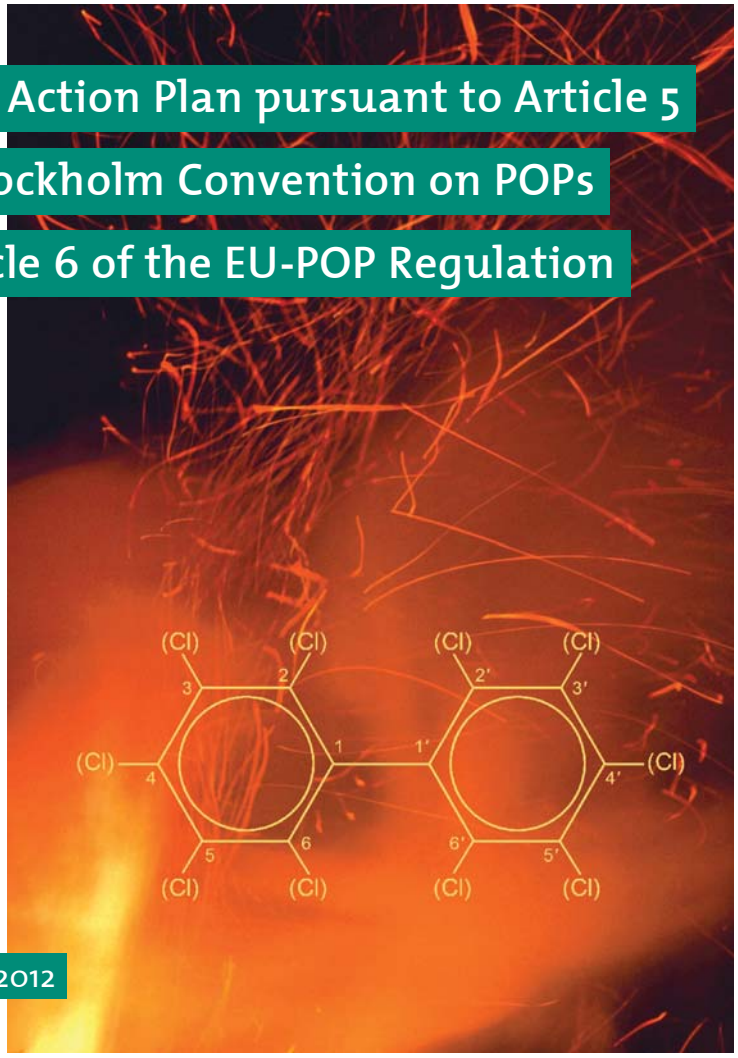
National Action Plan pursuant to Article 5 of the Stockholm Convention on POPs and Article 6 of the EU-POP Regulation



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Gerhard Thanner, Peter Weiss
Herbert Wiesenberger, Georg Windhofer
Andreas Zechmeister

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Project management

Brigitte Winter, Umweltbundesamt
Gertraud Moser, Umweltbundesamt

Authors

Brigitte Winter, Umweltbundesamt
Gertraud Moser, Umweltbundesamt
Siegmund Böhmer, Umweltbundesamt
Manfred Clara, Umweltbundesamt
Karin Deutsch, Lebensministerium
Susanna Eberhartinger-Tafill,Lebensministerium
Alexandra Freudenschuß, Umweltbundesamt
Helmut Frischenschlager, Umweltbundesamt
Thomas Gallauner, Umweltbundesamt
Martin Hischenhuber, Umweltbundesamt
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Alfred Rauchbüchl, Lebensministerium
Alexander Storch, Umweltbundesamt
Gudrun Stranner, Umweltbundesamt
Gerhard Thanner, Umweltbundesamt
Peter Weiss, Umweltbundesamt
Herbert Wiesenberger, Umweltbundesamt
Georg Windhofer, Umweltbundesamt
Andreas Zechmeister, Umweltbundesamt

Editing

Brigitte Read, Umweltbundesamt
Maria Deweis (German Summary), Umweltbundesamt

On behalf of directorates V/1 and VI/5 of the Federal Ministry of Agriculture, Forestry, Environment and Water Management

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EXECUTIVE SUMMARY

A Introduction

This report is the first review of the National Action Plan for POPs published in 2008. Article 5 of the Stockholm Convention requires Parties to develop an Action Plan to identify, characterize and address the release of chemicals listed in Annex C. Article 5 further requires a review of the National Action Plan every five years of the strategies and their success in meeting the relevant obligations.

Currently listed in Annex C are polychlorinated dibenzo(p)dioxins (PCDD), polychlorinated dibenzofurans (PCDF), hexachlorobenzene (HCB), polychlorinated biphenyls (PCB) and pentachlorobenzene (PeCB) when produced unintentionally.

In line with the European POP-Regulation (850/2004) polyaromatic hydrocarbons (namely the substances benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene) shall be included in the action plan as well.

The Action Plan, which was to be part of a Party's National Implementation Plan to be developed pursuant to Article 7 of the Convention, included strategies for meeting obligations to reduce or eliminate releases of chemicals listed in Annex C of the Stockholm Convention (including PAH as additional requirement from the EU-POP Regulation), and a schedule for the Action Plan. The plan identified priorities for action, including for those source categories that provide the most cost-effective opportunities for release reduction or elimination. It also included an inventory of releases of chemicals listed in Annex C.

The definition of the term "release" includes emissions of POPs into air, water and soil as well as releases via residues and waste from processes and releases via products.

Within the review of the National Action Plan the inventory (basis: year 2004) of POPs releases will be updated. Based on this inventory instruments and measures aiming at the reduction of POPs releases are going to be described. In particular, the efficacy of national legal regulations will be assessed again and it will be investigated if Best Available Techniques (BAT) in combination with Best Environmental Practices (BEP) have already been applied in the source categories defined by the Stockholm Convention. If applicable, recommendations on how BAT and BEP can be implemented are given. In addition data gaps are again identified and proposals for the improvement of data quality are elaborated.

Concerning emissions into air, the data quality is sufficient to establish an inventory for the POPs PCDD/F, PAH and HCB (in declining order with respect to data quality). However, due to a general lack of data this could not be achieved in the case of PCBs.

Whereas data on environmental concentrations (e.g. air) is available for most of the substances of concern, few data are available concerning releases into water and waste. For the latter a plausible estimation of releases could be made for PCDD/F only.

In general, the data quality in the case of PCBs is not sufficient to establish an inventory (air, water, soil, waste, products).

Direct releases of POPs into soil take place from the source category ”open burning of waste, including burning of landfill sites” (this includes the burning of straw and stubble as well). However, if residues and waste from processes are brought back into the environment, releases of POPs may occur indirectly (e.g. when ashes from small scale residential combustion sources or biomass plants are used for fertilizing purposes).

Releases by accidents and releases from contaminated sites are not covered by this study. However, releases into air from accidental burning of landfill sites and intermediate storage sites for waste may be substantial.

There are some data available in the literature concerning concentrations of POPs in the products cement and pulp and paper which are presented in this report.

In 2011 the Environment Agency Austria accomplished analyses of cardboard boxes which have been produced from waste paper (possibly contaminated with PCDD/F from printer’s ink. The results did not show contamination of PCDD/F in the used printer’s ink.

The Action Plan will be reviewed and updated on a periodic basis.

B Inventory of emissions into air

Trends for POPs emissions into air

Emissions of the three POP categories PAH, PCDD/F and HCB decreased significantly between the years 1985–1994 as a result of legal regulations concerning emission reduction from industry and waste incineration. Emissions increased in the years 1995 and 1996, but steadily declined afterwards until the year 2001.

Emissions of PAH and HCB were increasing slightly from 2000 until 2005 and have been dropping from 2006 onwards, whereas emissions of PCDD/F dropped remarkably between 2001 and 2002 (due to a reduction measure in one sinter plant).

In 2009 emissions of PAH, HCB and PCDD/F dropped significantly due to less economic activity.

Dioxins and furans (PCDD/F, I-TEQ)

In the year 2009 a total of 35.7 g of PCDD/F (I-TEQ)were emitted in Austria from source categories listed in annex C of the Stockholm Convention. In the Austrian Air Emissions Inventory (OLI) PCDD/F emissions into air were calculated to be 36.0 g (I-TEQ, 2009). The difference can be explained by the fact that the OLI is more comprehensive as far as activities are concerned. On the other hand some emission factors have been updated for the purpose of this report.

Only a few source categories contribute significantly to the total emissions of dioxins and furans (PCDD/F), the most important being residential combustion sources with a share of 70% and thermal processes in the metallurgical sector with a share of 13%. Other sources are motor vehicles with 3.4%, biomass combustion (8.3%)and fossil fuel use in industry (3.1%) (see figure A and tables A and B).

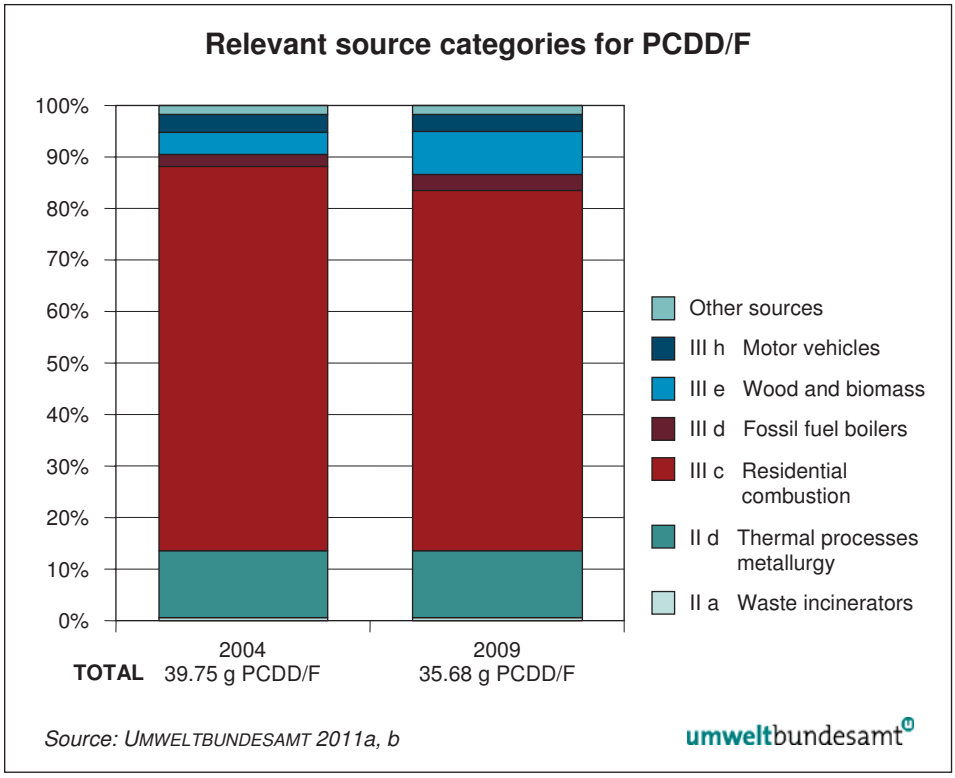

Figure A: Relevant source categories for PCDD/F.

Table A: PCDD/F emissions from Source categories part II for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source category part II	2004 [g I-TEQ]	2009 [g I-TEQ]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	0.230	0.229
Cement kilns firing hazardous waste[1]	0.116	0.131
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	0.279	0.279
(ii) Sinter plants in the iron and steel industry	3.106	2.538
(iii) Secondary aluminium production	1.813	1.813
(iv) Secondary zinc production	NO	NO
Total (Part II)	**5.544**	**4.990**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here; PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.*

NO: not occurring

IE: included elsewhere

Table B: PCDD/F emissions from source categories part III for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source category part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Open burning of waste*	0.222	0.136
Thermal processes in the metallurgical industry not mentioned in Part II	0.198	0.190
Residential combustion sources	29.564	24.931
Fossil fuel-fired utility and industrial boilers	0.974	1.117
Firing installations for wood and other biomass fuels	1.644	2.957
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.154	0.164
Motor vehicles, particularly those burning leaded gasoline	1.453	1.200
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**34.208**	**30.694**

** Without burning of landfill sites and accidental fires*

NA: not applicable

NO: not occurring

NE: estimated

Hexachlorobenzene (HCB)

In 2009 total emissions of HCB amounted to 38.2 kg (see Table C, D and Figure B). Residential combustion sources had the lion's share of 86.4% and the thermal processes in the metallurgical sector (predominantly sinter plants) combined accounted for 8.7%. All other sources were below 1%.

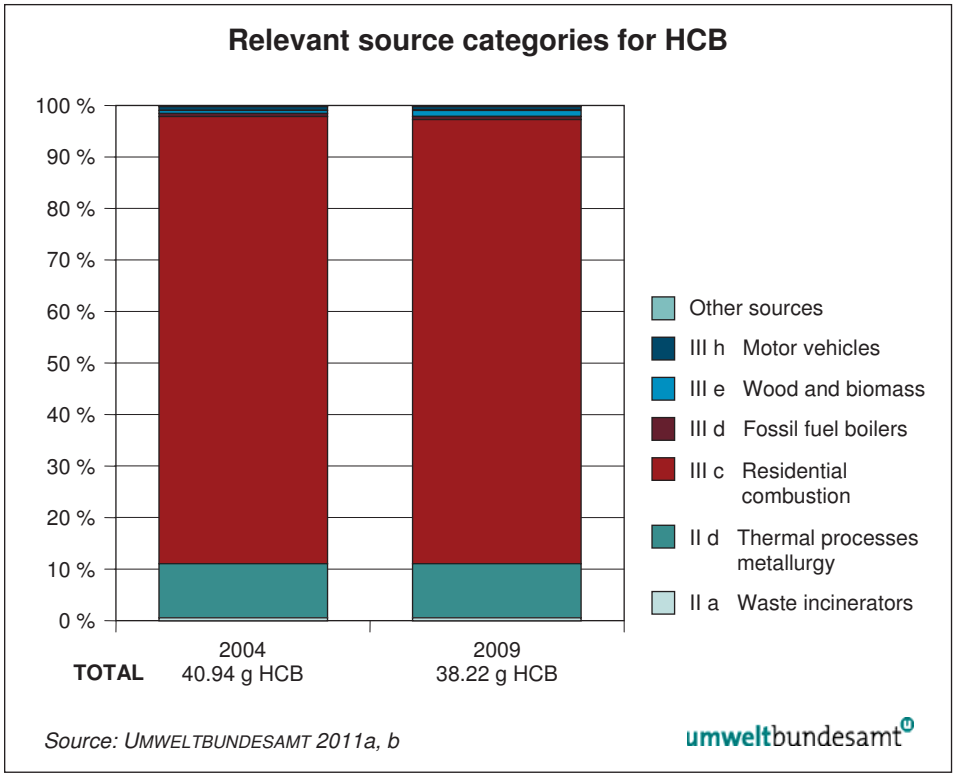

Figure B: Relevant source categories for HCB.

Table C: HCB emissions in source category part II for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source category part II	2004 [kg HCB]	2009 [kg HCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	0.290	0.247
Cement kilns firing hazardous waste[1]	0.017	0.020
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	0.091	0.091
(ii) Sinter plants in the iron and steel industry	3.261	2.926
(iii) Secondary aluminium production	0.907	0.907
(iv) Secondary zinc production	NO	NO
Total (Part II)	**4.566**	**4.189**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here; PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.*

NO: not occurring

IE: included elsewhere.

Table D: HCB emissions in source category part III for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source category part III	2004 [kg HCB]	2009 [kg HCB]
Open burning of waste, including burning of landfill sites	0.044	0.027
Thermal processes in the metallurgical industry not mentioned in Part II	0.016	0.014
Residential combustion sources	35.515	33.012
Fossil fuel-fired utility and industrial boilers	0.194	0.198
Firing installations for wood and other biomass fuels	0.287	0.511
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.031	0.033
Motor vehicles, particularly those burning leaded gasoline	0.291	0.240
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**36.377**	**34.035**

NA: not applicable; NE: not estimated; NO: not occurring

Polychlorinated biphenyls (PCBs)

Due to limited availability of qualified data releases of PCB could not be calculated.

Polycyclic aromatic hydrocarbons (PAHs)

In the year 2009 7,462 kg of PAHs were emitted in Austria. PAH emissions are mainly caused by two source categories (see Figure C, Table E and F). Residential combustion sources accounted for the lion share of 69.7% and mobile vehicles for 24.2%. Other notable sources are open burning of waste (2.5%) and sinter plants (1.9%).

Figure C: Relevant source categories for PAH.

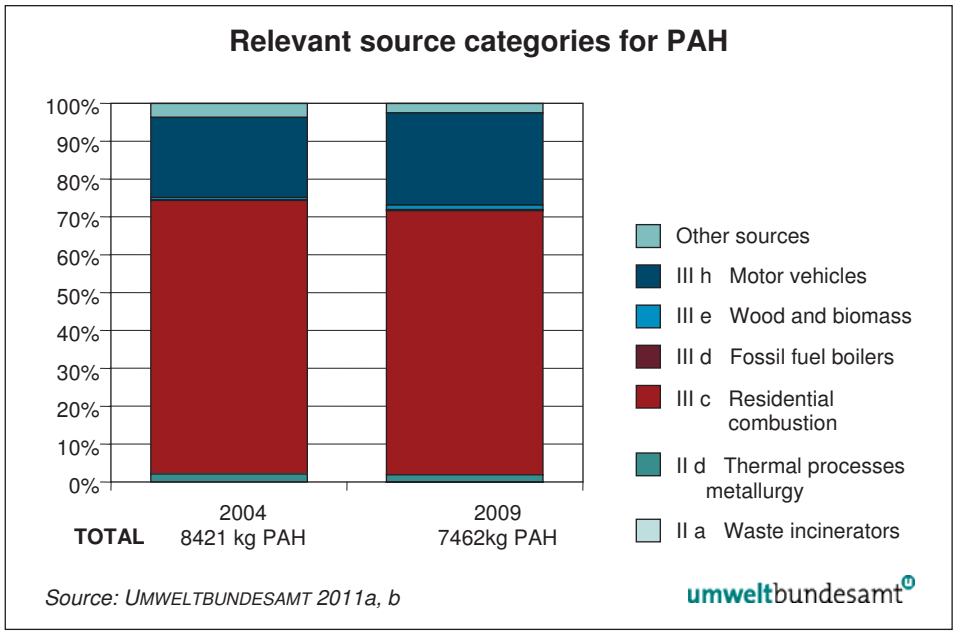

Table E: PAH emissions from source category part II for 2004 and 2009 (UMWELTBUNDESAMT 2011 a, b).

Source Category Part II	2004 [kg PAH]	2009 [kg PAH]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	24.1	11.5
Cement kilns firing hazardous waste[1]	3.2	3.7
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	NE	NE
(ii) Sinter plants in the iron and steel industry	156.5	140.9
(iii) Secondary aluminium production	NE	NE
(iv) Secondary zinc production	NO	NO
Total (Part II)	**183.8**	**156.1**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here; PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.*

NO: not occurring

NE: not estimated

IE: included elsewhere.

Table F: PAH emissions in source category part III for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source category part III	2004 [kg PAH]	2009 [kg PAH]
Open burning of waste, including burning of landfill sites	304.1	183.5
Thermal processes in the metallurgical industry not mentioned in Part II	2.9	2.8
Residential combustion sources	6 080.0	5 198.3
Fossil fuel-fired utility and industrial boilers	16.5	27.1
Firing installations for wood and other biomass fuels	47.0	89.1
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	<0.1	<0.0
Motor vehicles, particularly those burning leaded gasoline	1 777.9	1 805.6
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**8 228.3**	**7 306.3**

NA: not applicable; NO: not occurring; NE: not estimated

Pentachlorobenzene (PeCB)

In the year 2009 a total of 21.28 kg PeCB was emitted in Austria from the source categories according to the Stockholm Convention.

Figure D: Relevant source categories for PeCB.

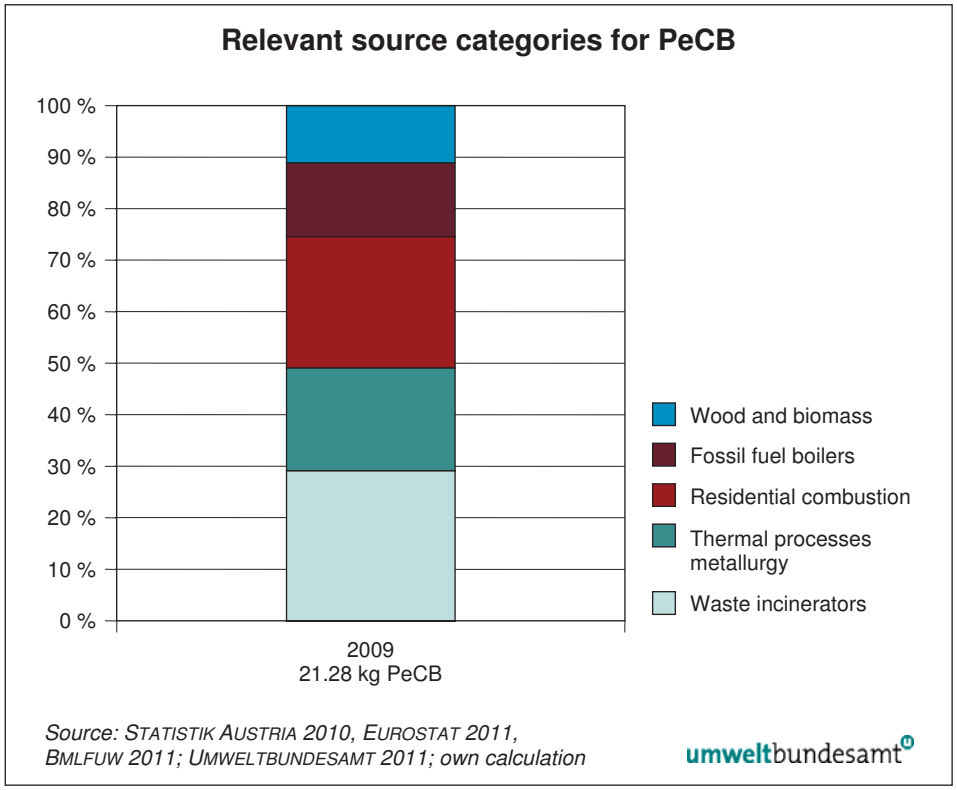

Table G: PeCB emissions in source category part II for 2009 (STATISTIK AUSTRIA 2010, EUROSTAT 2011, BMLFUW 2011; UMWELTBUNDESAMT 2011, own calculation).

Source category part II	2009 [kg PeCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	6.21
Cement kilns firing hazardous waste	NA
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching	NA
The following thermal processes in the metallurgical industry	
(i) Secondary copper production	NA
(ii) Sinter plants in the iron and steel industry	4.2
(iii) Secondary aluminium production	NA
(iv) Secondary zinc production	NO
Total (Part II)	**10.41**

NO: not occurring

NA: not applicable.

Source category part III	2009 [kg PeCB]
Open burning of waste, including burning of landfill sites	NA
Thermal processes in the metallurgical industry not mentioned in Part II	NA
Residential combustion sources	5.5
Fossil fuel-fired utility and industrial boilers	3.00
Firing installations for wood and other biomass fuels	2.37
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA
Crematoria	NA
Motor vehicles, particularly those burning leaded gasoline	NA
Destruction of animal carcasses	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA
Shredder plants for treatment of end of life vehicles	NA
Smouldering of copper cables	NO
Waste oil refineries	NO
Total (Part III)	**10.87**

NA: not applicable.

NO: not occurring

Table H: PeCB emissions in source category part III for 2009 (STATISTIK AUSTRIA 2010, EUROSTAT 2011, BMLFUW 2011; UMWELTBUNDESAMT 2011, own calculation).

C Inventory of emissions into water

For the time being, data on sources for POPs releases into water are gathered in two registers in Austria:

In the European Pollutant Release and Transfer Register – PRTR – point sources and emissions to water for all POPs are included in principle. In fact, for most industrial sectors, a reporting obligation to PRTR exists only for facilities exceeding a certain production capacity threshold and for emissions which exceed a pollutant release threshold. For Austria, with its mainly small and medium-sized enterprises and thus lower production capacity thresholds only some 80 facilities with emissions to water or waste water are listed in the PRTR. In 2007, 2008 and 2009 no emissions of POPs were reported for these facilities. So far, no data on diffuse sources of POPs have been available in PRTR.

In 2009 a national inventory on pollutant emissions to surface waters was established. The national register comprises emissions of the following point sources: PRTR facilities, urban waste water treatment plants with a capacity from 2000 population equivalents upwards and waste incineration facilities with a capacity of more than 2 tonnes of waste per hour. There is no release threshold for reporting. In practice, the lower limit is determined by the limit of quantification of the specified analytical method and the waste water discharge. The first reporting cycle for the data of 2009 covered only basic waste water parameters. The second more comprehensive reporting cycle of 2010 was finalized and partly evaluated in 2011.

Additional information on POPs releases was gathered within a supporting project for the setup of the national emissions inventory in 2007/2008. Some 70 substances were analysed for intake and outlet of 15 urban waste water treatment plants of different capacities, purification technologies and waste water-composition. The analytical programme comprised the priority substances and certain other substances according to the daughter Directive 2008/105/EC of the Water Framework Directive and pollutants of national relevance regulated in the Austrian Ordinance on Quality Standards for Surface Waters. DDT, chlordane, aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene and pentachlorobenzene could not be detected in crude waste water. With exception of one facility PAHs were only detectable in crude waste water. Only polybrominated diphenylethers were detectable in effluents in the sub-ng/l range and hexachlorcyclohexane (lindane) in the ng/l range. The use of lindane was allowed in some selected minor applications until January 1st 2008.

With regard to contaminated sites it can be concluded that underground pollution by PAHs causes in general only local impacts on soil and groundwater.Nevertheless, it must be recognised that, depending on the site-specific situation and where sensitive land uses are concerned, risks to human health or to ecosystems need to be analysed. Regarding PCDD/F, HCB and PCB there are hardly any sites or data available on site pollution or wider environmental impacts.

D Inventory of releases via residues and waste

An inventory of releases via residues and waste can be established in the case of PCDD/F and PeCB.

Dioxins and furans (PCDD/F)

The releases of dioxins and furans via residues and waste remained largely the same compared to the year 2004: In the year 2009 a total of 274.1 g PCDD/F I-TEQ were emitted (in 2004 267.1 g), which is approximately seven times as much as the emissions to air. Solid waste from waste incineration contributes most (59%) to the overall releases. Waste from residential sources presents also a significant release (28%). Other releases come from thermal processes in the metallurgical sector and from fossil fuel and biomass combustion (see Figure E).

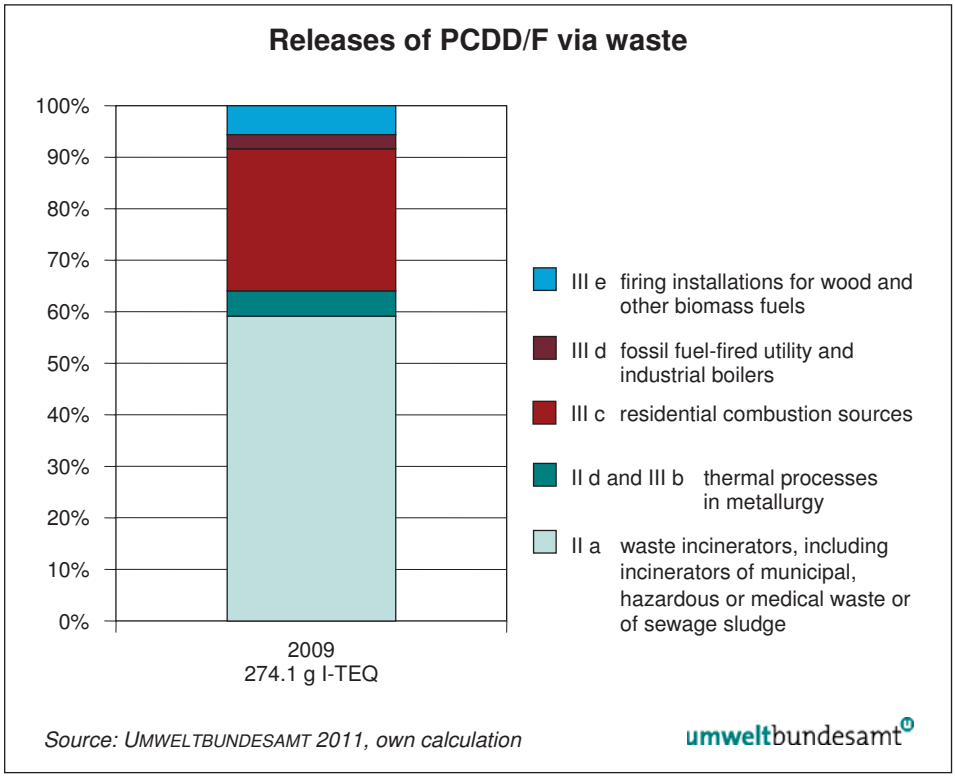

Figure E: Releases (although hardly bio-available) of PCDD/F via waste.

Note: Total releases may be higher since for many source categories (e.g. the metallurgical sector) which have the potential of POPs releases via waste qualified emission factors are not available.

However, there are **distinct differences** to other releases with regard to the uptake by organisms and impacts on human health: Many waste types are disposed of in landfills and thus removed from the regular material flow and are **not bio-available** anymore, provided that the landfills are properly designed and operated:

Waste from waste incinerators are generally disposed of in landfills (landfills for residual waste, mass waste or underground disposal). 87% of PCDD/F releases occur via fly ash, which is often sent to underground disposal.

Very high PCDD/F concentrations could be found in the soot from small scale combustion sources. It is not known in detail how this type of waste is treated, but it is assumed that the major part is disposed of via the typical municipal solid waste routes. In case of thermal treatment of municipal solid waste POPs will be either oxidised or – if captured in the ashes – sent to landfills. In the case of mechanical-biological treatment soot will accumulate in the fraction which is usually sent to landfills.

Waste from metallurgical processes – which is to some extent contaminated – is either sent back to the process or to external treatment and/or disposal. There are major data gaps with respect to concentrations of POPs and treatment of POP containing waste types.

Fly ash from thermal power plants is used in the cement and construction industry, whereas fly ash from biomass plants has to be disposed of in landfills.

Releases of POPs into the environment via waste can occur when POP containing waste types are brought back to the environment. This can be the case-when ash from small scale firing installations (which can contain considerable high concentrations of POPs) is used for “fertilising” purposes or used as an agent for sanding the pavement during the winter season. Coarse ashes from biomass plants are used as additional material for preparing compost. In general there are also major data gaps concerning concentrations of POPs in ashes from residential combustion sources. Release estimations are associated with great uncertainties. Reasons for these uncertainties are (among others) the wide variety of the types (including some types of waste) and quality of fuels used (e.g. water content, ash content, calorific value, chlorine content), the wide variety of firing systems with different combustion conditions and the wide variety of “local” factors (such as manual loading of the firing system, co-incineration of waste).

However, these releases are relevant because a certain part of this waste is re-transferred to the environment (e.g. when ash is used as “fertiliser” in private gardens).

Pentachlorobenzene (PeCB)

In the year 2009 a total of 3.08 kg PeCB was emitted, approximately seven times less than to air (see 2.6.6). Solid waste from waste incineration contributes most (81%) to the overall releases. Other releases come from thermal processes in the metallurgical sector and from fossil fuel and biomass combustion. Anyway, it should be mentioned that the availability of data was scarce.

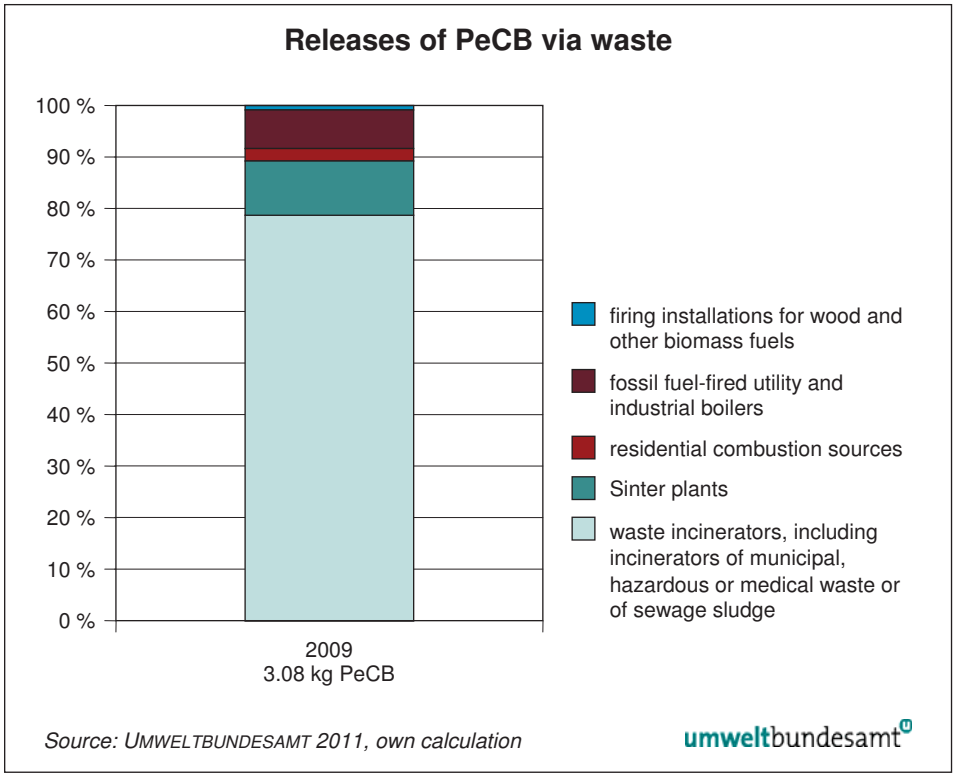

Figure F: Releases of PeCB via waste.

Source category	2009 [kg PeCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	2.42
The following thermal processes in the metallurgical industry	
(ii) Sinter plants in the iron and steel industry	0.33
Residential combustion sources	0.07
Fossil fuel-fired utility and industrial boilers	0.23
Firing installations for wood and other biomass fuels	0.03
Total	**3.08**

Table I: PeCB discharge into waste for 2009 (own calculation)

E Releases via products

Action in relation to POPs in products stems from Annex C Part V A (g) of the Convention ("minimization of these chemicals as contaminants in products"). Some data can be found in the literature relating to concentrations of PCDD/F in the sold products cement and pulp and paper (see Table J). Concerning the other POPs described in this report there are no proven data available.

However, for most source categories there are no relevant releases via the product.

Table J: PCDD/F-releases via the products cement and pulp and paper – calculations were based on data from literature (KARSTENSEN 2006, UNEP 2005, GRUBER 1996).

	Release (g I-TEQ/a)
Cement	4.02
Paper	4.98
Pulp exported[1]	0.123

[1] *Releases via pulp occur only via export; releases via pulp which is not exported are included in the value given for paper*

The PCDD/F-releases via the products cement and pulp and paper in 2009 were the same as in 2004 since there were no significant changes in the production.

Concentrations of PCDD/F in cement are considered to be low and can be explained by the fact that filter dust from the clinker process (average PCDD/F concentration: 6.7 ng I-TEQ/kg) is added to the product and that secondary raw materials (e.g. fly ash, gypsum from flue gas desulphurisation) are used. On the other hand, the cement clinker itself is contaminated with low concentrations of PCDD/F (average: 0.9 ng I-TEQ/kg clinker) (KARSTENSEN 2006).

Here again, it should be mentioned that the bio-availability of POPs in cement is greatly reduced.

Austria participates in the revision of the Dioxin Toolkit (UNEP 2005). The current draft states the following: "This section summarizes high-temperature processes in the mineral industry. Raw materials or fuels that contain chlorides may potentially cause the formation of PCDD/PCDF at various steps of the processes, e.g., during the cooling phase of the gases or in the heat zone. Due to the long residence time in kilns and the high temperatures needed for the product, emissions of PCDD/PCDF are generally low in these processes." Cement kilns firing hazardous waste are a source as mentioned in Annex C Part II (b) of the Convention concerning emissions of PCDD/F, HCB, PAH and PeCB. Therefore the quantification of these POPs in the media as well as residues and products is desirable.

In the case of the pulp- and paper production PCDD/F is introduced into the products mainly via bleached (Kraft-)pulp and via recycled papers.

In Austria total pulp production (reference year 2009) amounted to 1,514 kt (2004: 1,509 kt) with bleached sulphite pulp (TCF bleaching) having a share of 24%, bleached Kraft-pulp (ECF-bleaching) 26%, unbleached Kraft-pulp for 32% and textile pulp for 18% (AUSTROPAPIER 2009).

Calculation of releases from pulp was based on emission factors of 0.5 µg/t (bleached Kraft-pulp) and 0.1 µg/t (other pulp) (UNEP 2005). Thus total releases via pulp amounted to 0.28 g in the year 2009.

Relevant raw materials for paper production are pulp (both from national production and from imports), wood pulp and recovered paper (either de-inked or not de-inked).

In addition to the pulp produced in Austria (see above) imported pulp has to be taken into account: In 2009 about 690,000 t of bleached (Kraft-)pulp was imported, part of the imported pulp came from countries where chlorine is still used as a bleaching agent (AUSTROPAPIER 2009). For the calculation of the PCDD/F content it is assumed that 10% of the imported pulp has an emission factor of 0.5 µg/t, whereas the other imported pulp is less contaminated (0.1 µg/t). This leads to a total import of 0.096 g I-TEQ via pulp. In the year 2009 about 0.123 g I-TEQ were exported via pulp.

Input of PCDD/F via wood-pulp has been calculated using an emission factor of 0.1 µg/t (UNEP 2005; total input: 0.044 g I-TEQ).

On the other hand PCDD/F is introduced via the recycled paper and more specific via impurities in the used inks. In case de-inking is applied (about 40% of recovered paper is de-inked in Austria) PCDD/F will be reduced by a factor of 3 (GRUBER 1996). Comparably high concentrations (up to 12 ng/kg) were found in packaging papers and paper board in the early nineties. In general, a sharp decline in average concentrations could be observed between 1989 and 1994 whereas concentrations have been decreasing slowly since 1994 (GRUBER 1996).

Based on that information and on data given in the Dioxin Toolkit (UNEP 2005) it has been assumed that the PCDD/F concentration in recovered paper is 3 µg/t (without de-inking) and 0.99 µg/t (with de-inking). These assumptions result in an average emission factor of 2.18 µg/t (averaged over paper which undergoes a de-inking step and which does not). Thus the total release via paper amounts to 4.98 g (reference year: 2004).

Publications in scientific literature give some indication, that waste paper could be contaminated by printing inks containing significant residues of PCDD/F, e.g. through pigments. In 2011 the Environment Agency Austria accomplished a survey assessing the PCDD/F contents of cardboard-boxes known to be produced from waste paper as the predominant raw material. Comparing the PCDD/F contents of brand-new non-printed cardboard-boxes with used cardboard-boxes with amount of ink printed on them this limited study did not show any indication of PCDD/F input via printing inks. The cardbox samples analysed for this study showed PCDD/F contents in a range of 1.2 to 1.9 ng TEQ/kg (UMWELTBUNDESAMT 2011c).

In 2010 Austropapier, the Association of the Austrian Paper Industry, submitted new data on PCDD/F contents of selected paper products in order to refine calculations based on the emissions factors taken from the Dioxin Toolkit (UNEP 2005). Emission factors derived from the new data indicate a reduction of the overall PCDD/F release via paper products by a factor of three. Although there are still certain concerns about the representativeness of the data presented by Austropapier this information will be forwarded to the expert panel of the Dioxin Toolkit to initiate a discussion about a revision of the respective emission factors.

A new calculation was performed in 2011:

Table K: Releases of PCDD/F via products (calculation on the basis of the output of Austropapier and transmitted results of analysis).

Product	Production (t/a)	Emission factor (µg TEQ/t)	Releases (g PCDD/F TEQ/a)	Percentage (%)
Newspaper printing paper	299,205	0.068	0.02	1.2
Printing and writing paper				
• deinked	902,421	0.068	0.06	3.7
• from pulp	1,346,070	0.050	0.07	4.0
Folding box cardboard	487,214	0.723	0.35	21.1
Packaging paper	676,177	1.141	0.77	46.2
Kraft paper				0.0
• with recovered paper	374,855	0.858	0.32	19.3
• only from pulp	250,743	0.050	0.01	0.8
Thin- and special papers				0.0
Sanitary paper	128,660	0.068	0.01	0.5
Others	126,896	0.050	0.01	0.4
Packing and spezial board	13,299	0.858	0.01	0.7
Market pulp exported	95,471	0.070	0.01	0.4
Market pulp (ECF)	313,818	0.090	0.03	1.7
Total	**5,014,829**		**1.67**	**100.0**

F Evaluation of the efficacy of national laws and policies and strategies for meeting the obligations of the Stockholm Convention and the EU POP-Regulation

As already stated in the National Action Plan 2008 Austria complies to a great extent with the provisions of the Stockholm Convention and the EU POP Regulation. Nevertheless, as one of the goals of the Convention is the “continuous reduction of POPs releases” further efforts are necessary.

POP emissions of major (industrial) sources have considerably declined in the past years. Between 2004 and 2009 a further decrease of air emissions of POPs took place, partly due to a decline in economic activities in the years 2008 and 2009. Still, if changes in the best available techniques allow for lower or zero emissions from relevant sources policy makers have to react and to adapt the relevant legal provisions accordingly (e.g. by laying down stricter emission limit values).

In general, the findings of the NAP 2008 remain valid for the near future:

The NAP 2008 identified small residential combustion plants as an important target area. They still hold responsible for 70.0% of the PCDD/F emissions, 86.4% of the HCB emissions and for 69.7% of the PAH emissions into air. All possible measures have to be investigated and exploited to reduce the POP emissions from these sources.

Anotherset of measures is concerned with awareness-raising to encourage ”low emission” incineration in household stoves or e.g. the use of ashes from these plants for fertilising purposes. Here, an important initiative was launched in 2009 and 2010 (see below).

It should be mentioned that in order to comply with certain national and international obligations a variety of comprehensive and to some extent cross-sectoral measures and instruments are being developed in Austria. These measures are aiming at the reduction of greenhouse gases, NO_x and (fine) particulate matter. Some of these measures (described e.g. in the Climate Strategy 2007 (FEDERAL MINISTRY OF AGRICULTURE, FORESTRY, ENVIRONMENT AND WATER MANAGEMENT 2007) or in the Programme of the Federal Government (FEDERAL GOVERNMENT 2007)) will lead to an indirect reduction of POPs releases (by e.g. reduction of energy consumption or prescription of stricter air emission limit values for dust), others (such as the increased use of biomass in small scale firing installations) will lead to an increase of POPs releases.

Further, it is important to gain a still deeper knowledge in fields where reliable data are limited or missing. Specific studies e.g. on POP concentrations in certain wastes as well as further POP related monitoring activities are mentioned below.

PeCB Management Options: It is common knowledge, that measures which are effective for PCDD/F removal or elimination are also effective for a minimisation of PeCB releases. Here, the reader is referred to Annex V of the Stockholm Convention on POPs and in particular to the technical guidelines on best available techniques and guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention.

Therefore, no particular management actions for PeCB are required.

Evaluation and Proposal of Measures (according to § 20 (2) Chemicals Act 1996)

The NAP 2008 listed a variety of measures which on the one hand contribute to lower POPs emissions from relevant sources and which would, on the other hand, improve the availability of data on POPs in the environment.

Releases of POPs from source categories

The following table provides an overview which of the measures proposed in the NAP 2008 had been implemented in the period 2008–2011.

National legislation	Contents with respect to POPs	Measures proposed in NAP 2008	Current status
Act on Emissions of Boiler Plants (BGBl. I No. 150/2004); Clean Air Ordinance on Boiler Plants (BGBl. No. 19/1989 as amended by BGBl. II No. 2005/55); as amended by Emission Measurement Ordinance (Fed.Law Gaz. II No.153/2011)	ELVs for dust, CO, Corg, NO_x	Adaptation to BAT necessary	Adaptation done through Act on Emissions of Boiler Plants as applicable
Industrial Code 1994 and specific ordinances according to Article 82 para 1, for example Ordinance on sinter plants (Fed. Law. Gaz. II No. 1997/163)	ELV for various air pollutants, eg dust, PCDD/F	Continuous evaluation with regard to BAT	Routine Evaluation
Ordinance on combustion plants (BGBl. II No. 331/1997)	ELVs for dust, CO, Corg, NO_x	Adaptation to BAT necessary (stricter ELVs for dust)	Measure was implemented by amendment (BGBl. II No. 312/2011)
Waste incineration ordinance (Fed. Law. Gaz. II No. 2002/389)	ELVs for dust, CO, Corg, NO_x, heavy metals, PCDD/F	stricter ELVs for dust for co-incineration plants	Revised ordinance Fed.LawGaz. II No. 2010/476, but no stricter ELV for dust
Austrian Water Act and specific Ordinances:	ELVs for AOX and POX in the sector specific ordinances		
Ordinance on the limitation of waste water emissions from flue gas treatment (BGBl. II No. 271/2003)	ELVs for PCDD/F	Continuous evaluation with regard to BAT	none
Ordinance on the limitation of waste water emissions from processing of coal (BGBl. II No. 346/1997)	ELVs for PAHs	Continuous evaluation with regard to BAT	none
Ordinance on the limitation of waste water emissions from the production of plant protecting agents and crop sprayings (BGBl. No. 668/1996)	ELVs for AOX and specific POPs	Continuous evaluation with regard to BAT	none
Ordinance on the determination of the target state for surface waters (BGBl. II No. 96/2006)	Environmental quality standard for HCB	For PAHs community environmental quality standards were determined (in 2008)	ordinance was amended in 2010 according to directive 2008/105/EC (BGBl. II No. 461/2010)
Other relevant legal provisions			
Ordinance on landfills (BGBl. II No. 39/2008)	Limit values for the content of PAH in wastes		Amended with BGBl. II No. 185/2009 und II 178/2010
Compost ordinance (BGBl. II No. 292/2001)	Limit values for the content of POPs in composts	Continuous evaluation of the limit values necessary	none
Ordinances on sewage sludge and compost of the Federal Provinces	Limit values for POP	Continuous evaluation of the limit values necessary	None, some Austrian provinces limit POPs in sewage sludge
Soil Protection Laws of the Federal Provinces: Burgenländisches Bodenschutzgesetz (LGBl. Nr. 87/1990) Niederösterreichisches Bodenschutzgesetz (LGBl. Nr. 6160-0) Oberösterreichisches Bodenschutzgesetz (LGBl. Nr. 63/1997) Bodenschutzgesetz Salzburg (LGBl Nr. 80/2001) Steiermärkisches landwirtschaftliches Bodenschutzgesetz (LGBl. Nr. 66/1987)		Elaboration of target values for organic pollutants (including polybrominated diphenylethers, perfluorinated tensides and pesticides) with the aim to reduce pollution of soils	Not realised

National legislation	Contents with respect to POPs	Measures proposed in NAP 2008	Current status
Ambient Air Quality Act (IG-L)	§ 21 IG-L: Legal basis for an ordinance	Evaluation whether generally binding ELVs for crematoria in an ordinance according to § 21 IG-L are necessary	Not implemented, no general binding rule for crematoria
Laws of the Federal Provinces concerning residential combustion sources		Agreement pursuant to Art. 15a Federal Constitution Law concerning the placing on the market and the inspection of combustion installations, rapid transposition of the requirements of this agreement into the law of the federal provinces	Agreement was signed in 2011
Act on Air Pollution Prevention (BGBl. I No. 137/2002, as amended (BGBl. I No. 50/2012))	Prohibition of burning of biogenic materials, many exemptions possible	Evaluation with respect to the exemptions	Prohibition integrated in Act on Air Pollution Prevention
Permitting process	*Contents with respect to POPs*	*Comments/Specific Steps*	
Landfill sites	Fire protection requirements	Implementation of effective fire protection requirements for landfills and intermediate storage sites for waste	No new information

Bearing in mind that the sector **residential combustion** is responsible for 70% of the PCDD/F emissions into air the Federal Ministry of agriculture and forestry, environment and water management in cooperation with the federal guild of chimney sweepers, the tile stove alliance, the Austrian Medical Chamber and the association of doctors for a healthy environment published a booklet entitled “Richtig heizen” (“Proper Heating”) in 2010. The booklet contains information on the effects of emissions from household stoves on human health and the environment as well as advice on how low emissions heating can be achieved. It has been distributed to the public via chimney sweepers and medical doctors. Furthermore an internet-site has been created (**www.richtigheizen.at**), where the proper use of household stoves as well as legal considerations are described.

Furthermore, the rapid implementation of the following measures is of utter importance:

- Establish compliance with the requirements of the agreement between the federal provinces pursuant to Article 15a of the Federal Constitutional Law concerning the setting of consolidated quality standards to support the establishment and refurbishment of residential buildings for the purpose of the reduction of greenhouse gases
- Effective financial funding for the replacement of coal fired small scale firing installations

  Periodic reviews and improvements of the criteria for the funding of biomass plants (including biomass plants operated in the agricultural sector) with respect to operating conditions, energy efficiency (including district heating systems), the quality of fuels and emission limit values for dust → emission limit values for dust were changed in 2007 and 2009.
- Further information with respect to the prevention of co-incineration of waste in small scale firing installations

- Further information with respect to the final disposal of ashes/soot from small scale firing installations
- Implementation of appropriate measures to ensure that the target value for benz(a)pyrene in ambient air (1 ng/m^3) will be complied with. This target value will be converted into a limit value as of 31.12.2012.

  → different measures in the provinces

For the following sources the availability of data is **still** very limited or missing. Therefore, to assess whether releases of POPs are relevant and to improve and complete the Austria Inventories on POPs, the following **specific steps to improve data quality** are desirable/necessary. However, the implementation of these measures may often be subject to available budget resources.

- Emission behaviour of small scale combustion installations (esp. in the case of firing straw and cereals)

  → still partly unknown with regard to POPs, but a project is envisaged which will investigate certain emission parameters of small scale combustion installations (residential combustion, “EnEm Tech project”)
- Measurement of emissions of motor vehicles and update of emission factors to improve quality of the forecasts

  → The Handbook Emission Factors for Road Transport (HBEFA) provides emission factors for all current vehicle categories (PC, LDV, HGV, urban buses, coaches and motor cycles), each divided into different categories, for a wide variety of traffic situations. Emission factors for all regulated and the most important non-regulated pollutants as well as fuel consumption and CO_2 are included.The last version HBEFA 2.1 dates back to 2004 and was updated in 2010 (HBEFA 3.1). All emission factors have been recalculated (based on a broader set of emission data, on new measurements of motor vehicle emissions; new emission factor models have been applied). For calibrating the model, a broad set of emission measurements up to Euro 4 has been used. Emission factors for the new standards of Euro 5 and 6 are mainly based on assumptions in view of future legislation.
- Improvement of data quality with respect to releases of POPs from landfills and abandoned industrial sites and known contaminated sites (e.g. PAH content oflandfill gases)
- Assessment of the contamination and treatment of waste and residues in non ferrous metals and secondary steel production as well as in sinter plants

  → no new assessment
- Determination of POP-concentrations in waste streams from small scale combustion installations in the sectors residential combustion, services and agriculture which have a high probability of being released into the environment (e.g. bottom ash and fly ash)
- Determination of POP-concentrations in waste streams from fossil fuel fired utility and industrial boilers (including co-incineration of waste) which are recovered in other production processes or which have a high probability to be released into the environment (e.g. fly ash from co-incineration plants)
- Determination of POP-concentrations in waste streams from biomass fired combustion installations which are recovered in other production processes or which have a high probability to be released into the environment (e.g. bottom ash)

- Determination of concentrations of PCDD/F and relevant precursors especially in bleached (Kraft-)pulp (imported and domestic production), paper (packaging paper, paper board, paper made from recovered fibres), colours and inks, de-inking sludge

  → In 2011 the Environment Agency Austria accomplished a survey assessing possible PCDD/F input into cardboard boxes via contaminated printing inks. The results of this limited study did not show any indication of PCDD/F contamination of currently used printing inks
- Quantification of POPs in filter dusts from the clinker process (Austrian cement kilns)

  → quantification after consultation talks with Environment Agency Austria, Federal Economic Chamber/cement industry and other stakeholders; support of the revision of the Dioxin Toolkitrelating to „mineral products“
- Quantification of POPs emissions (esp. PCDD/F and PCB) of Platformer 3 of the OMV refinery in Schwechat

  → quantification of POPs emissions of Platformer 3 still unknown

Data availability on POP emissions into the environment

The following table lists specific measures designed to improve the quality of available data regarding POPs emissions into the environment:

Specific steps	Timetable
Improvement of data quality with respect to releases of HCB and PCB into air (e.g. by planning and carrying out measurement programmes for sources with high priority, such as residential combustion sources, industrial processes).	Review of available (literature) data, identification of (suspected) relevant sources
Establishment of monitoring programmes in the neighbourhood of POP relevant emitters	Identification of relevant sites for sampling sampling and measurements (winter/summer)
Continuation of monitoring programmes using Norway spruce needles close to POP sources	Continued sampling

Data availability on POP concentrations in the environment

The following table lists specific measures designed to improve quality of available data regarding POPs concentrations in the environment:

Specific steps	Timetable
Continuation of ambient air and deposition monitoring for POPs at Alpine summits (Sonnblick)	Continued sampling and analysis
Ambient air and deposition monitoring for POPs in the Austrian-Czech border region	Sampling in 2011/12 and analysis
Development of transfer factors to improve knowledge of interrelations between POP concentrations in the environment and bioavailable concentrations.	Establishment of a scientific panel to elaborate a study design
Development and adaptation of passive sampling methods to improve the comparability of available data	Method/Instrument selection and development, pilot study Evaluation of the pilot study and selection of an appropriate method
Implementation of a national monitoring programme to investigate the distribution of deposited POPs	2008 – selection of sampling sites From 2009 onwards – implementation

ZUSAMMENFASSUNG

A Einleitung

Dieser Bericht ist der 1. Review des Nationalen Aktionsplans POPs, der 2008 veröffentlicht wurde.

Artikel 5 des Stockholmer Übereinkommens verpflichtet die Vertragsparteien zur Erarbeitung eines Aktionsplanes der die unbeabsichtigt entstandenen POPs (laut Anlage C) beschreibt und näher behandelt. Artikel 5 sieht darüber hinaus eine regelmäßige Überprüfung (Revision) desAktionsplanes und der erfolgreichen Umsetzung der Verpflichtungen des Übereinkommens alle 5 Jahre vor.

In Anlage C sind derzeit folgende unbeabsichtigt freigesetzte Chemikalien enthalten: polychlorierte Dibenzo(p)dioxine (PCDD), polychlorierte Dibenzofurane (PCDF), Hexachlorbenzol (HCB), Pentachlorbenzol (PeCB) und polychlorierte Biphenyle (PCBs).

Ferner behandelt der Nationale Aktionsplan auch die Freisetzung von polyzyklischen aromatischen Kohlenwasserstoffen (Benzo(a)pyren, Benzo(b)fluoranthen, Benzo(k)fluoranthen und Indeno(1,2,3-cd)pyren), da diese in der EU-POP-Verordnung (EG) Nr. 850/2004 genannt sind.

Der Nationale Aktionsplan war Teil des Nationalen Durchführungsplanes gemäß Artikel 7 des Übereinkommens und hatte Strategien zur Verminderung oder Eliminierung der Freisetzung der in Anlage C genannten Chemikalien (einschließlich PAHs) sowie einen Zeitplan zu enthalten. Der Nationale Aktionsplan sollte den möglichen Handlungsbedarfaufzeigen sowie Quellverzeichnisse und Emissionsabschätzungen für diese Chemikalien enthalten. Der Plan identifiziert Handlungsprioritäten, unter anderem für diejenigen Quellkategorien, die eine möglichst kosteneffiziente Verringerung oder Eliminierung von Freisetzungen versprechen. Zudem enthält er Freisetzungsinventare für die in Anhang C gelisteten Chemikalien.

Die Bezeichnung „Freisetzung" umfasst POP-Emissionen in Luft, Wasser und Boden sowie Freisetzungen über Abfälle, Rückstände und Produkte.

Die Revision des Nationalen Aktionsplanes enthält eine Aktualisierung der Quellverzeichnisse und der Emissionsabschätzungen (Basisjahr 2004). Auf deren Grundlage werden Instrumente und Maßnahmen vorgeschlagen, die zur Reduzierung von POPs Freisetzungen führen sollen. Die Wirksamkeit der bisherigen gesetzlichen Regelungen und auch die Anwendung von BAT (Best Available Techniques – Beste Verfügbare Techniken) und BEP (Best Environmental Practice – Beste Umweltschutzpraktiken) in den Quellkategorien des Stockholmer Übereinkommens (laut Anhang C) werden überprüft. Zudem werden Empfehlungen gegeben, wie BAT und BEP einzusetzen sind. Weiters werde noch bestehende Datenlücken identifiziert und Vorschläge zur Verbesserung der Datenqualität ausgearbeitet.

Ein Quellverzeichnis für Emissionen von PCDD/F, PAHs und HCB in die Luft kann erstellt werden, für PCBs ist dies aufgrund mangelnder Daten jedoch nicht möglich.

Zur Freisetzung von POPs in das Wasser und in Abfälle existieren wenig Daten. In Bezug auf Abfälle kann lediglich für PCDD/F eine Abschätzung getroffen werden. Für PCBs können aufgrund mangelnder verfügbarer Daten keine Quellverzeichnisse für Luft, Wasser, Boden, Abfall und Produkte erstellt werden.

Eine direkte Freisetzung von POPs in den Boden erfolgt durch die Quellkategorie “offene Verbrennung von Abfällen, einschließlich Verbrennung auf Deponien“ (dies beinhaltet auch die offene Verbrennung biogener Materialien wie etwa Stroh). Jedoch können auch POPs in den Boden freigesetzt werden, wenn Prozessrückstände wieder in die Umwelt gelangen (Beispiel: Verwendung von Asche aus Kleinfeuerungsanlagen für Düngezwecke).

Freisetzungen aufgrund von Unfällen und aus kontaminierten Flächen werden im Nationalen Aktionsplan nicht behandelt. Sie können jedoch im Fall von Bränden in Deponien oder Abfallzwischenlagern beträchtlich sein.

Der Nationale Aktionsplan enthält weiters einige Literaturdaten zu Gehalten von POPs in den Produkten Zement, Zellstoff und Papier.

Das Umweltbundesamt untersuchte im Jahr 2011 Kartonagen aus recycliertem Papier auf eine mögliche Kontaminationmit PCDD/F durch Druckfarben. Allerdings konnte keine Verunreinigung nachgewiesen werden.

Der Nationale Aktionsplan wird periodisch überarbeitet.

B Emissionsverzeichnis Luft

Allgemeine Trends

Aufgrund der gesetzlichen Regelungen zur Reduktion von Emissionen aus industriellen Prozessen und Abfallverbrennung sind die Emissionen an PAHs, PCDD/F und HCB von 1985 bis 1994 signifikant gesunken. 1995 und 1996 stiegen die Emissionen an, wurden aber bis 2001 kontinuierlich geringer.

Von 2000 bis 2005 stiegen die PAK- und HCB-Emissionen geringfügig an, seit 2006 ist eine Verringerung feststellbar. Die Emissionen an PCDD/F verringerten sich zwischen 2001 und 2002 deutlich, was auf Reduktionsmaßnahmen in einer Sinteranlage zurückzuführen ist.

Durch die verringerte Wirtschaftstätigkeit im Krisenjahr 2009 fielen die PAK-, HCB- und PCDD/F-Emissionen in signifikantem Ausmaß.

Dioxine und Furane (PCDD/F; I-TEQ)

Im Jahr 2009 wurden 35,7 g PCDD/F (I-TEQ) aus den in Anlage C des Stockholmer Übereinkommens angeführten Quellkategorien emittiert. Gemäß der Österreichischen Luftschadstoffinventur (OLI) betrugen die PCDD/F-Emissionen in die Luft im Jahr 2009 36,0 g (I-TEQ). Diese Differenz ergibt sich einerseits durch den weiteren Anwendungsbereich der OLI, andererseits durch teilweise adaptierte Emissionsfaktoren, die für diesen Bericht verwendet wurden.

Einen wesentlichen Beitrag zur Emission von Dioxinen und Furanen liefern nur einige wenige Quellkategorien, am größten ist hierbei der Anteil der Kleinfeuerungsanlagen (häusliche Quellen) mit 70 % und jener der thermischen Prozesse in der metallurgischenIndustrie mit 13 %. Andere Verursacher sind Kraftfahrzeuge (3,4 %),die Verbrennung von Biomasse (8,3 %) und der Einsatz von fossilen Brennstoffen in der Industrie (3,1 %) (siehe Abbildung A und Tabelle A und B).

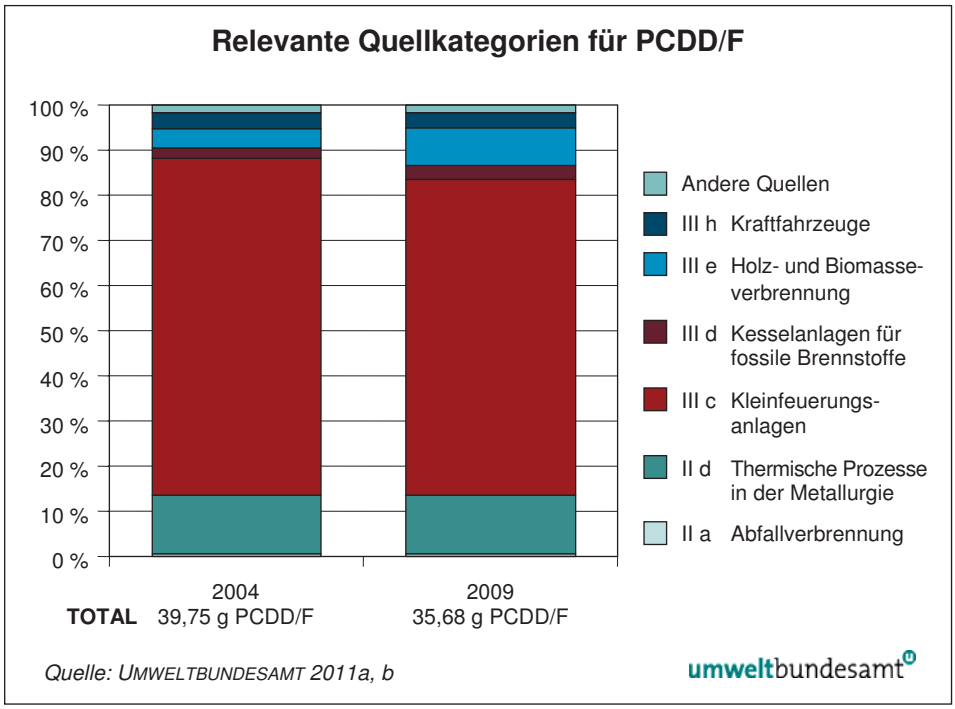

Abbildung A: Relevante Quellkategorien für PCDD/F

Tabelle A: PCDD/F-Emissionen aus Quellkategorien Teil II für 2004 und 2009 (UMWELTBUNDESAMT 200116 a, b).

Quellkategorien Teil II	**2004 [g I-TEQ]**	**2009 [g I-TEQ]**
Abfallverbrennungsanlagen, einschließlich Anlagen zur Mitverbrennung von Siedlungsabfällen, gefährlichen Abfällen, Abfällen aus dem medizinischen Bereich oder Klärschlamm	0,230	0,229
mit gefährlichen Abfällen befeuerte Zementöfen*	0,116	0,131
Zellstoffproduktion unter Verwendung von elementarem Chlor oder von Chemikalien, bei denen elementares Chlor erzeugt wird, für Bleichzwecke **	IE	IE
folgende thermische Prozesse in der metallurgischen Industrie:		
(i) Sekundärkupferproduktion	0,279	0,279
(ii) Sinteranlagen in der Eisen- und Stahlindustrie	3,106	2,538
(iii) Sekundäraluminiumproduktion	1,813	1,813
(iv) Sekundärzinkproduktion	NO	NO
Gesamt (Teil II)	**5,544**	**4,990**

* *Gesamt PCDD/F-Emissionen der österreichischen Zementöfen*

** *nur Prozessemissionen; PCDD/F-Emissionen aus Verbrennungsprozessen werden bei den relevanten Quellkategorien des Teil III betrachtet.*

NO: not occurring (Emissionsquelle in Österreich nicht vorhanden);

IE: inkludiert in anderer Emissionsquelle

Tabelle B: PCDD/F-Emissionen aus Quellkategorien Teil III für 2004 und 2009 (UMWELTBUNDESAMT 2011a, b).

Quellkategorien Teil III	2004 [g I-TEQ]	2009 [g I-TEQ]
offene Verbrennung von Abfall, einschließlich Verbrennung auf Deponien*	0,222	0,136
in Teil II nicht genannte thermische Prozesse in der metallurgischen Industrie	0,198	0,190
häusliche Verbrennungsquellen	29,564	24,931
mit fossilen Brennstoffen befeuerte Kesselanlagen von Versorgungs- und Industrieunternehmen	0,974	1,117
Feuerungsanlagen für Holz und sonstige Biomassebrennstoffe	1,644	2,957
spezifische chemische Produktionsprozesse, bei denen unbeabsichtigt gebildete persistente organische Schadstoffe freigesetzt werden, insbesondere bei der Produktion von Chlorphenolen und Chloranil	NA	NA
Krematorien	0,154	0,164
Kraftfahrzeuge, insbesondere bei Verbrennung von verbleitem Ottokraftstoff	1,453	1,200
Tierkörperbeseitigung	NA	NA
Färben (mit Chloranil) und Endbehandlung (durch alkalische Extraktion) von Textilien und Leder	NA	NA
Shredderanlagen zur Behandlung von Altfahrzeugen	NE	NE
Kupferkabelverschwelung	NO	NO
Altölaufbereitungsanlagen	NO	NO
Gesamt (Teil III)	**34,208**	**30,694**

** ohne Brände (einschließlich Deponiebrände)*

NA: not applicable – als vernachlässigbar betrachtet.

NE: not estimated – nicht abgeschätzt

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

Hexachlorbenzol (HCB)

Im Jahr 2009 wurden 38,2 kg HCB emittiert (siehe Tabelle C, D und Abbildung B). Hauptverantwortliche Quellkategorie sind die Kleinfeuerungsanlagen mit 86,4 %, danach thermische Prozesse in der metallurgischen Industrie (v. a. Sinteranlagen) mit 8,7 %. Der Anteil aller anderen Quellkategorien beträgt unter 1 %.

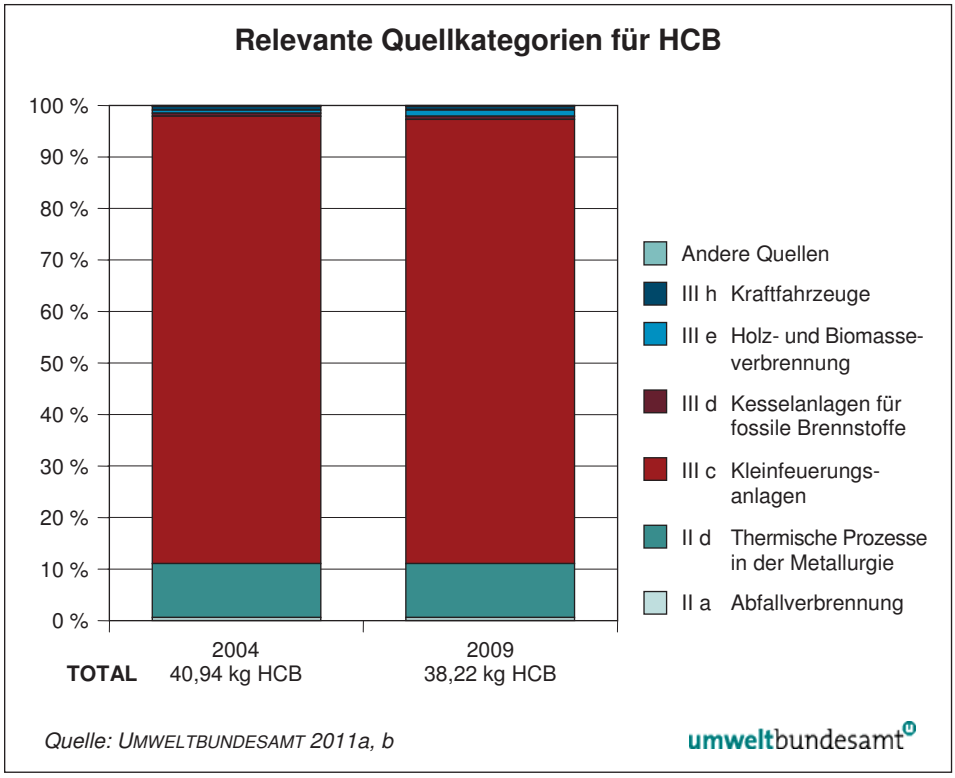

Abbildung B: Relevante Quellkategorien für HCB

Tabelle C: HCB-Emissionen aus Quellkategorien Teil II für 2004 und Prognose für 2009 (UMWELTBUNDESAMT 2011a, b).

Quellkategorien Teil II	**2004 [kg HCB]**	**2009 [kg HCB]**
Abfallverbrennungsanlagen, einschließlich Anlagen zur Mitverbrennung von Siedlungsabfällen, gefährlichen Abfällen, Abfällen aus dem medizinischen Bereich oder Klärschlamm	0,290	0,247
mit gefährlichen Abfällen befeuerte Zementöfen*	0,017	0,020
Zellstoffproduktion unter Verwendung von elementarem Chlor oder von Chemikalien, bei denen elementares Chlor erzeugt wird, für Bleichzwecke **	IE	IE
folgende thermische Prozesse in der metallurgischen Industrie:		
(i) Sekundärkupferproduktion	0,091	0,091
(ii) Sinteranlagen in der Eisen- und Stahlindustrie	3,261	2,926
(iii) Sekundäraluminiumproduktion	0,907	0,907
(iv) Sekundärzinkproduktion	NO	NO
Gesamt (Teil II)	**4,566**	**4,189**

* *Gesamt HCB-Emissionen der österreichischen Zementöfen*

** *nur Prozessemissionen; HCB-Emissionen aus Verbrennungsprozessen werden bei den relevanten Quellkategorien des Teil III betrachtet.*

IE: inkludiert in anderer Emissionsquelle

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden.

Tabelle D: HCB-Emissionen aus Quellkategorien Teil III für 2004 und 2009 (UMWELTBUNDESAMT 2011a, b).

Quellkategorien Teil III	2004 [kg HCB]	2009 [kg HCB]
offene Verbrennung von Abfall, einschließlich Verbrennung auf Deponien*	0,044	0,027
in Teil II nicht genannte thermische Prozesse in der metallurgischen Industrie	0,016	0,014
häusliche Verbrennungsquellen	35,515	33,012
mit fossilen Brennstoffen befeuerte Kesselanlagen von Versorgungs- und Industrieunternehmen	0,194	0,198
Feuerungsanlagen für Holz und sonstige Biomassebrennstoffe	0,287	0,511
spezifische chemische Produktionsprozesse, bei denen unbeabsichtigt gebildete persistente organische Schadstoffe freigesetzt werden, insbesondere bei der Produktion von Chlorphenolen und Chloranil	NA	NA
Krematorien	0,031	0,033
Kraftfahrzeuge, insbesondere bei Verbrennung von verbleitem Ottokraftstoff	0,291	0,240
Tierkörperbeseitigung	NA	NA
Färben (mit Chloranil) und Endbehandlung (durch alkalische Extraktion) von Textilien und Leder	NA	NA
Shredderanlagen zur Behandlung von Altfahrzeugen	NE	NE
Kupferkabelverschwelung	NO	NO
Altölaufbereitungsanlagen	NO	NO
Gesamt (Teil III)	**36,377**	**34,035**

IE: inkludiert in anderer Emissionsquelle; NA: not applicable – als vernachlässigbar betrachtet

NE: not estimated – nicht abgeschätzt; NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

Polychlorierte Biphenyle (PCBs)

Aufgrund der beschränkten Verfügbarkeit an Daten konnte für diese Stoffgruppe kein Freisetzungsinventar erstellt werden.

Polyzyklische aromatische Kohlenwasserstoffe (PAHs)

Im Jahr 2009 wurden 7.462 kg PAHs emittiert. Hauptverantwortlich für die PAH-Emissionen sind v. a. die Kleinfeuerungsanlagen mit 69,7 % Anteil sowie Kraftfahrzeuge mit einem Beitrag von 24,2 % an den Gesamtemissionen (siehe Abbildung C, Tabelle E and F). Andere nennenswerte Verursacher sind die offene Verbrennung von Abfällen (2,5 % sowie Sinteranlagen (1,9 %).

Abbildung C: Relevante Quellkategorien für PAHs

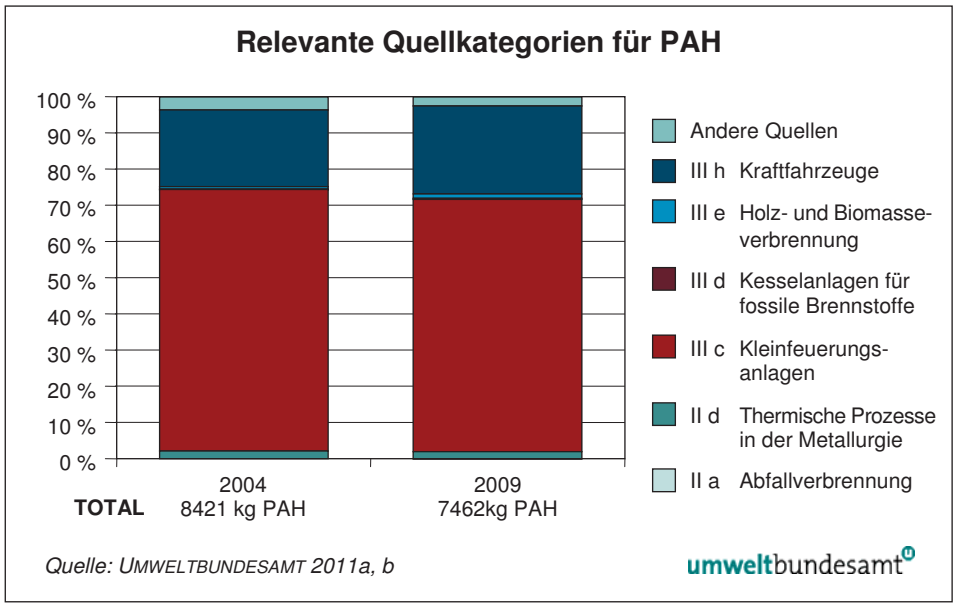

Tabelle E: PAH-Emissionen aus Quellkategorien Teil II für 2004 und 2009 (UMWELTBUNDESAMT 2011a, b).

Quellkategorien Teil II	2004 [kg PAH]	2009 [kg PAH]
Abfallverbrennungsanlagen, einschließlich Anlagen zur Mitverbrennung von Siedlungsabfällen, gefährlichen Abfällen, Abfällen aus dem medizinischen Bereich oder Klärschlamm	24,1	11,5
mit gefährlichen Abfällen befeuerte Zementöfen*	3,2	3,7
Zellstoffproduktion unter Verwendung von elementarem Chlor oder von Chemikalien, bei denen elementares Chlor erzeugt wird, für Bleichzwecke **	IE	IE
folgende thermische Prozesse in der metallurgischen Industrie:		
(i) Sekundärkupferproduktion	NE	NE
(ii) Sinteranlagen in der Eisen- und Stahlindustrie	156,5	140,9
(iii) Sekundäraluminiumproduktion	NE	NE
(iv) Sekundärzinkproduktion	NO	NO
Gesamt (Teil II)	**183,8**	**156,1**

* *Gesamt PAK-Emissionen der österreichischen Zementöfen*

** *nur Prozessemissionen; PAK-Emissionen aus Verbrennungsprozessen werden bei den relevanten Quellkategorien des Teil III betrachtet.*

IE: inkludiert in anderer Emissionsquelle

NE: not estimated – nicht abgeschätzt

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

Tabelle F: PAH-Emissionen aus Quellkategorien Teil III für 2004 und 2009 (UMWELTBUNDESAMT 2011a, b).

Quellkategorien Teil III	2004 [kg PAH]	2009 [kg PAH]
offene Verbrennung von Abfall, einschließlich Verbrennung auf Deponien*	304,1	183,5
in Teil II nicht genannte thermische Prozesse in der metallurgischen Industrie	2,9	2,8
häusliche Verbrennungsquellen	6.080,0	5.198,3
mit fossilen Brennstoffen befeuerte Kesselanlagen von Versorgungs- und Industrieunternehmen	16,5	27,1
Feuerungsanlagen für Holz und sonstige Biomassebrennstoffe	47,0	89,1
spezifische chemische Produktionsprozesse, bei denen unbeabsichtigt gebildete persistente organische Schadstoffe freigesetzt werden, insbesondere bei der Produktion von Chlorphenolen und Chloranil	NA	NA
Krematorien	<0,1	<0,0
Kraftfahrzeuge, insbesondere bei Verbrennung von verbleitem Ottokraftstoff	1.777,9	1.805,6
Tierkörperbeseitigung	NA	NA
Färben (mit Chloranil) und Endbehandlung (durch alkalische Extraktion) von Textilien und Leder	NA	NA
Shredderanlagen zur Behandlung von Altfahrzeugen	NE	NE
Kupferkabelverschwelung	NO	NO
Altölaufbereitungsanlagen	NO	NO
Gesamt (Teil III)	**8.228,3**	**7.306,3**

NA: not applicable – als vernachlässigbar betrachtet.

NE: not estimated – nicht abgeschätzt

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

Pentachlorbenzol (PeCB)

Im Jahr 2009 wurden 21,28 kg an PeCB emittiert.

Abbildung D: Relevante Quellkategorien für PeCB.

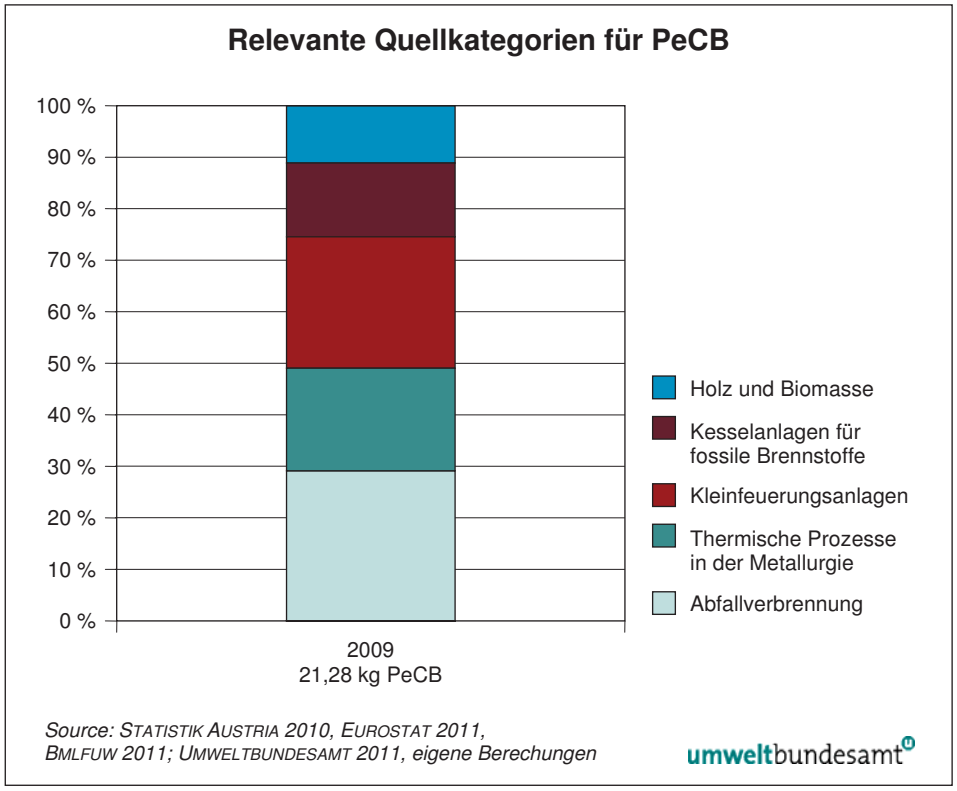

Tabelle G: PeCB-Emissionen aus Quellkategorien Teil II für 2009 (STATISTIK AUSTRIA 2010, EUROSTAT 2011, BMLFUW 2011; UMWELTBUNDESAMT 2011, eigene Berechnung).

Quellkategorien Teil II	2009 [kg PeCB]
Abfallverbrennungsanlagen, einschließlich Anlagen zur Mitverbrennung von Siedlungsabfällen, gefährlichen Abfällen, Abfällen aus dem medizinischen Bereich oder Klärschlamm	6,21
mit gefährlichen Abfällen befeuerte Zementöfen	NA
Zellstoffproduktion unter Verwendung von elementarem Chlor oder von Chemikalien, bei denen elementares Chlor erzeugt wird, für Bleichzwecke	NA
folgende thermische Prozesse in der metallurgischen Industrie:	
(i) Sekundärkupferproduktion	NA
(ii) Sinteranlagen in der Eisen- und Stahlindustrie	4,2
(iii) Sekundäraluminiumproduktion	NA
(iv) Sekundärzinkproduktion	NO
Gesamt (Teil II)	**10,41**

NA: not applicable – als vernachlässigbar betrachtet.

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

Quellkategorien Teil III	2009 [kg PeCB]
offene Verbrennung von Abfall, einschließlich Verbrennung auf Deponien*	NA
in Teil II nicht genannte thermische Prozesse in der metallurgischen Industrie	NA
häusliche Verbrennungsquellen	5,5
mit fossilen Brennstoffen befeuerte Kesselanlagen von Versorgungs- und Industrieunternehmen	3,0
Feuerungsanlagen für Holz und sonstige Biomassebrennstoffe	2,37
spezifische chemische Produktionsprozesse, bei denen unbeabsichtigt gebildete persistente organische Schadstoffe freigesetzt werden, insbesondere bei der Produktion von Chlorphenolen und Chloranil	NA
Krematorien	NA
Kraftfahrzeuge, insbesondere bei Verbrennung von verbleitem Ottokraftstoff	NA
Tierkörperbeseitigung	NA
Färben (mit Chloranil) und Endbehandlung (durch alkalische Extraktion) von Textilien und Leder	NA
Shredderanlagen zur Behandlung von Altfahrzeugen	NA
Kupferkabelverschwelung	NO
Altölaufbereitungsanlagen	NO
Gesamt (Teil III)	**10,87**

Tabelle H: PeCB-Emissionen aus Quellkategorien Teil III für 2009 (STATISTIK AUSTRIA 2010, EUROSTAT 2011, BMLFUW 2011; UMWELTBUNDESAMT 2011, eigene Berechnung).

NA: not applicable – als vernachlässigbar betrachtet.

NO: Not occurring – Emissionsquelle in Österreich nicht vorhanden

C Emissionsverzeichnis Wasser

In Österreich werden Freisetzungen von POPs in zwei verschiedenen Registern erfasst:

- Im Europäischen Schadstofffreisetzungs- und Verbringungsregister (Pollutant Release and Transfer Register – PRTR) werden prinzipiell für alle POPs Punktquellen und Emissionen in Oberflächengewässer erfasst. In der Praxis unterliegen allerdings die meisten Industriezweige nur dann einer Berichtspflicht, wenn bestimmte Produktionskapazitäten oder Emissionsschwellen überschritten werden. Aufgrund der in Österreich bestehenden Betriebsstruktur(hauptsächlich kleine und mittlere Unternehmen) sind nur ungefähr 80 Anlagen mit Freisetzungen in Wasser oder Abwasser im PRTR gelistet. In den Jahren 2007, 2008 und 2009 wurden in diesen Anlagen keine POPs emittiert. Derzeit sind auch noch keine Daten über diffuse Quellen verfügbar.
- Im Jahr 2009 wurde ein nationales Emissionsverzeichnis (als Teil des Wasserinformationssystems WISA gemäß §§ 59, 59a Wasserrechtsgesetz 1959 i.d.g.F.) eingerichtet. Dieses Verzeichnis umfasst folgende Punktquellen: Anlagen gemäß PRTR, städtische Wasseraufbereitungsanlagen mit einer Kapazität von mehr als 2000 Einwohnergleichwerten (EGW) und Müllverbrennungsanlagen mit einer Kapazität von mehr als 2 t Abfall pro Stunde. Es gibt keine Freisetzungsschwellen für die Berichtspflicht. Die untere Grenze ergibt

sich allerdings in der Praxis aus der Bestimmungsgrenze der jeweiligen Analysemethode und aus der Ablaufmenge des Abwassers. Im ersten Berichtszeitraum (2009) wurden nur grundlegende Abwasserparameter erfasst. Der zweite, umfassendere Berichtszyklus wurde 2010 angeschlossen, die Ergebnisse wurden 2011 teilweise evaluiert.

In den Jahren 2007 und 2008 wurden im Rahmen der Erstellung eines nationalen Emissionsinventars zusätzliche Daten zu POPs Freisetzungen in Wasser erhoben. Einlauf und Abfluss von 15 städtischen Abwasserreinigungsanlagen mitverschiedener Kapazität, unterschiedlicher Reinigungsverfahren und Abwasserzusammensetzung wurden auf ca. 70 Stoffe hin untersucht. Das Analyseprogramm umfasste prioritäre Stoffe und bestimmte andere Stoffe gemäß der Tochterrichtlinie 2008/105/EG der Wasserrahmenrichtlinie, aber auch national relevante Schadstoffe gemäß der österreichischen Qualitätszielverordnung Chemie[1]. DDT, Chlordan, Aldrin, Dieldrin, Endrin, Heptachlor, Hexachlorbenzol und Pentachlorbenzolwurden im Rohabwasser nicht gefunden. PAHs wurden mit einer Ausnahme nur im Rohabwasser gefunden. Im Abwasserauslauf konnten nur PBDEs (< ng/l) und Lindan (γ-Hexachlorcyclohexan – ng/l) analysiert werden. Die Verwendung von Lindan war für einige Verwendungen im pharmazeutischen Bereich bis 1. Jänner 2008 zugelassen.

Mögliche Freisetzungen von PAHs auf kontaminierten Flächen können zu lokalen Beeinträchtigungen des Bodens und des Grundwassers führen. Abhängig von der spezifischen Situation und der Frage, auf welche Weise das betroffene Gebiet genutzt wird, müssen mögliche Risiken für die menschliche Gesundheit und das Ökosystem untersucht und sodann hintangehalten werden. Im österreichischen Altlastenregister sind nur sehr wenige mit den Schadstoffen PCDD/F, HCB und PCB kontaminierte Altlasten erfasst, Daten zum Ausmaß der Kontamination oder Auswirkungen auf die Umwelt liegen nicht vor.

[1] Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über die Festlegung des Zielzustandes für Oberflächengewässer (Qualitätszielverordnung Chemie Oberflächengewässer – QZV Chemie OG) **BGBl. II Nr. 96/2006**; geändert durch **BGBl. II Nr. 267/2007** und **BGBl. II Nr. 461/2010**

D Emissionen über Abfälle und Rückstände

Ein Emissionsverzeichnis kann nur für PCDD/F und PeCB erstellt werden.

Dioxine und Furane

Die Freisetzungen von Dioxinen und Furanen über Abfälle und Rückstände sind seit 2004 weitgehend gleich geblieben. Im Jahr 2009 wurden insgesamt 274,1 g PCDD/F I-TEQ (Im Jahr 2004 267,1 g) emittiert, ein Siebenfaches der Emissionen in die Luft. Der Anteil fester Abfälle aus der Abfallverbrennung ist hierbei mit 59 % am größten, erheblich ist auch der Anteil von Abfällen aus Kleinfeuerungsanlagen (28 %). Andere Quellen sind Abfälle aus thermischen Prozessen der metallurgischen Industrie sowie aus dem Einsatz fossiler Brennstoffe und Biomasse (siehe Abbildung E).

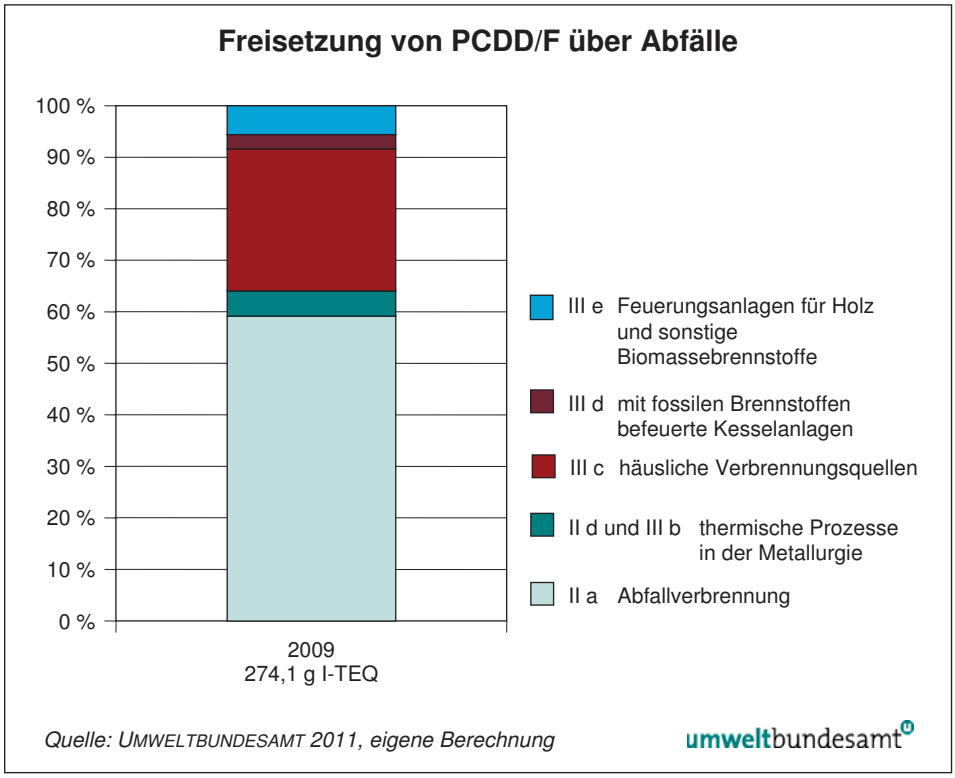

Abbildung E: Freisetzungen (jedoch überwiegend nicht bioverfügbar) von PCDD/F über Abfälle.

Es muss jedoch hervorgehoben werden, dass POP-Freisetzungen über Abfälle grundsätzlich anders zu betrachten sind als Freisetzungen über die Medien Luft und Wasser: Die überwiegende Mehrheit der Abfälle wird auf Deponien abgelagert. Eine Bioverfügbarkeit der möglicherweise enthaltenen POPs ist dadurch nicht mehr gegeben, vorausgesetzt die Deponien wurden und werden ordnungsgemäß errichtet und betrieben.

Rückstände aus der Abfallverbrennung werden im Allgemeinen auf Deponien entsorgt (Restmülldeponien, oder Untertagedeponien. Die Flugasche, in der 87 % der PCDD/F enthalten sind, wird oft einer Untertagedeponie zugeführt.

Sehr hohe PCDD/F-Konzentrationen finden sich in Ruß aus Kleinfeuerungsanlagen. Vermutlich wird ein Großteil des Rußes über den Hausmüll entsorgt. Bei der thermischen Behandlung dieses Hausmülls werden die POPs entweder oxidiert oder mit der Asche auf Deponien entsorgt. Auch im Fall einer mechanisch-biologischen Behandlung des Hausmülls gelangen die POPs letztendlich in jene Fraktion, die auf der Deponie endgelagert wird.

Abfälle aus der metallurgischen Industrie, die zu einem gewissen Ausmaß kontaminiert sein können, werden entweder wieder in den Prozess zurückgeführt oder einer externen Behandlung/Entsorgung zugeführt. Diesbezüglich bestehen jedoch noch Unklarheiten über die Höhe der POP-Konzentrationen und die in Österreich praktizierte Behandlung der Abfälle.

Die Flugasche aus Kraftwerken wird in der Zement- und Baustoffindustrie weiterverwendet, Flugasche aus der Verbrennung von Biomasse muss jedoch über Deponien entsorgt werden.

Abfälle, die in die Umwelt gelangen, können zur Freisetzung von POPs führen. Ein Beispiel wäre die Verwendung von Aschen aus Kleinfeuerungsanlagen (die beträchtliche Mengen an POPs enthalten können) für Düngezwecke oder für Streuzwecke im Winter. Weiters werden etwa grobe Aschen aus Biomasseverbrennungsanlagen als Zusatzstoffe für Kompost genutzt. Da große Datenlücken hinsichtlich der Höhe der POP-Konzentrationen in Aschen existieren, sind Freisetzungsabschätzungen generell mit hohen Unsicherheiten behaftet. Ausschlaggebend für die Höhe der POP-Konzentrationen in Aschen sind insbesondere die unterschiedliche Art und Qualität des Brennstoffes (Feuchtegehalt, Aschegehalt, Heizwert, Chlorgehalt), das verwendete Feuerungssystem sowie die Menge mitverbrannter Abfälle.

Jedoch sind diese Freisetzungen relevant, weil ein Teil der Rückstände/Abfälle in die Umwelt rückgeführt wird (z. B. Verwendung von Asche als Dünger in Privatgärten).

Pentachlorbenzol (PeCB)

Im Jahr 2009 wurden insgesamt 3,08 g PeCB emittiert, ungefähr ein Siebtel der Emissionen in die Luft.Der Anteil fester Abfälle aus der Abfallverbrennung ist hierbei mit 81 % am größten. Andere Quellen sind Abfälle aus thermischen Prozessen der metallurgischen Industrie sowie aus dem Einsatz fossiler Brennstoffe und Biomasse (siehe Abbildung F). Es ist allerdings anzumerken, dass für Freisetzungen an PeCB nur wenige Daten verfügbar sind.

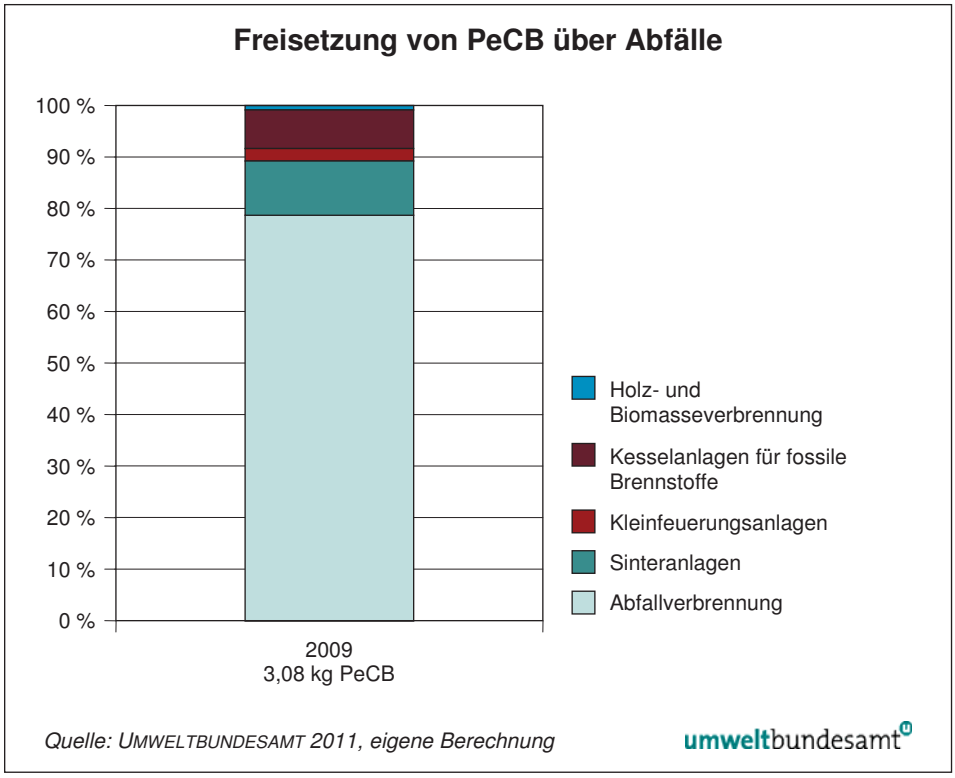

Abbildung F: Freisetzungen von PeCB über Abfälle.

Quellkategorie	2009 [kg PeCB]
Abfallverbrennungsanlagen, einschließlich Anlagen zur Mitverbrennung von Siedlungsabfällen, gefährlichen Abfällen, Abfällen aus dem medizinischen Bereich oder Klärschlamm	2,42
folgende thermische Prozesse in der metallurgischen Industrie:	
(ii) Sinteranlagen in der Eisen- und Stahlindustrie	0,33
häusliche Verbrennungsquellen	0,07
mit fossilen Brennstoffen befeuerte Kesselanlagen von Versorgungs- und Industrieunternehmen	0,23
Feuerungsanlagen für Holz und sonstige Biomassebrennstoffe	0,03
Gesamt	**3,08**

Tabelle I: PeCB Freisetzung über Abfälle für 2009 (eigene Berechnung)

E Freisetzungen über Produkte

Der Handlungsbedarf betreffend POP in Produkten ergibt sich u. a. aus Anhang C Teil V A (g) des Übereinkommens („minimization of these chemicals as contaminants in products“).In der Literatur finden sich einige Daten zu Gehalten von PCDD/F in den Produkten Zement, Zellstoff und Papier (siehe Tabelle J). Zu anderen POPs existieren keine Daten. Freisetzungen über Produkte sind jedoch bei den meisten Quellkategorien nicht relevant.

Tabelle J: PCDD/F-Gehalte in den Produkten Zement, Zellstoff und Papier. Berechnungen basieren auf Literaturdaten (KARSTENSEN 2006, UNEP 2005, GRUBER 1996).

Produkt	Freisetzung(g I-TEQ/a)
Zement	4,02
Papier	4,98
exportierter Zellstoff[1]	0,123

[1] *Freisetzungen über exportierten Zellstoff; Freisetzungen über den heimischen Zellstoff sind in den Angaben zu Papier enthalten.*

Da es keine Änderungen der Produktionsweise gegeben hat, ist das Ausmaß der Freisetzungen von PCDD/F über Zement, Zellstoff und Papier seit 2004 gleich geblieben.

PCDD/F-Gehalte im Zement sind gering und lassen sich durch die Tatsache erklären, dass die Filterstäube aus der Klinkerproduktion (durchschnittliche PCDD/F-Konzentration: 6,7 ng I-TEQ/kg) dem Produkt beigemengt werden und weiters auch sekundäre Rohstoffe eingesetzt werden (z. B. Flugasche, Gips aus der Rauchgasentschwefelung). Auch der Zementklinker selbst kann mit PCDD/F verunreinigt sein (durchschnittlich: 0,9 ng I-TEQ/kg Klinker) (KARSTENSEN 2006). Die Bioverfügbarkeit von im Zement gebundenen POPs ist jedoch sehr gering.

Österreich arbeitet aktiv an der Revision des Dioxin Toolkit (UNEP 2005) mit. Im aktuellen Entwurf wird festgehalten: „Wegen der langen Verweilzeiten im Brennofen und der erforderlichen hohen Temperatur zur Herstellung dieser Produkte ist die Bildung von Dioxinen bei diesem Prozess relativ gering“.[2]Zementöfen, die mit gefährlichen Abfällen befeuert werden, sind eine Quellkategorie gemäß Anhang C Teil II litera (b) des Übereinkommens für Emissionen von PCDD/F (Tab. 6), HCB (Tab. 8), PAKs (Tab. 10) und PeCB (Tab. 12). Daher ist die Quantifizierung der verschiedenen POP in den Umweltmedien sowie in Rückständen und Produkten wünschenswert.

Im Fall von Zellstoff und Papier können PCDD/F über die Zellstoffbleiche oder über Altpapier eingetragen werden. Im Bezugsjahr 2009 betrug die Gesamtproduktion an Zellstoff in Österreich 1,514 kt (2004 waren es 1,509 kt). 24 % davon wurden nach dem Sulfitverfahren mit TCF (total chlorine free) Bleiche hergestellt, 26 % nach dem Sulfatverfahren mit anschließender ECF (elemental chlorine free) Bleiche, 32 % sind ungebleichter Sulfatzellstoff und 18 % Zellstoff auf textiler Basis (AUSTROPAPIER 2009).

Die Berechnung der Freisetzungen aus Zellstoff basieren auf folgenden Emissionsfaktoren: 0,5 µg/t für gebleichten Sulfatzellstoff und 0,1 µg/t für andere Zellstoffe (UNEP 2005). Die Freisetzung von PCDD/F über Zellstoff betrug daher 0,28 g im Jahr 2009.

[2] Zitat aus Dioxin Toolkit (Entwurf 2012) Kapitel 4 Mineral Products
„This section summarizes high-temperature processes in the mineral industry. Raw materials or fuels that contain chlorides may potentially cause the formation of PCDD/PCDF at various steps of the processes, e.g., during the cooling phase of the gases or in the heat zone. Due to the long residence time in kilns and the high temperatures needed for the product, emissions of PCDD/PCDF are generally low in these processes.”

Als Rohstoffe in der Papierzeugung werden Zellstoff (heimisch oder importiert), Holzstoff und Altpapier (de-inkt oder nicht de-inkt) verwendet. Daher ist auch der Eintrag über importierten Zellstoff in Betracht zu ziehen. Im Jahr 2009 wurden ungefähr 690.000 t gebleichter Zellstoff importiert, teils aus Ländern, in denen Chlor noch zum Bleichen des Zellstoffs verwendet wird (AUSTOPAPIER 2009). Zur Berechnung des PCDD/F-Gehalts wird für 10 % der Importware ein Emissionsfaktor von 0,5 µg/t angenommen und für den Großteil des importierten Zellstoffs ein Emissionsfaktor von 0,1 µg/t. Damit ergibt sich eine Gesamteinfuhr von 0,096 g I-TEQ über Zellstoff. Im Gegenzug wurden im Jahr 2009 ca. 0,123 g I-TEQ exportiert. Der Eintrag von PCDD/F über Holzstoff wurde mit einem Emissionsfaktor von 0,1 µg/t berechnet, daraus ergibt sich ein Gesamteintrag von 0,044 g I-TEQ).

Zusätzlich ist auch ist der Eintrag von POPs über das Altpapier (insbesondere über Verunreinigungen in den verwendeten Druckfarben) relevant. Ein De-inking reduziert die PCDD/F-Konzentrationen um den Faktor 3 (ungefähr 40 % des Altpapiers in Österreich wird de-inkt) (GRUBER 1996). Vergleichsweise hohe Konzentrationen von bis zu 12 ng/kg wurden in den frühen Neunzigerjahren in Verpackungspapieren und Karton gefunden. Im Allgemeinen konnte ein drastischer Rückgang zwischen 1989 und 1994 verzeichnet werden, seither sinken die Konzentrationen nur mehr geringfügig. Auf Basis dieser Studien sowie der im UNEP DioxinToolkit (UNEP 2005) angegebenen Emissionsfaktoren wurde die Konzentration an PCDD/F in Altpapier auf 3 µg/t ohne De-inking und auf 0,99 µg/t in de-inktem Papier geschätzt. Daraus ergeben sich ein durchschnittlicher Emissionsfaktor von 2,18 µg/t für Altpapier und eine Gesamtfreisetzung über Papier von 4,98 g I-TEQ (Referenzjahr: 2004).

Diverse wissenschaftliche Publikationen zeigen, dass Altpapier möglicherweise durch Verunreinigungen mit Druckerfarben (z. B. Pigmente) signifikante Spuren von PCDD/F enthalten kann. Im Jahr 2011 führte das Umweltbundesamt eine stichprobenartige Untersuchung der PCDD/F-Gehalte von Kartonagen aus Altpapier durch. Der Vergleich von neuen, unbedruckten Faltschachtelkartons mit bedruckten Schachteln aus der Altpapiersammlung ergab keinen Hinweis auf einen PCDD/F-Eintrag durch Druckerfarben. Die Kartonagenproben enthielten PCDD/F in einem Bereich von 1,2 bis 1,9 ng TEQ/kg (UMWELTBUNDESAMT 2011c).

Im Jahr 2010 legte die Austropapier, die Vereinigung der österreichischen Papierindustrie, neue Daten zum PCDD/F-Gehalt bestimmter Produktsorten vor, mit dem Ziel die im Dioxintoolkit (UNEP 2005) enthaltenen Emissionsfaktoren zu optimieren. Die daraus abgeleiteten Emissionsfaktoren würden die Gesamtfreisetzung von PCDD/F über Papiererzeugnisse um den Faktor 3 reduzieren. Obwohl es noch unklar ist, inwieweit diese Daten repräsentativ sind, werden diese Informationen an die Experten des Dioxintoolkits weitergegeben, um eine Überprüfung der bestehenden Emissionsfaktoren zu diskutieren. Im Jahr 2011 erfolgte daher eine neuerliche Berechnung der PCDD/F-Freisetzungen über Papier:

Tabelle K: Freisetzungen vonPCDD/F über Produkte
(eigene Berechnung auf Basis der Statistik von Austropapier und der übermittelten Analyseergebnisse).

Erzeugnis	Produktion (t/a)	Emissionfaktor (µg TEQ/t)	Freisetzungen (g PCDD/F TEQ/a)	Prozentsatz (%)
Zeitungsdruckpapier	299.205	0,068	0,02	1,2
Druck- und Schreibpapiere				
• de-inked	902.421	0,068	0,06	3,7
• aus Zellstoff	1.346.070	0,050	0,07	4,0
Faltschachtelkarton	487.214	0,723	0,35	21,1
Verpackungspapiere	676.177	1,141	0,77	46,2
Kraftpapiere				0.0
• mit Altpapieranteil	374.855	0,858	0,32	19,3
• aus reinem Zellstoff	250.743	0,050	0,01	0,8
Dünn und Spezialpapiere				0.0
Hygienepapier	128.660	0,068	0,01	0,5
Sonstige	126.896	0,050	0,01	0,4
Wickel- und Spezialpappe	13.299	0,858	0,01	0,7
Marktzellstoff – exportiert	95.471	0,070	0,01	0,4
Marktzellstoff (ECF-gebleicht)	313.818	0,090	0,03	1,7
Gesamt	**5.014.829**		**1,67**	**100,0**

F Bewertung der Wirksamkeit der Rechtsvorschriften und Politiken in Bezug auf die Verpflichtungen des Stockholmer Übereinkommens und der EU-POP-Verordnung

Wie bereits im Nationalen Aktionsplan von 2008 festgehalten, erfüllt Österreich die Vorschriften des Stockholmer Übereinkommens und der EU-POP-Verordnung bereits zu einem großen Teil. Nichtsdestotrotz sind weitere Anstrengungen notwendig, da das Stockholmer Übereinkommen „die kontinuierliche Verringerung von POP-Freisetzungen“ zum Ziel hat.

POP-Emissionen großer stationärer (industrieller) Quellen wurden in den letzten Jahren stark reduziert. Zwischen 2004 und 2009 gingen die Emissionen weiter zurück, was aber teilweise durch die geringere Wirtschaftsaktivität in den Jahren 2008 und 2009 zu erklären ist. Sollten jedoch Weiterentwicklungen im Stand der Technik geringere Emissionen oder sogar eine vollständige Vermeidung derselben bewirken, muss die Politik darauf reagieren und die relevanten Rechtsvorschriften entsprechend anpassen (z. B. durch Einführung strengerer Emissionsgrenzwerte).

Im Allgemeinen gelten die Schlussfolgerungen des NAP 2008 auch für die nächsten Jahre:

So wurden bereits 2008 (häusliche) Kleinfeuerungsanlagen, die für 70 % der PCDD/F-Emissionen, 86,4 % der HCB-Emissionen und 69,7 % der PAK-Emissionen in Luft verantwortlich sind, als eine sehr wichtige Emissionsquelle identifiziert. Alle möglichen Maßnahmen müssen untersucht und ausgeschöpft werden, um eine Reduktion dieser POP-Emissionen zu bewirken.

Weitere notwendige Maßnahmen betreffen die Bewusstseinsbildung in Hinblick auf die Verbrennung von Abfällen in Haushaltenoder etwa die Verwendung von Aschen und Ruß aus Kleinfeuerungsanlagen z. B. für die Düngung. In diesem Zusammenhang wurde bereits 2009 und 2010 eine wichtige Initiative gestartet (s. unten).

Derzeit werden in Österreich eine Reihe von umfassenden und sektorenübergreifenden Maßnahmen und Instrumenten entwickelt, um verschiedene nationaleund internationale Verpflichtungen zu erfüllen. Ziel dieser Maßnahmen (enthalten etwa in der Klimastrategie 2007 (BMLFUW 2007[3]) ist die Reduktion von Treibhausgasen, NO_x und Feinstaub. Dadurch kann teilweise auch eine indirekte Reduktion von POP-Freisetzungen erreicht werden (z. B. durch die Reduktion des Energieverbrauchs oder durch strengere Luftemissionsgrenzwerte für Staub). Andere Maßnahmen wie etwa der vermehrte Einsatz von Biomasse für Kleinfeuerungsanlagen könnten jedoch auch zu einem Anstieg von POP Emissionen führen.

Außerdem erscheint es wichtig, bessere Kenntnis in Bereichen zu erlangen, in denen bisher nur sehr begrenzt zuverlässige Daten zur Verfügung stehen. Deshalb wurden im Folgenden konkrete Vorschläge für Studien z. B. betreffend POP-Konzentrationen in bestimmten Abfällen oder weitere Monitoringaktivitäten formuliert.

Management von PeCB-Emissionen: Es ist eine allgemein bekannte Tatsache, dass Maßnahmen zur Eliminierung von PCDD/F auch zu einer Minimierung von PeCB führen. Dies ist auch dem Anhang V der Stockholmer Konvention über POPs und im besonderen den Richtlinien über beste verfügbare Techniken und beste Umweltschutzpraktiken zu entnehmen. Es ist daher nicht notwendig, spezifische Aktivitäten für PeCB zu setzen.

Evaluierung des NAP 2008 und weiterer Handlungsbedarf (gemäß § 20 Abs. 2 Chemikaliengesetz 1996 i.d.g.F)

Im Nationalen Aktionsplan 2008 wurde bereits eine Reihe von Maßnahmen angeführt, die einerseits eine Verringerung der POPs-Emissionen erzielen und andererseits mehr Informationen bezüglich POPs in der Umwelt generieren sollen.

[3] Klimastrategie 2007; wird derzeit überarbeitet – Klimastrategie 2013–2020 (Arbeitstitel)

Freisetzungen von POPs aus den Quellkategorien

Die folgende Tabelle enthält eine Übersicht der im NAP 2008 vorgeschlagenen Maßnahmen und den derzeitigen Stand der Umsetzung:

Nationale Gesetze und Verordnungen	POP-relevante Inhalte	Kommentar/ konkrete Schritte	Derzeitiger Status
Emissionsschutzgesetz für Kesselanlagen – EG-K (BGBl. I Nr. 150/2004); Luftreinhalteverordnung für Kesselanlagen (BGBl. Nr. 19/1989 i.d.F. BGBl. II Nr. 55/2005), beide zuletzt geändert durch Emissionsmessverordnung-Luft – EMV-L (BGBl. II Nr. 153/2011)	EGW für Staub, CO, Corg, NO_x	Anpassung an BAT notwendig	Anpassung erfolgte durch EG-K i.d.g.F.
Gewerbeordnung 1994 und Verordnungen gemäß § 82 Abs. 1 GewO 1994, beispielsweise Verordnung des Bundesministers für wirtschaftliche Angelegenheiten über die Begrenzung der Emission von luftverunreinigenden Stoffen aus Anlagen zum Sintern von Eisenerzen – Sinteranlagenverordnung (BGBl. II Nr. 163/1997)	EGW für unterschiedliche Schadstoffe, z.B. Staub, PCDD/F	Regelmäßige Überprüfung der Konformität mit BAT	Laufende Überprüfung
Feuerungsanlagen-Verordnung BGBl. II Nr. 331/1997	EGW für Staub, CO, Corg, NO_x	Anpassung an BAT notwendig (strengere EGW für Staub)	Die Maßnahme wurde 2011 durch Änderung der FAV (BGBl. II Nr. 312/2011) umgesetzt.
Abfallverbrennungsverordnung (BGBl. II Nr. 389/2002)	EGW für Staub, CO, Corg, NO_x, Schwermetalle, PCDD/F	Strengere EGWs für Staub bei Mitverbrennungsanlagen wünschenswert	Novelle Abfallverbrennungsverordnung BGBl. II Nr. 476/2010, aber ohne strengere EGWs für Staub
Wasserrechtsgesetz und Verordnungen	EGW für AOX and POX sowie spezifische POPs in den branchenspezifischen Abwasseremissionsverordnungen		
Abwasseremissionsverordnung Verbrennungsgas (BGBl. II Nr. 271/2003)	EGW für PCDD/F	Regelmäßige Überprüfung der Konformität mit BAT notwendig	Keine Änderungen
Abwasseremissionsverordnung Kohleverarbeitung (BGBl. II Nr. 346/1997)	EGW für PAHs	Regelmäßige Überprüfung der Konformität mit BAT notwendig	Keine Änderungen
Abwasseremissionsverordnung Pflanzenschutzmittel (BGBl. Nr. 668/1996)	EGW für AOX und spezifische POPs	Regelmäßige Überprüfung der Konformität mit BAT notwendig	Keine Änderungen
Qualitätszielverordnung Oberflächengewässer (BGBl. II Nr. 96/2006)	Umweltqualitätsziel für HCB	Für PAHs werden voraussichtlich noch 2008 gemeinschaftsweite Qualitätsziele festgelegt.	Änderung der Qualitätszielverordnung (BGBl. II Nr. 461/2010) gemäß der RL 2008/105/EG
Andere relevante Rechtsvorschriften			
Deponieverordnung (BGBl. Nr.39/2008)	Grenzwerte für PAH-Konzentrationen in Abfällen		Änderung der Deponieverordnung BGBl. II Nr. 185/2009 und BGBl. II Nr. 178/2010
Kompostverordnung[1] (BGBl. II Nr. 292/2001)	Grenzwerte für POP-Konzentrationen in Komposten	Regelmäßige Evaluierung der Grenzwerte notwendig	Keine Änderung

Nationale Gesetze und Verordnungen	POP-relevante Inhalte	Kommentar/ konkrete Schritte	Derzeitiger Status
Klärschlamm- und Kompostverordnungen der Bundesländer	Grenzwerte für POP	Regelmäßige Evaluierung der Grenzwerte notwendig	Keine Änderung
Bodenschutzgesetze der Bundesländer: Burgenländisches Bodenschutzgesetz LGBl. Nr. 87/1990 Niederösterreichisches Bodenschutzgesetz LGBl. Nr. 6160-0 Oberösterreichisches Bodenschutzgesetz LGBl. Nr. 63/1997 Bodenschutzgesetz Salzburg LGBl Nr. 80/2001 Steiermärkisches landwirtschaftliches Bodenschutzgesetz LGBl. Nr. 66/1987		Festlegung von Zielwerten für organische Schadstoffe (einschließlich polybromierte Diphenylether, perfluorierte Tenside und Pestizide) zur Verminderung von Bodenkontaminationen zweckmäßig	Keine Änderung
Immissionsschutzgesetz – Luft (IG-L)	§ 21 IG-L: Verordnungsermächtigung	Überprüfung, ob allgemein verbindliche EGW für Krematorien in einer Verordnung gemäß § 21 IG-L notwendig sind	Nicht umgesetzt, keine generellen Verpflichtungen für Krematorien
Rechtsakte der Bundesländer betreffend häusliche Verbrennungsanlagen (Kleinfeuerungsanlagen)		Entwurf einer Vereinbarung gemäß Art. 15a B-VG über das Inverkehrbringen und die Überprüfung von Feuerungsanlagen Zeitplan: ehestmögliche Umsetzung dieser Vereinbarung in das Länderrecht	Die Vereinbarung wurde 2011 unterzeichnet.
Bundesluftreinhaltegesetz[2] mit dem Ziel der Erhaltung der natürlichen Zusammensetzung der Luft in einem Ausmaß, welches den dauerhaften Schutz der Gesundheit und des Lebens von Tieren und Pflanzen soweit wie möglich sicherstellt	Verbot des Verbrennens biogener Materialien – viele Ausnahmen möglich	Überprüfung der Ausnahmebestimmungen	Integration des Verbots im Bundesluftreinhaltegesetz – BLRG
Genehmigungsverfahren	*POP-relevante Inhalte*	*Kommentare/Konkrete Schritte*	
Deponien	Anforderungen an die Brandverhütung	Implementierung wirksamer Brandverhütungsmaßnahmen für Deponien und Abfallzwischenlager	Keine neuen Informationen

EGW: Emissionsgrenzwert; BAT: Best Available Technique

[1] *Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über Qualitätsanforderungen an Komposte aus Abfällen (Kompostverordnung) gemäß AWG i.d.g.F.*

[2] *Bundesgesetz über das Verbrennen von Materialien außerhalb von Anlagen (Bundesluftreinhaltegesetz – BLRG), BGBl. I Nr. 137/2002, zuletzt geändert durch BGBl. I Nr. 50/2012.*

Da **häusliche Verbrennungsanlagen** 70 % der PCDD/F-Emissionen in die Luft verursachen, veröffentlichte das Lebensministerium in Zusammenarbeit mit der Bundesinnung der Rauchfangkehrer Österreichs, dem österreichischen Kachelofenverband, der Österreichischen Ärztekammer und den Ärztinnen und Ärzten für eine gesunde Umwelt im Jahr 2010 eine Broschüre mit dem Titel „Richtig heizen“: der Folder informiert über die Auswirkungen von Emissionen aus Holzöfen auf die menschliche Gesundheit und die Umwelt und gibt Hinweise darauf, wie diese Emissionen durch die Bedienungsweise verringert werden können. Die Broschüre wurde über Rauchfangkehrer und Ärzte verteilt. Zusätzlich wurde

auch eine Internetseite eingerichtet (**www.richtigheizen.at**), die weitere Informationen über die richtige Verwendung von Öfen und über rechtliche Belange bietet.

Weiters ist die zügige Implementierung der folgenden Maßnahmen von besonderer Wichtigkeit:

- Umsetzung der Anforderungender Vereinbarung gemäß Art. 15a B-VG zwischen dem Bund und den Ländern über gemeinsame Qualitätsstandards für die Förderung der Errichtung und Sanierung von Wohngebäuden zum Zweck der Reduktion des Ausstoßes an Treibhausgasen;
- Effiziente Förderung des Austausches von kohlebefeuerten Öfen;
- Regelmäßige Überprüfung und Verbesserung der Förderkriterien für Biomasseverbrennungsanlagen (einschließlich derartiger landwirtschaftlicher Anlagen) in Hinblick auf Betriebsbedingungen, Energieeffizienz (einschließlich Fernwärmesysteme), Brennstoffqualität und EGW für Staub

  → EGW für Staub wurden 2007 und 2009 geändert
- Weiterführung derInformationskampagnen zur Verhinderung der Verbrennung von Abfällen in Kleinfeuerungsanlagen,
- Weiterführung der Informationskampagnen zur Entsorgung von Ruß und Asche aus Kleinfeuerungsanlagen (insbesondere im Haushalt und in der Landwirtschaft);
- Implementierung geeigneter Maßnahmen, die eine Einhaltung des Zielwertes für Benzo(a)pyren in der Umgebungsluft (1 ng/m^3) sicherstellen (Zielwert wird mit 31.12.2012 in einen Grenzwert umgewandelt). →verschiedene Maßnahmen der Bundesländer

Für die im Folgenden genannten Quellen existieren **bisher** nur unzureichend Daten. Um die Relevanz dieser Quellen abschätzen zu können sowie um die österreichischen Quellverzeichnisse zu vervollständigen, erscheinen die unten angeführten **Maßnahmen** notwendig oder zumindest wünschenswert. Allerdings bleibt die Umsetzung dieser Maßnahmen oft abhängig von der Finanzierbarkeit:

- Untersuchung des Emissionsverhaltens von Kleinfeuerungsanlagen (insb. Stroh- und Getreideverbrennung)

  → bezüglich POPs noch teils nicht bekannt; ein Projekt („EnEmTech“) zur Untersuchung bestimmter Emissionsparameter bei häuslichen Kleinfeuerungsanlagen befindet sich derzeit in der Entwicklungsphase;
- Emissionsmessungen bei Kraftfahrzeugen und Überprüfung der Emissionsfaktoren, um genauere Trendprognosen zu ermöglichen

  → Das Handbuch für Emissionsfaktoren des Straßenverkehrs (HBEFA) stellt Emissionsfaktoren für die gängigsten Fahrzeugtypen zur Verfügung (PKW, leichte und schwere Nutzfahrzeuge, Linien- und Reisebusse sowie Motorräder), differenziert nach Emissionskonzepten sowie nach verschiedenen Verkehrssituationen. HBEFA liefert Emissionsfaktoren für alle reglementierten sowie eine Reihe von nicht-reglementierten Schadstoffen, einschließlich CO_2 und Kraftstoffverbrauch. Die Version HBEFA 3.1 ist die neueste verfügbare Version. Die Emissionsfaktoren der PKW wurden gänzlich überarbeitet. (neue Modellansätze, breitere empirische Grundlagen, neue Emissionsmessungen). Für die Eichung des Modells wurden modale Emissionsmessungen (in Sekundenauflösung) bis Euro 4 verwendet. Die Emissionsfaktoren für künftige Kon-

zepte (Euro 5, 6) wurden in Anlehnung an die künftige Gesetzgebung abgeschätzt.

- Verbesserung der Datenqualität der POP-Freisetzungen aus Deponien und aufgelassenen Industriestandorten sowie kontaminierten Flächen (z. B. PAH-Anteile im Deponiegas);
- Bewertung der POP-Konzentrationen in Abfällen und Rückständen aus der Nichteisenmetallerzeugung, Elektrostahlerzeugung und aus Sinteranlagen

  → keine neue Bewertung
- Bestimmung der POP-Konzentrationen in Abfällen aus Kleinfeuerungsanlagen (Haushalt, Versorgungsunternehmen, Landwirtschaft), die mit hoher Wahrscheinlichkeit in die Umwelt gelangen (z. B. Bodenasche und Flugasche);
- Bestimmung der POP-Konzentrationen in Abfällen aus mit fossilen Brennstoffen befeuerten Kesselanlagen (einschließlich Mitverbrennung von Abfällen), die in andere Produktionsprozesse Eingang finden oder mit hoher Wahrscheinlichkeit in die Umwelt gelangen (insb. Flugasche aus Mitverbrennungsanlagen);
- Bestimmung der POP-Konzentrationen in Abfällen aus Biomasseverbrennungsanlagen, die in andere Produktionsprozesse Eingang finden oder mit hoher Wahrscheinlichkeit in die Umwelt gelangen (z. B. Bodenasche);
- Bestimmung der Konzentrationen von PCDD/F und relevanten Vorläufersubstanzen in gebleichtem Kraft-Zellstoff (importiert und heimisch erzeugt), in Papier (Verpackungspapier, Karton,Papier mit Altpapieranteil), in Farben und Druckfarben und in De-inking-Schlämmen

  → Im Jahr 2011 führte das Umweltbundesamt eine Überblicksstudie zur Abschätzung möglicher PCDD/F-Einträge in Kartonagen über Druckfarben durch. Die Ergebnisse zeigten keine Hinweise auf eine PCDD/F-Kontamination durch die derzeit verwendeten Druckfarben.
- Quantifizierung der POP-Gehalte im Filterstaub aus der Zementklinkerherstellung

  → Quantifizierung in Abstimmung mit Umweltbundesamt GmbH, WKÖ/Zementindustrie und anderen Stakeholdern; Unterstützung bei der Revision des Dioxin Toolkits bezüglich „Mineral Products“
- Quantifizierung der POP-Emissionen (insb. PCDD/F und PCBs) des Platformer 3 der OMV Raffinerie in Schwechat

  → Quantifizierung noch nicht erfolgt.

Daten zu POP-Emissionen in die Umwelt

Die folgende Tabelle enthält konkrete Maßnahmen zur Verbesserung der verfügbaren Daten über POP-Emissionen in die Umwelt:

Konkrete Schritte	Zeitplan
Verbesserung der Datenqualität in Hinblick auf HCB- und PCB-Freisetzungen in die Luft (z. B. durch Planung und Durchführung von Messprogrammen bei prioritären Quellen wie z. B. häuslichen und industriellen Quellen)	Prüfung der verfügbaren (Literatur-)Daten, Identifizierung möglicherweise relevanter Quellen
Einrichtung von Monitoringprogrammen in der Nähe POP-relevanter Quellen	Identifizierung relevanter Standorte Probenahme und Messung (Winter/Sommer)
Weiterführung des Monitorings mit Fichtennadeln in der Nähe von POP-Quellen	Kontinuierliche Probenahme und Beginn der Analysen

Daten zu POP-Konzentrationen in der Umwelt

Die folgende Tabelle enthält konkrete Maßnahmen zur Verbesserung der verfügbaren Daten über POP-Konzentrationen in der Umwelt:

Konkrete Schritte	Zeitplan
Weiterführung des Monitorings der Umgebungsluft und der Deposition auf Alpengipfeln (Sonnblick)	Weiterführung der Probenahme und Analyse
Monitoring der Umgebungsluft und der Deposition von POPs in der Grenzregion Österreich-Tschechische Republik	Probenahme 2011/12 und Analyse
Entwicklung von Transferfaktoren zur Verbesserung der Kenntnis über Wechselbeziehungen zwischen POP-Konzentrationen in der Umwelt und bioverfügbaren Konzentrationen	Einrichtung eines wissenschaftlichen Panels
Entwicklung bzw. Anpassung von passiven Probenahmemethoden zur Verbesserung der Vergleichbarkeit von Daten	Auswahl und Entwicklung der Methoden/Instrumente, Pilotstudie Evaluierung der Pilotstudie und Auswahl geeigneter Methoden
Implementierung eines nationalen Monitoringprogrammes zur Untersuchung der Verteilung der Deposition von POPs	2008 – Auswahl relevanter Standorte 2009 – Implementierung

1 INTRODUCTION

This report is the first review of the National Action Plan for POPs published in 2008. Article 5 of the Stockholm Convention requires Parties to develop an Action Plan to identify, characterize and address the release of chemicals listed in Annex C. Article 5 further requires a review of the National Action Plan every five years of the strategies and their success in meeting the relevant obligations.

Currently listed in Annex C are polychlorinated dibenzo(p)dioxins (PCDD), polychlorinated dibenzofurans (PCDF), hexachlorobenzene (HCB), polychlorinated biphenyls (PCB) and pentachlorobenzene (PeCB) when produced unintentionally.

In line with the European POP-Regulation (850/2004) polyaromatic hydrocarbons (namely the substances benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene) shall be included in the action plan as well.

The Action Plan, which was to be part of a Party's National Implementation Plan to be developed pursuant to Article 7 of the Convention, included strategies for meeting obligations to reduce or eliminate releases of chemicals listed in Annex C of the Stockholm Convention (including PAH as additional requirement from the EU-POP Regulation), and a schedule for the Action Plan. The plan identified priorities for action, including for those source categories that provide the most cost-effective opportunities for release reduction or elimination. It also included an inventory of releases of chemicals listed in Annex C.

The definition of the term "release" includes emissions of POPs into air, water and soil as well as releases via residues and waste from processes and releases via products.

Within the review of the National Action Plan the inventory (basis: year 2004) of POPs releases will be updated. Based on this inventory instruments and measures aiming at the reduction of POPs releases are going to be described. In particular, the efficacy of national legal regulations will be assessed again and it will be investigated if Best Available Techniques (BAT) in combination with Best Environmental Practices (BEP) have already been applied in the source categories defined by the Stockholm Convention. If applicable, recommendations on how BAT and BEP can be implemented are given. In addition data gaps are again identified and proposals for the improvement of data quality are elaborated.

The Action Plan will be reviewed and updated on a periodic basis.

1.1 Methodology for Inventories

The inventory is based on activity data which is multiplied with activity specific emission factors. Activity data – units are preferably given in GJ in the case of combustion processes or in Mg in the case of production processes – have been taken from the Austrian Energy Balance (UMWELTBUNDESAMT 2011a). Data are given for the year 2009.

Both types of activity data are given in specific formats which are called SNAP[4]- and NFR[5]-Codes. Both formats show relevant differences to the Stockholm Convention with respect to the classification of source categories. Therefore, activity data on individual processes had to be identified and re-classified in order to obtain source specific activity data in line with the requirements of the Stockholm Convention.

In addition to that data from literature and further information from recent studies were used where available (see description of releases from individual source categories).

Emission factors for air emissions have been taken from the Austrian Air Emissions Inventory ("Österreichische Luftschadstoffinventur – OLI") which gives a yearly update of emissions of air pollutants, among them PCDD/F (I-TEQ), HCB and PAH (4 congeneres). Where necessary emission factors have been recalculated to reflect recent developments in data quality (see description of releases from individual source categories).

1.2 Pollutants of concern

1.2.1 Polychlorinated dibenzo(p)dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)

Polychlorinated dibenzo(p)dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) are formed unintentionally in industrial-chemical processes, such as chemical manufacture, and thermal processes, such as waste incineration. PCDD/PCDF are the only POPs whose mechanism of formation has been studied extensively in combustion-relatedprocessesand to a lesser extent in non-combustion-relatedchemical processes; even so, the mechanisms and the exact formation conditions are not fully resolved.

Carbon, oxygen, hydrogen and chlorine, whether in elemental, organic or inorganic form, are needed. At some point in the synthesis process, whether present in a precursor or generated by a chemical reaction, the carbon must assume an aromatic structure.

There are two main pathways by which these compounds can be synthesized: from precursors such as chlorinated phenols or de novo from carbonaceous structures in fly ash, activated carbon, soot or smaller molecule products of incomplete combustion. Under conditions of poor combustion, PCDD/PCDF can be formed in the burning process itself.

The mechanism associated with this synthesis can be homogeneous (molecules react all in the gas phase or all in the solid phase) or heterogeneous (involving reactions between gas phase molecules and surfaces).

[4] SNAP: Standard Nomenclature of Air Pollutants

[5] NFR: Nomenclature for Reporting

PCDD/PCDF can also be destroyed when incinerated at sufficient temperature with adequate residence time and appropriate mixing of combustion gases and waste or fuel feed. Good combustion practice includes management of the “3 Ts” – time of residence, temperature and turbulence. Use of a fast temperature quench and other known processes are necessary to prevent reformation.

In addition to the primary measures there are a variety of well proven and effective secondary measures to reduce emissions of once formed PCDD/F, including different techniques of adsorption on activated coke or oxidation with the help of a catalyst.

1.2.2 Hexachlorobenzene (HCB)

Hexachlorobenzene (HCB) has been widely employed as a fungicide on seeds, especially against the fungal disease 'bunt' that affects some cereal crops. The marketing and use of hexachlorobenzene as a plant protection product was banned in the European Union in 1988.

As hexachlorobenzene is no longer produced in the EU, the only man-made release of hexachlorobenzene is as unintentionally produced pollutant. HCB can still be found as an impurity in certain active ingredients of some plant protection products and biocides, although in much smaller amounts than there used to be. Further, it is emitted from the same chemical and thermal processes as dioxins and furans and formed via a similar mechanism.

There is far less information on the formation of PCB and HCB, especially in combustion processes. Since there are similarities in the structure and occurrence of PCDD/PCDF, PCB and HCB, it is usually assumed that, with the exception of oxygen-containing species, those parameters and factors that favour formation of PCDD/PCDF also generate PCB and HCB.

1.2.3 Polychlorinated biphenyls (PCB)

Polychlorinated biphenyls (PCB) have been widely used as additives in transformer oils, in capacitors, as hydraulic fluids and as softeners in lacquers and plastics.

As PCB is no longer produced in the EU, the only man-made release of PCB is as unintentionally produced pollutant; it is emitted from the same chemical and thermal processes as dioxins and furans and formed via a similar mechanism.

There is far less information on the formation of PCB and HCB, especially in combustion processes. Since there are similarities in the structure and occurrence of PCDD/PCDF, PCB and HCB, it is usually assumed that, with the exception of oxygen-containing species, those parameters and factors that favour the formation of PCDD/PCDF also generate PCB and HCB.

1.2.4 Polycyclic aromatic hydrocarbons (PAH)

Polycyclic aromatic hydrocarbons (PAH) are molecules built up of benzene rings. PAHs are a group of approximately 100 compounds. Most PAHs in the environment arise from incompletecombustion of carbon-containing materials

like oil, wood, garbage or coal. Fires are able toproduce fine PAH particles, which bind to ash particles and are considered long range airpollutants. Thus PAHs have been ubiquitously distributed in the environment for thousands of years.

The four compounds benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene are used as indicators for the purposes of emission inventories.

1.2.5 Pentachlorobenzene (PeCB)

PeCB belongs to a group of chlorobenzenes that are characterized by a benzene ring in which the hydrogen atoms are substituted by one or more chlorines.

PeCB was previously used in PCB products, in dyestuff carriers, as a fungicide, a flame retardant and as a chemical intermediate e.g. for the production of quintozene. PeCB might still be used as an intermediate. PeCB is also produced unintentionally during combustion, as well as during thermal and industrial processes. It is also present as an impurity in products such as solvents or pesticides.

PeCB is persistent in the environment, highly bioaccumulative and has a potential for long-range environmental transport. It is moderately toxic to humans and very toxic to aquatic organisms.

The production of PeCB was phased out in the main producer countries some decades ago as efficient and cost-effective alternatives are available. Applying Best Available Techniques and Best Environmental Practices would significantly reduce the unintentional production of PeCB.

(webpage Stockholm Convention on Persistant Organic Pollutants, **http://chm.pops.int/Convention/tabid/54/language/en-US/Default.aspx**)

2 SOURCE INVENTORY OF POPS RELEASES INTO AIR

In this section two inventories are described: the Austrian air emissions inventory ("Österreichische Luftschadstoff-Inventur OLI") according to UNECE/LRTAP and the inventory developed according to the source categories of Annex C of the Stockholm Convention (including PAH as required by the EU-POP Regulation).

There are distinct methodological differences between these two inventories: The OLI includes a variety of air pollutants, among them PCDD/F (I-TEQ), HCB and PAH (4 congeners). Source categories are combined in SNAP codes (SNAP: Standard Nomenclature for Air Pollutants) and in NFR codes (NFR: Nomenclature For Reporting).

On the other hand the inventory required by the Stockholm Convention should help to identify major sources of POPs emissions and therefore follows a more source-based approach: Emissions to air (but also emissions to water, soil and releases via residues and waste) should be given for individual processes which have been identified by the relevant Technical Working Group as having the potential for substantial POPs releases (refer to 6.1.1).

The National Action Plan according to Article 5 of the Stockholm Convention should also present an inventory of PCB releases. However, due to a general lack of data, this requirement could not be fulfilled.

With respect to emissions into air there are specific differences in the results of the two inventories. These can be explained by the different formats used for activity data and by the incorporation of updated emission factors for the Action Plan's inventory. Relevant discrepancies will be described in detail in the source specific sections.

2.1 Austrian Air emissions Inventory according to UNECE/LRTAP

The Umweltbundesamt, in its capacity as the Environment Agency Austria, has been designated by law as the national entity which is responsible for the preparation of the annual air pollutant inventory. The Environmental Control Act (BGBl. Nr. (Federal Law Gazette No.) 1998/152) regulates the responsibilities of environmental control in Austria and lists the tasks of the Umweltbundesamt. One of these tasks is to provide technical expertise and the data basis for the fulfilment of the emission related reporting obligations under the UNECE LRTAP Convention.

To this end, the Umweltbundesamt prepares and annually updates the Austrian air emissions inventory ("Österreichische Luftschadstoff-Inventur OLI"), which covers

- Greenhouse gases (CO_2, N_2O, CH_4, F-gases)
- SO_x, NO_x, NH_3, NMVOC (under the NEC Directive) and CO
- POPs (PAHs, HCB, PCDD/F)
- Heavy metals (Pb, Cd, Hg)
- Particulate matter (TSP, PM10 and PM2.5).

For the Umweltbundesamt a national air emission inventory that identifies and quantifies the sources of pollutants in a consistent manner has a high priority. Such an inventory provides a common basis for comparing the relative contributions of different emission sources and hence can be a basis for policies to reduce emissions.

2.1.1 Trends for POPs Emissions into Air

Emissions of the three POP categories PAH, PCDD/F and HCB decreased significantly between the years 1985–1994 as a result of legal regulations concerning emission reduction from industry and waste incineration. Emissions increased in the years 1995 and 1996, and steadily declined afterwards until the year 2001. As can be seen in Figure 1 and Table 1 emissions are well below their 1985 level, which is the requirement to be met for Austria as a Party to the POPs Protocol (see 6.1.2).

Emissions of PAH and HCB have increase slightly since 2000, whereas emissions of PCDD/F dropped remarkably between 2001 and 2002 (due to a reduction measure in one sinter plant). In 2009, emissions of PAH, HCB and PCDD/F dropped significantly due to a decline in economic activities.

Table 1: Emissions and emission trends for POPs 1985–2009 (UMWELTBUNDESAMT 2011b)

	Emission		
Year	**PAH [Mg]**	**PCDD/F [I-TEQ, g]**	**HCB [kg]**
1985	27.055	187.127	106.315
1986	26.326	186.036	103.764
1987	26.246	188.038	106.575
1988	24.683	173.361	98.073
1989	24.293	164.425	94.840
1990	17.364	160.649	91.937
1991	17.946	135.342	84.616
1992	13.388	76.776	69.684
1993	10.162	66.976	64.001
1994	9.316	56.206	51.931
1995	9.652	58.429	53.081
1996	10.746	59.744	55.787
1997	9.317	59.372	51.917
1998	8.972	56.259	49.159
1999	8.807	53.614	47.564
2000	8.218	52.035	44.248
2001	8.685	53.279	46.056
2002	8.313	40.481	42.506
2003	8.420	40.396	41.727

Year	Emission		
	PAH [Mg]	PCDD/F [I-TEQ, g]	HCB [kg]
2004	8.454	40.437	40.983
2005	8.996	43.303	45.583
2006	8.029	39.864	41.812
2007	7.878	38.532	40.662
2008	7.845	38.535	40.889
2009	7.501	35.995	38.258
Trend 1985–2009	**-72%**	**-80%**	**-64%**
Trend 1990–2009	**-57%**	**-78%**	**-58%**

Remark: Please note different units used for different groups of pollutants!

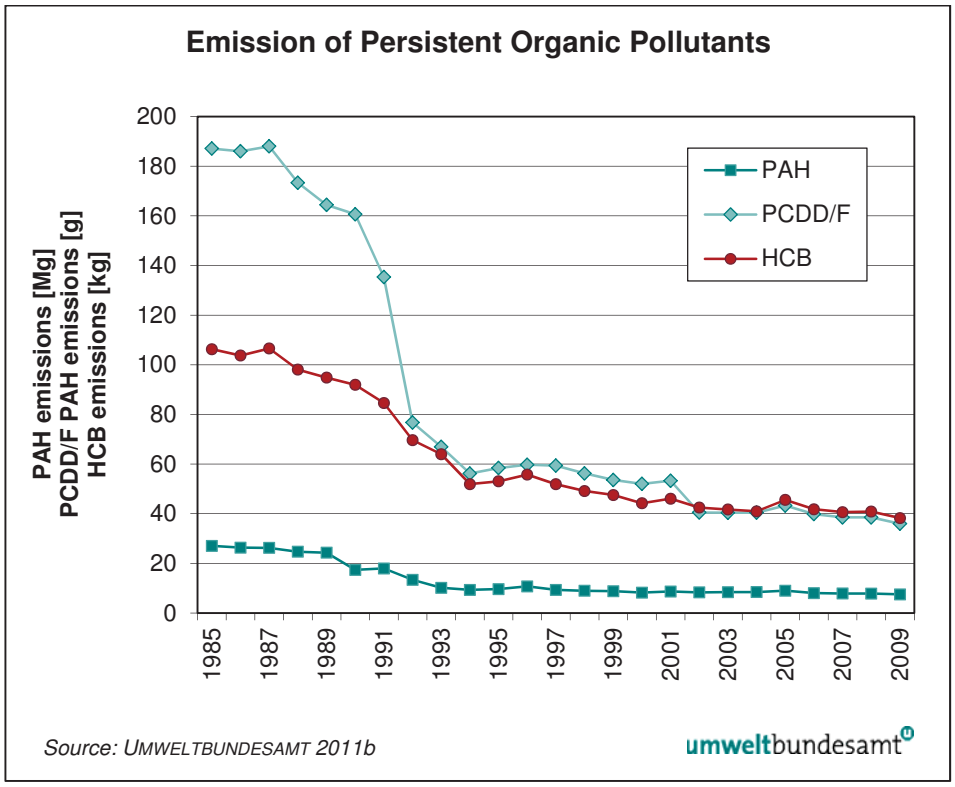

Figure 1: Emission of Persistent Organic Pollutants 1985–2009: PAH in Mg, PCDD/F in g and HCB in kg according to UNECE/LRTAP.

Remark: Please note different units used for different groups of pollutants!

2.2 Releases of polychlorinated dibenzo(p)dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) – Source categories of the Stockholm Convention

2.2.1 Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge

The following description of this source category is given in the Stockholm Convention's Technical Guidebook (UNEP 2006):

"This section deals only with the dedicated incineration of wastes and not with other situations where waste is thermally treated, for example co-incineration processes such as cement kilns and large combustion plants, which are dealt with in the sections relating to those processes."

2.2.1.1 Emission Factors and Emissions

PCDD/F emissions into air are in the range of 0.0013 to 0.05 ng/Nm^3 (I-TEQ; at 11% oxygen), which is within (or in some cases even below) the ranges associated with Best Available Techniques (0.01–0.1 ng/Nm^3; EUROPEAN COMMISSION 2006). Most of the measurements are done on a discontinuous basis. However, in some cases PCDD/F-emissions were measured on a semi-continuous basis (i.e. continuous sampling of flue-gas followed by an analyses of the filter cartridge every two weeks).

Municipal Solid Waste

An amount of about 4.9 million t municipal solid waste was generated in 2009 (EUROSTAT 2011). About 1.172 million t were incinerated in municipal waste incineration plants (BMLFUW 2011).

Hazardous Waste

In 2009, 0.975 million t of hazardous waste were treated (BMLFUW 2011), 0.16 million t were incinerated in 2008 (EUROSTAT 2011). The assumption was made that the same amount of hazardous waste was incinerated in 2009 since there was no significant change during the last years.

Sewage sludge

In 2008 an amount of 0.26 million t of sewage sludge was produced in Austria. Since there were no significant changes in the amounts of sewage sludge generation within the last few years it has been assumed that in 2009 the same amount was generated. 7% of this amount was landfilled, 36% incinerated, 15% applied on land, 19% treated in another way and 23% was stored (BMLFUW 2011).

Table 2 lists the PCDD/F-Emissions into air of the source category Waste Incineration for the years 2004 and 2009.

Table 2: PCDD/F-emissions into air from the source category Waste Incineration (UMWELTBUNDESAMT 2007a, UMWELTBUNDESAMT 2011b, own calculation).

	Emissions 2004 (g I-TEQ)	Emissions 2009 (g I-TEQ)
Municipal Solid Waste	0.214	0.210
Hazardous Waste	0.013	0.017
Sewage Sludge	0.002	0.002
Sum	**0.230**	**0.229**

2.2.2 Cement kilns firing hazardous waste

The following description of this source category is given in the Stockholm Convention's Technical Guidebook (UNEP 2006):

"The following draft guidelines shall provide guidance on best available techniques and guidance on best environmental practices for cement kilns relevant to Article 5 and Annex C, Part II of the Convention. This section also considers requirements of Article 6 of the Convention addressing destruction of POPs containing waste.

Within the scope of this document co-incineration of alternative fuels and hazardous wastes in cement kilns is dealt with as well. It should be kept in mind when reading these guidelines that stringent definitions of both terms do not exist at this moment.

2.2.2.1 Emission Factors and Emissions

In all Austrian cement plants waste is co-incinerated with an upward trend. Emission factors used in the OLI were assessed using reported emissions from Austrian cement kilns (ENVIRONMENTAL IMPACT STATEMENT WIETERSDORF (2003), ENVIRONMENTAL IMPACT STATEMENT RETZNEI (2004), ENVIRONMENTAL IMPACT STATEMENT LEUBE (2005), KARSTENSEN (2006)).

In 2009 3.43 million t of clinker were produced in nine plants. In total about 382,000 t of waste were co-incinerated in 2009 (VÖZ 2009). Data from single measurements (done in 2009) show emission concentrations between 0.001–0.0042 ng/Nm^3 (I-TEQ), which is considerably below the BAT ranges of <0.05-0.1 ng PCDD/F I-TEQ/Nm^3 (10 vol-% O_2, dry flue gas, standard state, average over the sampling period (6–8 hours), EUROPEAN COMMISSION 2010). In the AVV (relevant law for co-incineration of waste in cement plants) the ELV for PCDD/F for cement plants is 0.1 ng/Nm³.Results from literature show, that PCDD/F emissions are not primarily depending on the type of fuel or waste but on the operating conditions and on the prevention of conditions which favour de-novo synthesis.

The next table presents calculated emissions loads from Austrian cement kilns:

Table 3: PCDD/F-emissions from Austrian cement plants (UMWELTBUNDESAMT 2011b).

	Emissions 2004 (g I-TEQ)	Emissions 2009 (g I-TEQ)
Cement kilns (total emissions)	0.116	0.131

It should be mentioned, that PAH-emissions such as benzene or naphthalene may arise from cement plants. These emissions have so far been reported by a small number of Austrian cement plants. PAHs mainly escape from preheating raw meal and to some extent from the rotary kiln (see PRTR data on the website of the Environment Agency Austria: **www.prtr.at**).

2.2.3 Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching

The production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"The main processes involved in making pulp and paper products are raw material handling and preparation, storage (and preservation for non-woods), wood debarking, chipping and agricultural residue cleaning, deknotting, pulping, pulp processing and bleaching if required and, finally, paper or paperboard manufacturing. Most of the formation of the 2,3,7,8-TCDD and 2,3,7,8-TCDF is generated in the C-stage of bleaching via the reaction of chlorine with precursors of TCDD and TCDF. HCB and PCB are not formed during pulp bleaching".

2.2.3.1 Emission Factors and Emissions

Emissions into air are released by recovery boilers (incineration of black liquor and fuel oil), fluidised bed reactors (incineration of bark, sludge, coal, fuel oil, biomass and waste), lime kilns (incineration of gas and fuel oil) and other fossil fuel fired incineration plants (UMWELTBUNDESAMT 2007b). Although PCDD/F-emissions are not measured in most of the above mentioned incineration plants (emissions are routinely measured at fluidised bed reactors when waste in co-incinerated) emissions are generally considered to be low (UNEP 2005). Emissions of these incineration plants are reported in section 2.2.8 (fossil fuel-fired utility and industrial boilers).

2.2.4 Thermal processes in the metallurgical industry (Secondary copper production; sinter plants in the iron and steel industry; secondary aluminium production; secondary zinc production)

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Secondary copper smelting involves pyrometallurgical processes dependent on the copper content of the feed material, size distribution and other constituents. Feed sources are copper scrap, sludge, computer scrap, drosses from refineries

and semi-finished products. These materials may contain organic materials like coatings or oil, and installations take this into account by using de-oiling and de-coating methods or by correct design of the furnace and abatement system."

"Iron sintering plants may be used in the manufacture of iron and steel, often in integrated steel mills. The sintering process is a pretreatment step in the production of iron whereby fine particles of iron ores and, in some plants, secondary iron oxide wastes (collected dusts, mill scale) are agglomerated by combustion."

"Processes used in secondary aluminium smelting are dependent on feed material. Pretreatment, furnace type and fluxes used will vary with each installation. Production processes involve scrap pretreatment and smelting/refining. Pretreatment methods include mechanical, pyrometallurgical and hydrometallurgical cleaning. Smelting is conducted using reverberatory or rotary furnaces. Induction furnaces may also be used to smelt the cleaner aluminium feed materials."

"Secondary zinc smelting involves the processing of zinc scrap from various sources. Feed material includes dusts from copper alloy production and electric arc steel making (both of which have the potential to be contaminated with chemicals listed in Annex C of the Stockholm Convention), residues from steel scrap shredding, and scrap from galvanizing processes. The process method is dependent on zinc purity, form and degree of contamination. Scrap is processed as zinc dust, oxides or slabs. The three general stages of production are pretreatment, melting and refining."

The latter process is not applied in Austria.

2.2.4.1 Emission Factors and Emissions

Secondary copper plant

In Austria only one secondary copper plant is in operation with a production capacity of 74,000 t/a copper cathodes and 100,000 t/a of bolts (UMWELTBUNDESAMT 2004).

Emissions are reduced via fabric filter and regenerative afterburner after the shaft furnace. The general ELV for PCDD/F according to the Ordinance on non ferrous metals and refractory metals (BGBl. II No. 86/2008) is 0.4 ng/Nm^3; for copper plants already approved at the date of coming into effect of the Ordinance (1.4.2008), the ELV is 0.6 ng/Nm^3 until 1.4.2013.

There are no dioxin emission reduction measures installed after the converter and the anode furnace.

Sinter Plants

In Austria two sinter plants are in operation with a production capacity of 1.5 million t/a (VA Donawitz) and 2.75 million t/a (VA Linz), respectively. Both plants are equipped with fabric filter. For the larger plant the emission limit value is 0.1 ng/Nm^3 PCDD/F (as I-TEQ; EIA 2004), reported emissions are < 0.05 ng/Nm^3 PCDD/F (BREF review Iron and Steel Production, Final Draft 2011). The other plant emits less than 0.1 ng/Nm^3 PCDD/F (BREF review Iron and Steel Production, Final Draft 2011). However no limit value has been set, as there are no limit values or monitoring requirements for existing sinter plants in the Ordinance for sinter plants.

Secondary aluminium smelting plants

In Austria the following companies are producing secondary aluminium (UMWELTBUNDESAMT 2004):

- AMAG casting GmbH (84 000 t/a (UMWELTBUNDESAMT 2010))
- AMAG rolling GmbH (170 000 t/a (UMWELTBUNDESAMT 2010))
- Aluminium Lend GmbH & Co KG (SAG): capacity: 40.000 t/a http://www.sag.at/Zahlen-Fakten.524.0.html
- Hütte Klein-Reichenbach: capacity: 10.000 t/a.

Different furnaces are used in the secondary aluminium production in Austria like reverberatory furnace, rotary furnace, tilting rotary furnace, induction furnace. Emissions of PCDD/F are reduced via afterburning, dry sorption technique ($NaHCO_3$, coke) or injection of sorbalite (lime and coke). Measured PCDD/F emissions are in a range of <0.01–0.4 ng/Nm^3, (UMWELTBUNDESAMT 2004) which is below the emission value associated with Best Available Techniques (<0.1–0.5 ng/Nm^3, EUROPEAN COMMISSION 2001).

Actual limit values of PCDD/F from the different secondary aluminium plants in Austria are in a range of 0.1–0.4 ng/Nm^3.

Benzo(a)pyrene is limited in the non ferrous metals Ordinance with an emission limit value of 0.05 mg/Nm^3. Measured values (as far as they are available) are far below this limit value.

Emissions

Table 4 gives an overview of calculated emissions from the processes described above:

Table 4: PCDD/F-emissions from thermal processes in the metallurgical industry – Part II (UMWELTBUNDESAMT 2011b).

Source Category	2004 [g I-TEQ]	2009 [g I-TEQ]
Secondary copper production	0.279	0.279
Sinter plants in the iron and steel industry	3.106	2.538
Secondary aluminium production	1.813	1.813

2.2.5 Open burning of waste, including burning of landfill sites

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Open burning covers a wide range of different uncontrolled waste combustion practices, including dump fires, pit burning, fires on plain soil and barrel burning."

2.2.5.1 Emission Factors and Emissions

This source category includes on-field burning of stubble, straw, etc. and open burning of agricultural waste. Releases are taken from the Austrian National Inventory (see Table 5).

Intentional fires like bonfires bear a risk of abuse when used as a method of domestic waste disposal. This issue has been addressed in a single case study showing the effectiveness of current regulation in this field of activity. The situation with unintentional fires is more unclear. Emission factors reported in literature show high uncertainty due to limited sets of data.

In addition releases from accidental burning of landfill sites (esp. landfills for the intermediate storage of waste) should be added here as well as releases during accidental fires of houses and other facilities. In recent years burning of intermediate storage facilities of waste has occurred relatively often. However, due to missing data on the quantities of burnt waste and the great uncertainties associated with the relevant emission factors no quantification of emissions has been done for these types of unwanted emissions.

Nevertheless, it can be assumed that these incidents contribute substantially to the overall emissions of PCDD/F into air: The Dioxin Toolkit (UNEP 2005) gives a default emission factor of 1 mg per tonne of burnt material.

Table 5: PCDD/F-emissions from the source category open burning of waste (UMWELTBUNDESAMT 2011b).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Open burning of waste*	0.222	0.136

** without burning of landfill sites and accidental fires*

2.2.6 Thermal processes in the metallurgical industry not mentioned in Part II

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Secondary lead smelting involves the production of lead and lead alloys, primarily from scrap automobile batteries, and also from other used lead sources (pipe, solder, drosses, lead sheathing). Production processes include scrap pretreatment, smelting and refining."

"Primary aluminium is produced directly from the mined ore, bauxite. The bauxite is refined into alumina through the Bayer process. The alumina is reduced into metallic aluminium by electrolysis through the Hall-Héroult process (either using self-baking anodes – Söderberg anodes – or using prebaked anodes)."

"Magnesium is produced either from raw magnesium chloride with molten salt electrolysis, or magnesium oxide reduction with ferrosilicon or aluminium at high temperatures, as well as through secondary magnesium recovery (for example, from asbestos tailings)."

"Secondary steel is produced through direct smelting of ferrous scrap using electric arc furnaces. The furnace melts and refines a metallic charge of scrap steel to produce carbon steels, as well as high alloyed and stainless steels at non-integrated steel mills. Ferrous feed materials mainly consists of scrap. Scrap may be added to other melting furnaces and in particular in the primary iron and steel sectors."

"Primary base metals smelting involves the extraction and refining of nickel, lead, copper, zinc and cobalt. Generally, primary base metals smelting facilities process ore concentrates. Most primary smelters have the technical capability to supplement primary concentrate feed with secondary materials (e.g. recyclables)."

2.2.6.1 Emission factors and emissions

Secondary lead production

Only one plant in Austria (BMG Metall & Recycling GmbH in Arnoldstein/Kärnten) produces secondary lead from old batteries with a production capacity of 26 900 t/a. (UMWELTBUNDESAMT 2004, UMWELTERKLÄRUNG 2009). An afterburner has been installed after the furnaces. An emission limit value of 0.4 ng/Nm^3 for PCDD/F exists in the current ordinance (BGBl. II Nr. 86/2008). Measured values are well below this ELV. Benzo(a)pyrene is limited by ordinance (BGBl. II No. 86/2008) with an emission limit value of 0.05 mg/Nm^3,a measured value of 0.00685 mg/Nm^3 (UMWELTERKLÄRUNG 2009) is far below the limit value.

Primary aluminium production

Primary aluminium is no longer produced in Austria (1992 – change to secondary aluminium production).

Secondary steel production

Secondary steel (Electric Arc Furnace) is produced in three plants (Böhler Uddeholm, Marienhütte, Breitenfeld). Total production was 723,000 t in the year 2008 and 588,000 t in the year 2009. **www.worldsteel.org**.

Primary base metals

Nickel oxide is produced from old nickel containing catalysts and other nickel containing wastes and by-products (Treibacher TIAG in Althofen). Measured PCDD/F-emissions are well below <0.1 ng/Nm^3 (UMWELTBUNDESAMT 2004).

Emissions

Releases have been taken from the Austrian National Inventory (see Table 6).

Table 6: PCDD/F-emissions from the source category thermal processes in the metallurgical industry – Part III (UMWELTBUNDESAMT 2011b).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Thermal processes in the metallurgical industry not mentioned in Part II	0.198	0.190

2.2.7 Residential combustion sources

Residential combustion plants are defined in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"This section considers the combustion of wood, coal and gas, mainly for residential heating and cooking. Combustion takes place in hand-fired stoves or fireplaces or, in the case of larger central heating systems, in automatically fired installations."

Activity data for residential combustion plants can be found within the Austrian National Energy Balance in the NFR-codes (NFR: Nomenclature for Reporting) "Commercial/Institutional" (NFR: 1A4a, SNAP: 0201), "Residential Plants" (NFR: 1A4b1, SNAP: 0202) and "Plants in Agriculture/Forestry" (NFR: 1A4c1, SNAP: 0203). Since these plants are regarded as small scale installations, their emissions are allocated to the source category "Residential combustion sources".

2.2.7.1 Activity data – NFR-code: "Residential Plants"

In 2009 total energy consumption under the NFR-code "Residential Plants" was 174 PJ. Major fuels were oil (light and extra light heating oil and liquified petroleum gas) with a share of 32.3%, followed by natural gas (28.5%), wood (31.7%), wood waste (5.6%). Coal (1.9%) is of minor importance.

Residential Plants	**2004**	**2009**
Coal	3.1 %	1.9 %
Oil	37.4 %	32.3 %
Gas	27.4 %	28.5 %
Wood waste	3.6 %	5.6 %
Wood	28.5 %	31.7 %
Sum	**100 %**	**100 %**
Total Energy Consumption	**180 PJ**	**174 PJ**

Table 7: Fuel mix in the NFR-code „Residential Plants" (UMWELTBUNDESAMT 2011a).

2.2.7.2 Emission factors – NFR-code: "Residential Combustion Sources"

In the next table emission factors of relevant fuels are compiled:

EF PCDD/F [µg/GJ]	**UMWELTBUNDESAMT 2011A**	**UMWELTBUNDESAMT 2002**	**UNEP Toolkit**
1A4a Commercial/Institutional plants (SNAP 020103)			
Coal: 102A, 104A, 105A, 106A, 107A	0.24		
203B Light fuel oil 203C Medium fuel oil	0.002		0.01 (general)
203D Heavy fuel oil	0.0009		
204A Heating oil 206A Petroleum	0.0012		

Table 8: PCDD/F emission factors for Residential Plants, Commercial/ Institutional Plants and Plants in Agriculture/ Forestry

EF PCDD/F [µg/GJ]	UMWELTBUNDESAMT 2011A	UMWELTBUNDESAMT 2002	UNEP Toolkit
1A4a Commercial/Institutional plants (SNAP 020103)			
224A Other Oil Products	0.0017		
301A Natural gas	0.0016		0.0015 (general)
303A LPG 310A Landfill gas	0.0017		
309A Biogas 309B Sewage sludge gas	0.0006		
111A Wood (IEF 2008)	0.186		
115A Industrial waste	0.3		
116A Wood wastes (IEF 2008)	0.430		1.5 (general)
1A4c i Plants in Agriculture/Forestry/Fishing (SNAP 020302)			
Coal (102A, 104A, 105A, 106A, 107A)	0.24		
203B Light fuel oil 204A Heating oil	0.0015		0.01 (general)
301A Natural gas 303A LPG	0.0025		Natural gas 0.0015 (general)
111A Wood (IEF 2008)	0.223		
116A Wood wastes	0.38		1.5 (general)
1A4b Residential plants: central and apartment heating (SNAP 020202)			
Coal 102A, 105A, 106A, 107A	0.38		
203B Light fuel oil 204A Heating oil	0.0015		0.01 (general)
224A Other Oil Products	0.0017		
301A Natural gas 303A LPG	0.0025		Natural gas 0.0015 (general)
111A Wood, 116A Wood wastes			1.5 (general)
Central heating (IEF 2008)	0.223		
Apartment heating	0.38		
1A4b Residential plants: stoves (SNAP 020205)			
Coal 102A, 104A, 105A, 106A, 107A	0.75	Coal: 7.74 (stoves, fireplaces) Coke: 1.47 (stoves, fireplaces)	15 (stoves; high chlorine coal) 0.1 (stoves; low chlorine coal)
204A Heating oil	0.003		
301A Natural gas	0.006		
111A Wood 113A Peat 116A Wood wastes	0.75	0.32 (stoves, fireplaces)	Wood 0.1 (general) Wood waste 1.5 (general)

For the purpose of this calculation, emission factors used in the Austrian air emission inventory (OLI) have been updated subject to available literature (see IIR 2011, p. 168):

Residential plants

For residential plants the dioxin emission factors for coal and wood were taken from (HÜBNER & BOOS 2000); for heating oil a mean value from (PFEIFFER et al. 2000), (BOOS & HÜBNER 2000) and measurements by FTU (FTU 2000) were used. Combustion of waste in stoves was not considered, as no activity data was available.

"Commercial and Institutional plants" and "Plants in Agriculture/Forestry/Fishing"

The same emission factors as those for central heating in the residential sector and for small (and medium-sized) plants of category 1 A 2 were used (the share of the different size classes is based on expert judgement). The values given in the following Table are averaged values per fuel category.

As emission factors for heavy fuel oil and other oil products the same factors as for *1 A 2 Manufacturing and Construction* were used.

Emission factors for dioxin were taken from (FTU 1997) and measurements carried out at Austrian plants (FTU 2000).

Coal:

In the OLI two different emission factors are used to calculate emissions from central and apartment heating systems and from stoves. However, in a recent study (UMWELTBUNDESAMT 2002) a ten-fold higher emission factor (7.74) was published for stoves (see Table 8). In the Dioxin Toolkit (UNEP 2005) emission factors for coal (0.1 µg/GJ) and coal with a high chlorine content (15 µg/GJ) are listed. Because it is assumed that coals used in Austrian residential plants are of a medium to high chlorine content, the emission factor published in the most recent study is used.

Coke:

In line with the recent study (UMWELTBUNDESAMT 2002) an emission factor of 1.47 µg/GJ has been used for calculating emissions from stoves.

Wood:

No distinction is made between different firing systems. The emission factor has been taken from UMWELTBUNDESAMT 2002 (0.32 µg/GJ).

2.2.7.3 Emissions – NFR-code: "Residential Plants"

In the table below emissions of residential plants are listed in relation to the fuel input. The largest part of the emissions stems from the incineration of wood. The incineration of fossil solid fuels (coal, lignite, coke) contributes significantly to the overall emissions from this source category. However, emissions from fossil solid fuels are expected to decrease due to a decline in fuel consumption.

Table 9: Emissions of dioxines/furanes from residential plants (UMWELTBUNDESAMT 2011b, own calculation)

Residential Plants	2004 (g I-TEQ)	2009 (g I-TEQ)
Coal	2.59	1.49
Wood	20.86	17.17
Wood waste	2.24	2.40
Oil	0.11	0.09
Gas	0.13	0.13
Others	0.00	0.00
Sum	**25.93**	**21.28**

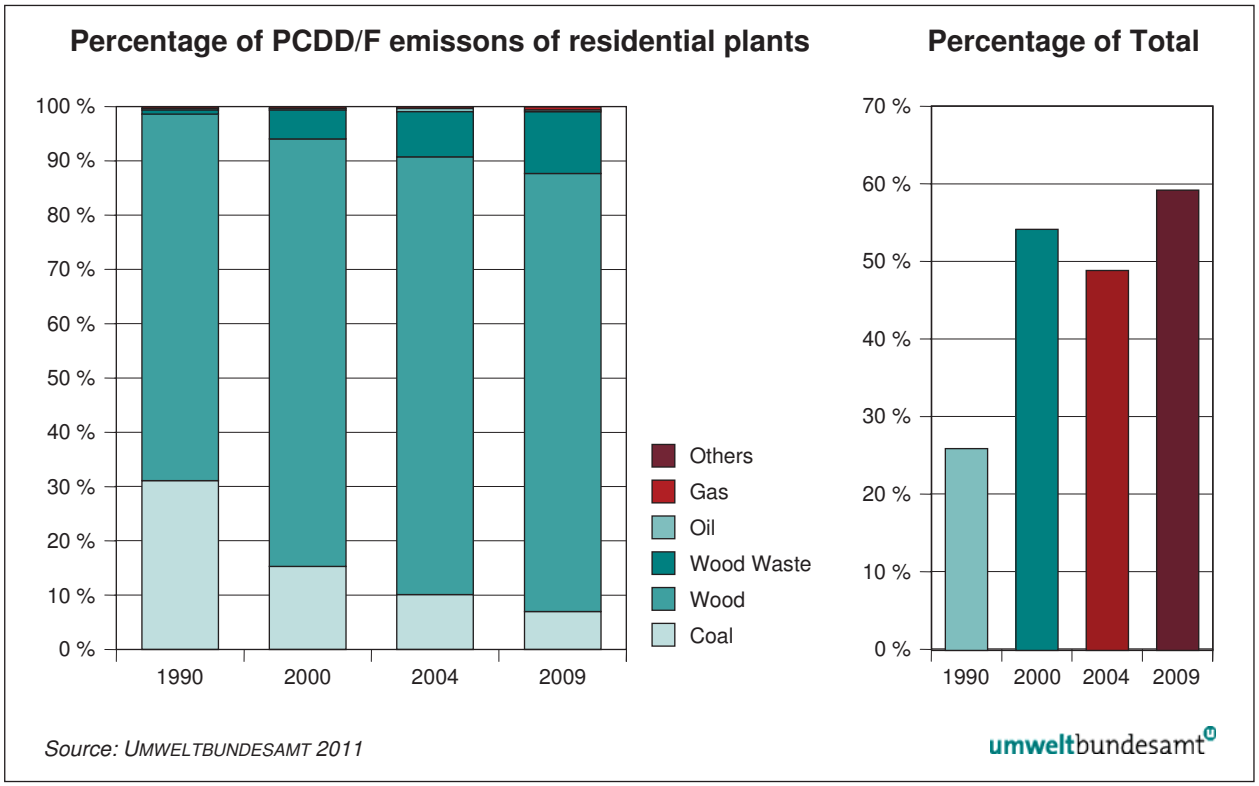

Figure 2: Percentage of PCDD/F emissions from residential plants 1990–2009.

2.2.7.4 Activity data – NFR-code "Commercial/Institutional" and "Plants in Agriculture/Forestry"

In the year 2009 the total input within these subcategories was 54.1 PJ. The major fuels were natural gas and other gases (57%), followed by oil (sum of heating oils and LPG: 30.6%). Wood waste (11.9%), industrial waste (0.8%), biomass (7.8%) and other solid fuels (total of coke, coal and lignite: 0.6%) were of minor importance. Activity data in this sector suffer from substantial uncertainties which are the result of a lack of qualified data.

Commercial/Institutional + Plants in Agriculture/Forestry	2004	2009
Coal	1.2 %	0.6 %
Oil	29.7 %	22.0 %
Gas	56.7 %	57.0 %
Wood waste	7.5 %	11.9 %
Industrial waste	0.7 %	0.8 %
Wood	4.7 %	7.8 %
Others (biogas, sewage gas, landfill gas)	0.6 %	0.5 %
Sum	**100 %**	**100 %**
Total Energy Consumption	**79 PJ**	**54 PJ**

Table 10: Share of fuels within the subcategories "Commercial/Institutional" and "Stationary" (UMWELTBUNDESAMT 2011a).

2.2.7.5 Emissions of PCDD/F – NFR-code "Commercial/Institutional" and „Plants in Agriculture/Forestry"

Emission factors were taken from the OLI. Due to the high activity rate of wood waste this type of waste contributes most to the overall emissions.

Commercial/Institutional + Stationary	2004 (g I-TEQ)	2009 (g I-TEQ)
Coal, lignite, coke	0.22	0.08
Heating oil	0.03	0.01
Wood waste	2.22	2.57
Wood	0.92	0.81
Gas	0.07	0.05
Ind. Waste	0.16	0.13
Others	0.01	0.00
Sum	**3.63**	**3.65**

Table 11: Emissions of Dioxines/Furanes caused by different fuel types (UMWELTBUNDESAMT 2011b, own calculation).

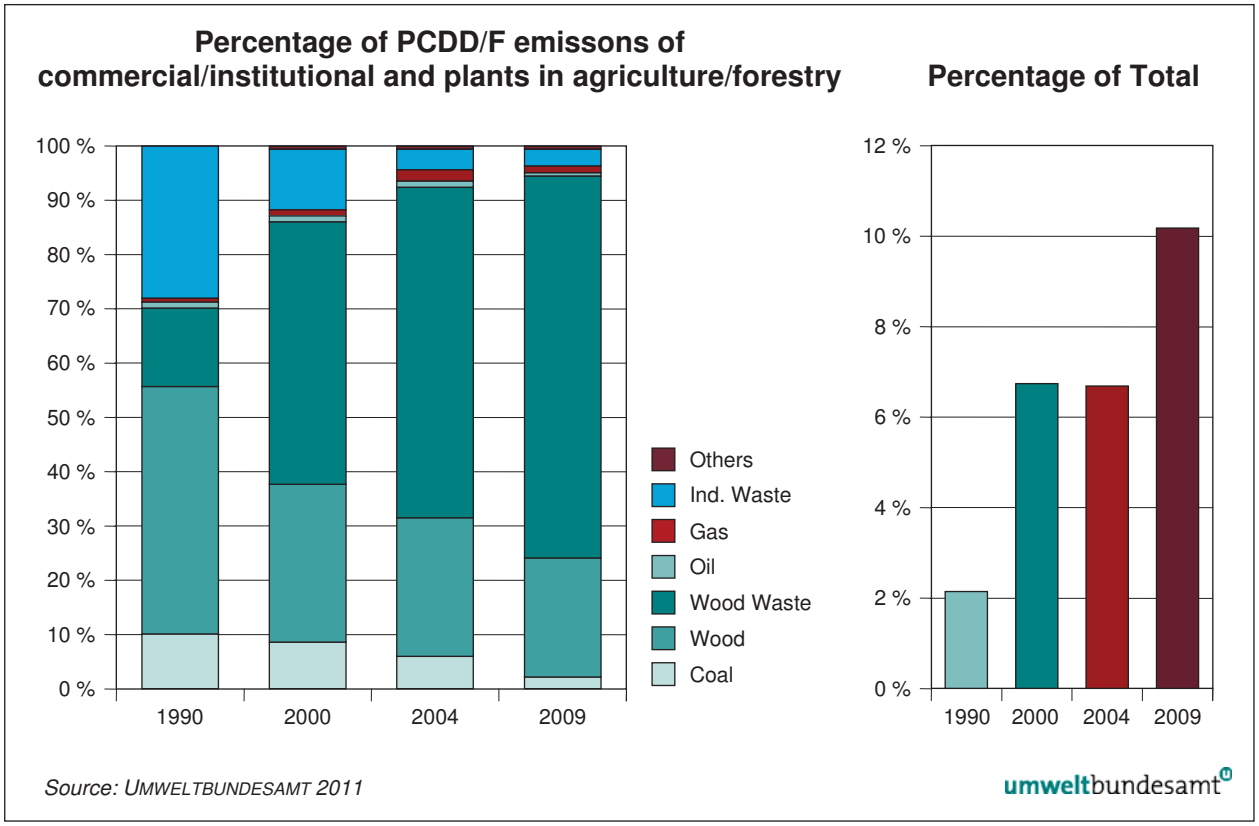

Figure 3: Percentage of PCDD/F emissions from commercial/institutional and plants in agriculture/forestry1990–2009.

2.2.8 Fossil fuel-fired utility and industrial boilers

Fossil fuel-fired utility and industrial boilers are described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Boilers are facilities designed to burn fuel to heat water or to produce steam. The majority of boilers use fossil fuels to provide the energy source, although boilers can also be designed to burn biomass and wastes. The steam produced from the boiler can be used for electricity production or used in industrial processes; likewise hot water can be used in industrial processing, or for domestic and industrial heating."

2.2.8.1 Emission Factors and Emissions

Emission factors used by the Austrian Air Emissions Inventory are consistent with data from literature (UMWELTBUNDESAMT 2003, EUROPEAN COMMISSION 2003, 2006). In general emission concentrations of investigated boilers are (far) below 0.1 ng/Nm^3. However, because of the high total activity number (total energy input: about 390 TJ in the year 2004 and 357 in the year 2009) the emitted load is in the range of 1 g per year (see Table 12).

Table 12: PCDD/F-emissions from the source category fossil fuel fired utility and industrial boilers (UMWELTBUNDESAMT 2011a).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Fossil fuel-fired utility and industrial boilers	0.974	1.117

2.2.9 Firing installations for wood and other biomass fuels

Firing installations for wood and other biomass fuels are described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"The main purpose of firing installations for wood and other biomass fuels is energy conversion. Large-scale installations for firing wood and other biomass fuels mainly use fluidized bed combustion and grate furnaces. Technologies for small-scale plants include underfeed furnaces and cyclone suspension furnaces. Recovery boilers in the pulp and paper industry apply specific combustion conditions. Technology selection is related to fuel properties and required thermal capacity. In the present section only large-scale applications in, for example, industry, power generation and district heating are covered".

2.2.9.1 Emission Factors and Emissions

Some emission factors used by the Austrian Air Emissions Inventory have been updated according to available literature (UMWELTBUNDESAMT 2007c). For example emission factors for industrial firing installations have been reduced from 0.08 µg/GJ to 0.03 µg/GJ. Due to the increasing number of commercial biomass firing installations emissions from this source category have risen to almost double those from 2004.

Table 13: PCDD/F-emissions from the source category firing installations for wood and other biomass fuels (UMWELTBUNDESAMT 2011b).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Firing installations for wood and other biomass fuels	1.644	2.957

2.2.10 Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"This section focuses on processes for the manufacture of industrial chemicals that could theoretically give rise to persistent organic pollutants (particularly those chemicals listed in Annex C of the Stockholm Convention). Most of the processes described share common steps, including chlorination of organic or inorganic raw materials, purification of the products, separation of product streams (usually by distillation), destruction of high-molecular-weight side products and recycle or sale of hydrogen chloride."

2.2.10.1 Emission Factors and Emissions

No national emission factors are available. It is assumed that – if any – emissions are negligible due to low activity figures.

2.2.11 Crematoria

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Cremation is the disposal of a cadaver by the process of burning. This can be undertaken in either an uncontrolled, open burning fashion on funeral pyres, or in a controlled fashion within a cremator, installed within a crematorium or crematory. For the purposes of this document, only the cremator installations are discussed with respect to preventing releases of persistent organic pollutants, and not open burning."

2.2.11.1 Emission factors and emissions

In the year 2004 three of ten Austrian crematoria were equipped with emission reduction techniques, two of which with PCDD/F reduction techniques. The emission limit value given in the permits for these two plants is 0.1 ng/Nm^3 (11% O_2) (communication from operators). There exists no generally binding rule concerning emission reduction for crematoria in Austria.

Due to a general lack of data emission factors from the Austrian Air Emissions Inventory have been used (Table 14).

Table 14: PCDD/F-emissions from the source category crematoria (UMWELTBUNDESAMT 2011b).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Crematoria	0.154	0.164

2.2.12 Motor vehicles, particularly those burning leaded gasoline

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"The major fuels used in motor vehicle transportation are gasoline and diesel. Liquefied petroleum gas, vegetable oil-based and other biofuels, and alcohol-oil mixtures are gaining importance."

2.2.12.1 Methodology

Activity data for motor vehicles can be found within the Austrian National Energy Balance in the NFR-codes:

Road Transportation (SNAP: 07):

- Passenger cars
- Light duty vehicles <3.5 t
- Heavy duty vehicles >3.5 t and buses (r)
- Mopeds and motorcycles <50 cm^3
- Motorcycles >50 cm^3

Other Mobile Sources and Machinery (SNAP: 08):

- Military
- Railways
- Inland waterways
- Agriculture
- Forestry
- Industry
- Household and gardening

2.2.12.2 Activity data – Road Transportation

In 2009 total energy consumption in the category "Road Transportation" was 304 PJ. The major source category with a share of 54% was passenger cars, followed by heavy duty vehicles (30%), followed by light duty vehicles, motorcycles and mopeds (8%) excluding the relative proportions of liquid biofuels.

	Activity 2004		Activity 2009	
Source Category	**(PJ)**	**(%)**	**(PJ)**	**(%)**
Passenger cars	176.2	54.9	164.3	54.1
Gasoline	*84.7*	*26.4*	*70.7*	*23.3*
Diesel	*91.5*	*28.5*	*93.6*	*30.8*
Light duty vehicles <3.5 t (r)	23.4	7.3	23.5	7.7
Liquid biofuels	-	-	21.6	7.1
Heavy duty vehicles >3.5 t and buses (r)	119.7	37.3	92.2	30.4
Mopeds and Motorcycles <50 cm^3	0.2	0.1	0.2	0.1
Motorcycles >50 cm^3	1.4	0.4	1.7	0.6
Total	**321.9**	**100**	**303.5**	**100**

Table 15: Fuel Allocation Road Transportation (HAUSBERGER 1997, UMWELTBUNDESAMT 2011a)

2.2.12.3 Activity data – Other Mobile Sources and Machinery

In 2009 total energy consumption in the category "Other Mobile Sources and Machinery" was 40.5 PJ.

Table 16: Fuel Allocation Other Mobile Sources and Machinery (HAUSBERGER 1997, UMWELTBUNDESAMT 2011a).

Source Category	Activity 2004		Activity 2009	
	(PJ)	(%)	(PJ)	(%)
Military	0.6	1.9	0.6	1.5
Railways	1.9	6.2	2.2	5.3
Inland Waterways	0.8	2.7	0.5	1.2
Agriculture	9.7	31.6	10.6	25.7
Forestry	1.2	3.8	1.4	3.4
Industry	14.5	47.5	24.2	58.4
Household and gardening	1.9	6.2	1.8	4.5
Total	**30.6**	**100.0**	**41.4**	**100.0**

2.2.12.4 Emission factors – NFR-code: "Road Transportation, Other Mobile Sources and Machinery"

The emission factors used in the Austrian air emission Inventory are also used for the emission projection. These emission factors are based on a study entitled "Österreichische Emissionsinventur für POPs, Forschungsgesellschaft Techn. Umweltschutz GmbH" financed by the Umweltbundesamt and completed in 2001.

In the next table emission factors for fuels are compiled:

Table 17: PCDD/F emission factors for Road Transportation and other Mobile Sources and Machinery (HÜBNER 2001).

Source Category	NFR Code	SNAP Code	Split	Fueltype	EF µg/GJ
Passenger cars (r)	1 A 3 b 1	701	Conventional	Gasoline	0.046
Passenger cars (r)	1 A 3 b 1	701	Catalyst	Gasoline	0.001
Passenger cars (r)	1 A 3 b 1	701	XXX	Diesel	0.001
Passenger cars (r)	1 A 3 b 1	701	XXX	Liquid Biofuels	0.001
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Diesel	0.001
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Gasoline	0.046
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Liquid Biofuels	0.001
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	HDV > 3.5 conv.	Diesel	0.006
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	Buses convent.	Diesel	0.006
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Gasoline	0.046
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Liquid Biofuels	0.006
Mopeds and Motorcycles < 50 cm^3	1 A 3 b 4	704	737	Gasoline	0.003
Mopeds and Motorcycles < 50 cm^3	1 A 3 b 4	704	738	Gasoline	0.001
Motorcycles > 50 cm^3	1 A 3 b 4	705	XXX	Gasoline	0.003
Military	1 A 5 b	801	XXX	Diesel	0.006
Military	1 A 5 b	801	XXX	Gasoline	0.000
Military	1 A 5 b	801	XXX	Liquid Biofuels	0.006

Source Category	NFR Code	SNAP Code	Split	Fueltype	EF µg/GJ
Shunting locs	1 A 3 c	80201	XXX	Diesel	0.006
Rail-cars	1 A 3 c	80202	XXX	Diesel	0.006
Locomotives	1 A 3 c	80203	XXX	Coal	0.380
Locomotives	1 A 3 c	80203	XXX	Diesel	0.006
Inland waterways	1 A 3 d 2	80303	XXX	Liquid Biofuels	0.006
Personal watercraft	1 A 3 d 2	80303	XXX	Diesel	0.000
Personal watercraft	1 A 3 d 2	80303	XXX	Gasoline	0.046
Inland goods carrying vessels	1 A 3 d 2	80304	XXX	Diesel	0.006
Agriculture	1 A 4 c 2	806	XXX	Diesel	0.006
Agriculture	1 A 4 c 2	806	XXX	Gasoline	0.046
Agriculture	1 A 4 c 2	806	XXX	Liquid Biofuels	0.006
Forestry	1 A 4 c 2	807	XXX	Diesel	0.006
Forestry	1 A 4 c 2	807	XXX	Gasoline	0.046
Forestry	1 A 4 c 2	807	XXX	Liquid Biofuels	0.006
Industry	1 A 2 f 1	808	XXX	Diesel	0.006
Industry	1 A 2 f 1	808	XXX	Gasoline	0.046
Industry	1 A 2 f 1	808	XXX	Liquid Biofuels	0.006
Household and gardening	1 A 4 b 2	809	XXX	Diesel	0.006
Household and gardening	1 A 4 b 2	809	XXX	Gasoline	0.046
Household and gardening	1 A 4 b 2	809	XXX	Liquid Biofuels	0.006

2.2.12.5 Emissions of dioxins/ – NFR-code “Road Transportation” and ”Other Mobile Sources and Machinery“

Source category	Emissions 2004		Emissions 2009	
	(g)	(%)	(g)	(%)
Passenger cars	0.455	36	0.320	34
thereof Gasoline conventional	*0.391*	*31*	*0.247*	*26*
thereof Diesel (incl. biofuels)	*0.064*	*5*	*0.074*	*8*
Light duty vehicles <3.5 t(r)	0.119	9	0.068	7
Heavy duty vehicles >3.5 t and buses (r)	0.673	54	0.555	58
Mopeds and Motorcycles <50 cm^3	0.000	<1	0.000	<1
Motorcycles >50 cm^3	0.004	<1	0.005	1
Total	**1.252**	**100**	**0.949**	**100**

Table 18: Emissions of dioxins from “Road Transportation” (UMWELTBUNDESAMT 2011b).

Table 19: Emissions of dioxins from "Other Mobile sources and Machinery" (UMWELTBUNDESAMT 2011b).

Source category	Emission 2004		Emission 2009	
	(g)	(%)	(g)	(%)
Military	<0.001	<1	<0.001	<1
Railways	0.013	6	0.014	6
Inland Waterways	0.010	5	0.008	3
International Sea Traffic	0.001	<1	0.002	<1
Agriculture	0.063	31	0.068	27
Forestry	0.015	8	0.016	7
Industry	0.046	23	0.093	37
Household and gardening	0.054	27	0.050	20
Total	**0.201**	**100**	**0.251**	**100**

2.2.13 Destruction of animal carcasses

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Destruction of animal carcasses is generally achieved by incineration, rendering or a combination of these two activities. Incineration techniques may include pyrolysis, gasification or other forms of heat treatment, and may involve burning of complete carcasses or parts of carcasses. Rendering covers a range of activities for processing of carcasses to recover materials."

2.2.13.1 Emission Factors and Emissions

No national emission factors are available. It is assumed that emissions, if any, are negligible due to the low activity figures.

2.2.14 Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Woven and knit fabrics cannot be processed into finished goods until the fabrics have passed through several water-intensive wet processing stages (also known as finishing) such as fabric preparation, dyeing, printing and finishing. Natural fibres typically require more processing steps than artificial fibres. Relatively large volumes of wastewater are generated, containing a wide range of contaminants, which must be treated prior to disposal. Significant quantities of energy are used in heating and cooling chemical baths and drying fabrics and yarns."

2.2.14.1 Emission Factors and Emissions

No national emission factors are available. It is assumed that emissions, if any, are negligible due to the low activity figures.

2.2.15 Shredder plants for the treatment of end of life vehicles

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Shredder plants for treatment of end-of-life vehicles are listed in Annex C of the Stockholm Convention as a source that has the potential to form and release chemicals listed in Annex C. Shredders are large-scale machines equipped inside with one or more anvils or breaker bars and lined with alloy steel wear plates. An electric motor drives the rotor with the freeswinging alloy steel hammers. Beneath the shredder is a vibratory pan, which receives the shredded material dischargedthrough the grates. Typically a ferrous metal stream is produced, which is relatively clean and consists of small (50 mm) pieces of steel and a "fluff" stream, which contains the fragments of non-ferrous metals and other materials that entered the shredder (also known as fragmentiser). Very few data on stack emission measurements at shredder plants are available. However, the results of some studies have shown levels of dioxin compounds greater than 0.1 ng I-TEQ/m^3.

At present there is not sufficient evidence that new formation of polychlorinated dibenzo(p)dioxins (PCDD), polychlorinated dibenzofurans (PCDF) or polychlorinated biphenyls (PCB) occurs in the (mechanical) shredding of vehicles, household electrical equipment or other electrical appliances. The data available indicate that the PCDD/PCDF and PCB released from shredderplants are from industrial, intentional production and have been introduced with oils, dielectric fluids, and other materials contained in these vehicles or consumer goods and which are simply set free through this mechanical process."

2.2.15.1 Emission Factors and Emissions

According to BMLFUW 2011, six shredder plants and three post-shredder plants are in operation in Austria.

No national emission factors are available for this activity.

2.2.16 Smouldering of copper cables

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"Smouldering of copper cables involves the open burning of plastic coatings from electrical cable and wiring to recover scrap copper and other constituents of the cables. This process is labour intensive, and is performed by individuals or in small facilities without any abatement measures for air emissions. Smouldering is conducted in burn barrels or on open ground. No means of temperature control or oxygen addition are used to achieve complete combustion of plastic compounds."

2.2.16.1 Emission Factors and Emissions

This process is not applied in Austria.

2.2.17 Waste oil refineries

This source category is described in the Stockholm Convention's Technical Guidebook (UNEP 2006) as follows:

"For the purpose of this guidance section, waste oils (or used oils) are defined as any petroleum-based, synthetic, or plant- or animal-based oil that has been used. Waste oils may originate from two large sources: industrial waste oils, and vegetable and animal waste oils. Among the industrial waste oils, three main oil streams can be identified: industrial oil (e.g. hydraulic oil, engine lubricant, cutting oil); garage or workshop oil; and transformer oil.

Waste oils have been found to be contaminated with PCDD, PCDF and PCB. At present there is no available evidence that PCDD/PCDF or PCB are newly formed in waste oil refineries. The data available indicate that the PCDD/PCDF and PCB released from waste oil refineries or waste oil handling and management plants are from industrial, intentional production of PCB or chlorobenzenes that are present in the waste oils either by contamination in the synthesis process (of these chemicals) or have become contaminated during the use phase or earlier recycling processes. In this sense, waste oil refineries represent a distribution source of chemicals listed in Annex C rather than a formation source. According to available information, waste oil management options include reuseor regeneration; thermal cracking; and incineration or use as fuel. It should be noted that dumping and open burning are also practised in many countries."

2.2.17.1 Emission Factors and Emissions

This process is not applied in Austria.

2.2.18 Summary of PCDD/F – Releases to Air from Source Categories of the Stockholm Convention

In the year 2009 a total of 35.7 g PCDD/F (I-TEQ) were emitted in Austria from source categories according to the Stockholm Convention. In the Austrian Air Emissions Inventory (OLI) PCDD/F emissions into air were calculated to be 36.0 g (I-TEQ, 2009). The difference can be explained by the fact, that the OLI is more comprehensive as far as activities are concerned. On the other hand some emission factors have been updated in the course of thisreport (see description of source categories).

Only a few source categories contribute significantly to the total emissions of dioxins and furans, the most important being residential combustion sources with a share of 70% and thermal processes in the metallurgical sector with a share of 13%. Other sources are motor vehicles with 3.4%, biomass combustion (8.3%) and fossil fuel use in industry (3.1%) (see Table 20, Table 21 and Figure 4).

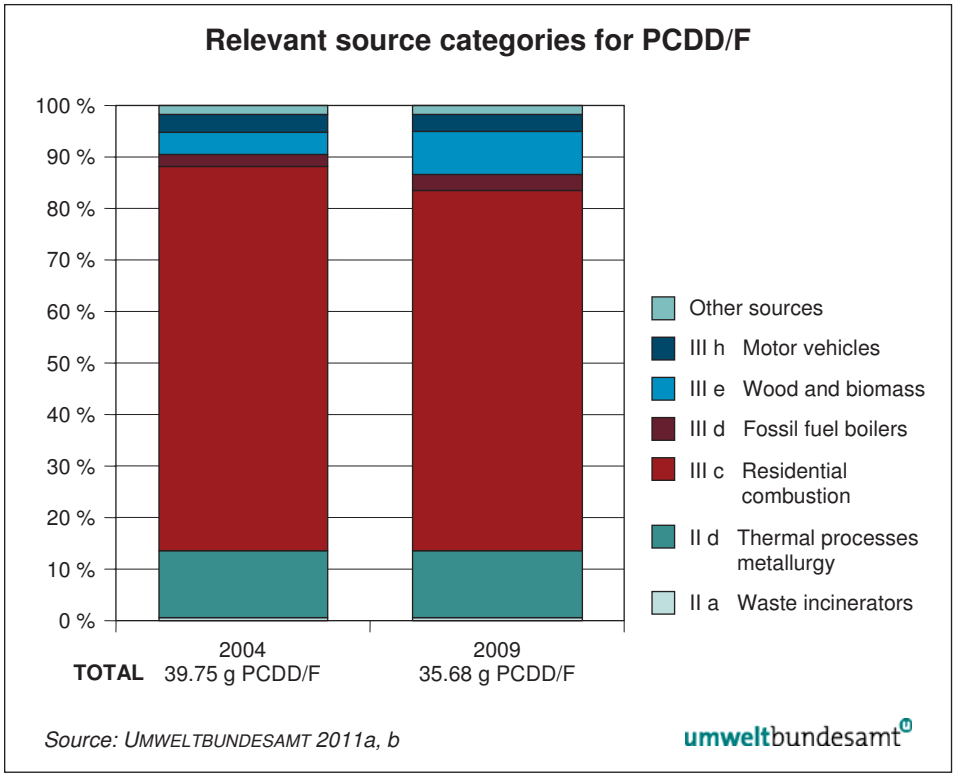

Figure 4: Relevant source categories of PCDD/F.

Table 20: PCDD/F emissions from Source Categories Part II for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source Category Part II	2004 [g I-TEQ]	2009 [g I-TEQ]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	0.230	0.229
Cement kilns firing hazardous waste[1]	0.116	0.131
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	0.279	0.279
(ii) Sinter plants in the iron and steel industry	3.106	2.538
(iii) Secondary aluminium production	1.813	1.813
(iv) Secondary zinc production	NO	NO
Total (Part II)	**5.544**	**4.990**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here; PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.*

NO: not occurring

IE: included elsewhere

Table 21: PCDD/F emissions from Source Categories Part III for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source Category Part III	2004 [g I-TEQ]	2009 [g I-TEQ]
Open burning of waste*	0.222	0.136
Thermal processes in the metallurgical industry not mentioned in Part II	0.198	0.190
Residential combustion sources[1]	29.564	24.931
Fossil fuel-fired utility and industrial boilers	0.974	1.117
Firing installations for wood and other biomass fuels	1.644	2.957
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.154	0.164
Motor vehicles, particularly those burning leaded gasoline	1.453	1.200
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**34.208**	**30.694**

[1] *NFR 1A4b1 Residential – stationary including NFR 1A4a1 Commercial/Institutional – Stationary as well as NFR 1A4c1 Agriculture/Forestry/Fisheries – Stationary*

** without burning of landfill sites and accidental fires*

NA: not applicable

NO: not occurring

NE: not estimated

2.2.19 Austrian Air Emissions Inventory – Polychlorinated dibenzo(p)dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)

In 1985 national total dioxin/furan emissions amounted to about 187 g and in 1990 they amounted to about 160 g; emissions have decreased steadily and by the year 2009 emissions were reduced by about 80% (to 36 g in 2009).

In 1985 the main sources for dioxin/furan (as I-TEQ) emissions were the NFR-Sectors *Energy* (59%; note: the NFR-code *Energy* includes Energy consumption in industry and energy as well as in the traffic sector) and *Industrial Processes* (especially iron and steel production) (27%). In 2009 the main sector regarding PCDD/F (as I-TEQ) emissions was *Energy* with a share of 92% of the National Total.

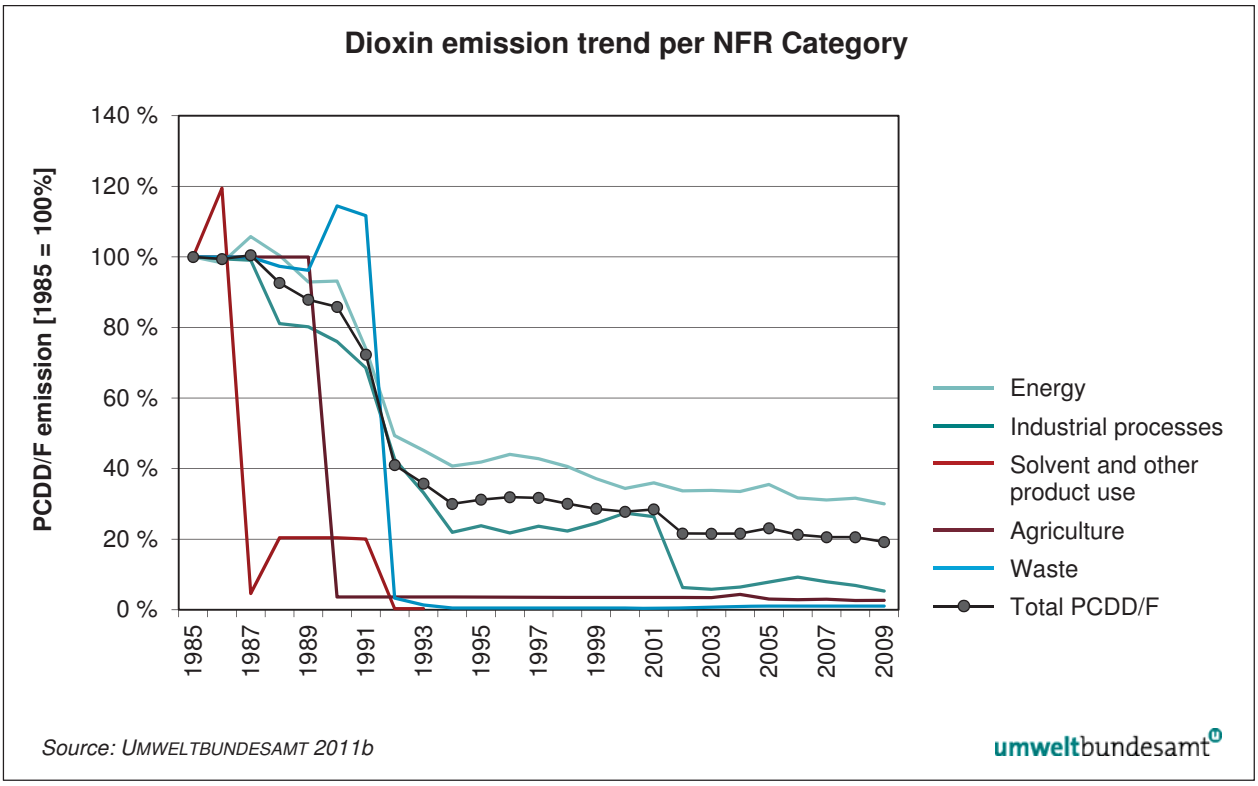

Figure 5: Dioxin emission trend per NFR Category 1985–2009 (base year 1985 = 100%) .

2.3 Releases of Hexachlorobenzene (HCB) – Source categories of the Stockholm Convention

Emission factors used by the Austrian Air Emissions Inventory for calculating emissions have been checked and considered appropriate. Minor changes were observed in the source category “Motor vehicles” only.

2.3.1 Motor vehicles, particularly those burning leaded gasoline

2.3.1.1 Activity data – “Road Transportation, Other Mobile Sources and Machinery”

Activity data can be found in chapter 2.2.12.2.

2.3.1.2 Emission factors – NFR-code: “Road Transportation, Other Mobile Sources and Machinery”

The emission factors used in the Austrian air emission inventory are also used for emission projection. These emission factors are based on the study “Österreichische Emissionsinventur für POPs, Forschungsgesellschaft Techn. Umweltschutz GmbH”.

In the next table emission factors for relevant fuels are compiled:

Table 22: Emission factors for road transportation and other mobile sources and machinery (HÜBNER 2001).

Source Category	NFR Code	SNAP Code	Split	Fueltype	EF µg/GJ
Passenger cars (r)	1 A 3 b 1	701	Conventional	Gasoline	5.3
Passenger cars (r)	1 A 3 b 1	701	Catalyst	Gasoline	0.3
Passenger cars (r)	1 A 3 b 1	701	XXX	Diesel	6.4
Passenger cars (r)	1 A 3 b 1	701	XXX	Liquid Biofuels	6.4
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Diesel	6.4
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Gasoline	5.3
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Liquid Biofuels	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	HDV > 3.5 conv.	Diesel	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	Buses convent.	Diesel	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Gasoline	5.3
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Liquid Biofuels	6.4
Mopeds and Motorcycles < 50 cm3	1 A 3 b 4	704	737	Gasoline	21.0
Mopeds and Motorcycles < 50 cm3	1 A 3 b 4	704	738	Gasoline	2.1
Motorcycles > 50 cm3	1 A 3 b 4	705	XXX	Gasoline	33.0
Military	1 A 5 b	801	XXX	Diesel	6.4
Military	1 A 5 b	801	XXX	Gasoline	0.0
Military	1 A 5 b	801	XXX	Liquid Biofuels	6.4
Shunting locs	1 A 3 c	80201	XXX	Diesel	6.4
Rail-cars	1 A 3 c	80202	XXX	Diesel	6.4
Locomotives	1 A 3 c	80203	XXX	Coal	85.0
Locomotives	1 A 3 c	80203	XXX	Diesel	6.4
Inland waterways	1 A 3 d 2	80303	XXX	Liquid Biofuels	6.4
Personal watercraft	1 A 3 d 2	80303	XXX	Diesel	0.0
Personal watercraft	1 A 3 d 2	80303	XXX	Gasoline	5.3
Inland goods carrying vessels	1 A 3 d 2	80304	XXX	Diesel	6.4
Agriculture	1 A 4 c 2	806	XXX	Diesel	6.4
Agriculture	1 A 4 c 2	806	XXX	Gasoline	5.3
Agriculture	1 A 4 c 2	806	XXX	Liquid Biofuels	6.4
Forestry	1 A 4 c 2	807	XXX	Diesel	6.4
Forestry	1 A 4 c 2	807	XXX	Gasoline	21.0
Forestry	1 A 4 c 2	807	XXX	Liquid Biofuels	6.4
Industry	1 A 2 f 1	808	XXX	Diesel	6.4
Industry	1 A 2 f 1	808	XXX	Gasoline	21.0
Industry	1 A 2 f 1	808	XXX	Liquid Biofuels	6.4
Household and gardening	1 A 4 b 2	809	XXX	Diesel	6.4
Household and gardening	1 A 4 b 2	809	XXX	Gasoline	21.0
Household and gardening	1 A 4 b 2	809	XXX	Liquid Biofuels	6.4

2.3.1.3 Emissions HCB – NFR-code "Road Transportation" and "Other Mobile Sources and Machinery"

Source category	Emissions 2004 (g)	(%)	Emissions 2009 (g)	(%)
Passenger cars	91.06	36	64.07	34
thereof Gasoline conventional	*78.25*	*31*	*49.33*	*26*
thereof Diesel (incl. biofuels)	*12.81*	*5*	*14.7*	*8*
Light duty vehicles <3.5 t (r)	23.75	9	13.65	7
Heavy duty vehicles >3.5 t and buses (r)	134.62	54	111.02	58
Mopeds and Motorcycles <50 cm^3	0.08	<1	0.07	<1
Motorcycles >50 cm^3	0.88	<1	1.04	<1
Total	**250.39**	**100**	**189.85**	**100**

Table 23: Emissions of HCB from road transport (UMWELTBUNDESAMT 2011b).

Source category	Emissions 2004 (g)	(%)	Emissions 2009 (g)	(%)
Military	0.03	<1	0.03	<1
Railways	2.55	6	2.76	6
Inland Waterways	1.94	5	1.53	3
International Sea Traffic	0.26	1	0.46	1
Agriculture	12.53	31	13.53	27
Forestry	3.02	8	3.28	7
Industry	9.11	23	18.56	37
Household and gardening	10.76	27	9.95	20
Total	**40.20**	**100**	**50.11**	**100**

Table 24: Emissions of HCB from other mobile sources and machinery UMWELTBUNDESAMT (2011b)

2.3.2 Summary of Source Categories of the Stockholm Convention: HCB – Releases to Air

In Austria only a few source categories contribute significantly to the total emissions of HCB. Inthe year 2009 a total of 38.2 kg were emitted (Table 25, Table 26 and Figure 6). Residential combustion sources had the lion's share of 86.4% and thermal processes in the metallurgical sector (predominantly sinter plants) had a combined 8.7%. All other sources are below 1%.

Figure 6: Relevant source categories of HCB.

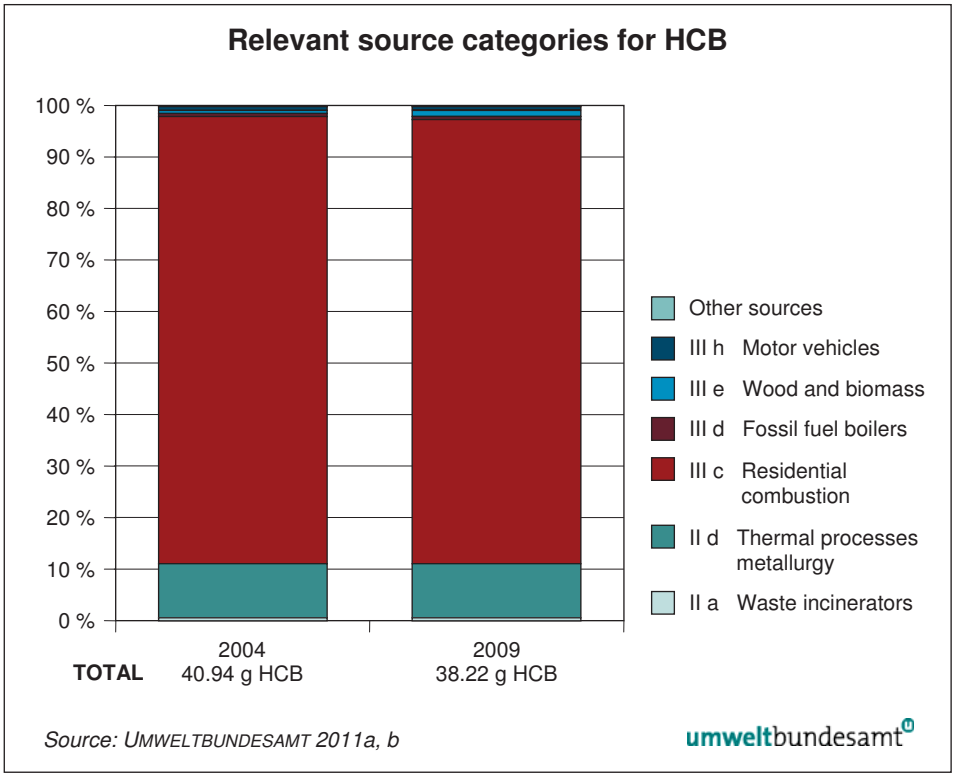

Table 25: HCB emissions in Source Category Part II for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source Category Part II	2004 [kg HCB]	2009 [kg HCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	0.290	0.247
Cement kilns firing hazardous waste[1]	0.017	0.020
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	0.091	0.091
(ii) Sinter plants in the iron and steel industry	3.261	2.926
(iii) Secondary aluminium production	0.907	0.907
(iv) Secondary zinc production	NO	NO
Total (Part II)	**4.566**	**4.189**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here;*
PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.

NO: not occurring

IE: included elsewhere.

Table 26: HCB emissions in Source Category Part III for 2004 and 2009(UMWELTBUNDESAMT 2011a, b).

Source Category Part III	2004 [kg HCB]	2009 [kg HCB]
Open burning of waste, including burning of landfill sites	0.044	0.027
Thermal processes in the metallurgical industry not mentioned in Part II	0.016	0.014
Residential combustion sources	35.515	33.012
Fossil fuel-fired utility and industrial boilers	0.194	0.198
Firing installations for wood and other biomass fuels	0.287	0.511
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	0.031	0.033
Motor vehicles, particularly those burning leaded gasoline	0.291	0.240
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**36.377**	**34.035**

NA: not applicable

NE: not estimated

NO: not occurring

2.3.3 Austrian Air Emissions Inventory – Hexachlorobenzene (HCB)

In 1985 national total HCB emissions amounted to 106 kg. They decreased to 92 kg in 1990. Emissions have decreased steadily and by the year 2005 emissions were reduced by about 58% (to 38 kg in 2009).

In 1985 the two main sources for HCB emissions were the NFR-sectors Energy (78%; note: the NFR-code *Energy* includes Energy consumption in industry and energy as well as in the traffic sector) and Industrial processes (12%). In 2009 the main NFR-sector for HCB emissions was Energy with a share of 92% of the National Total.

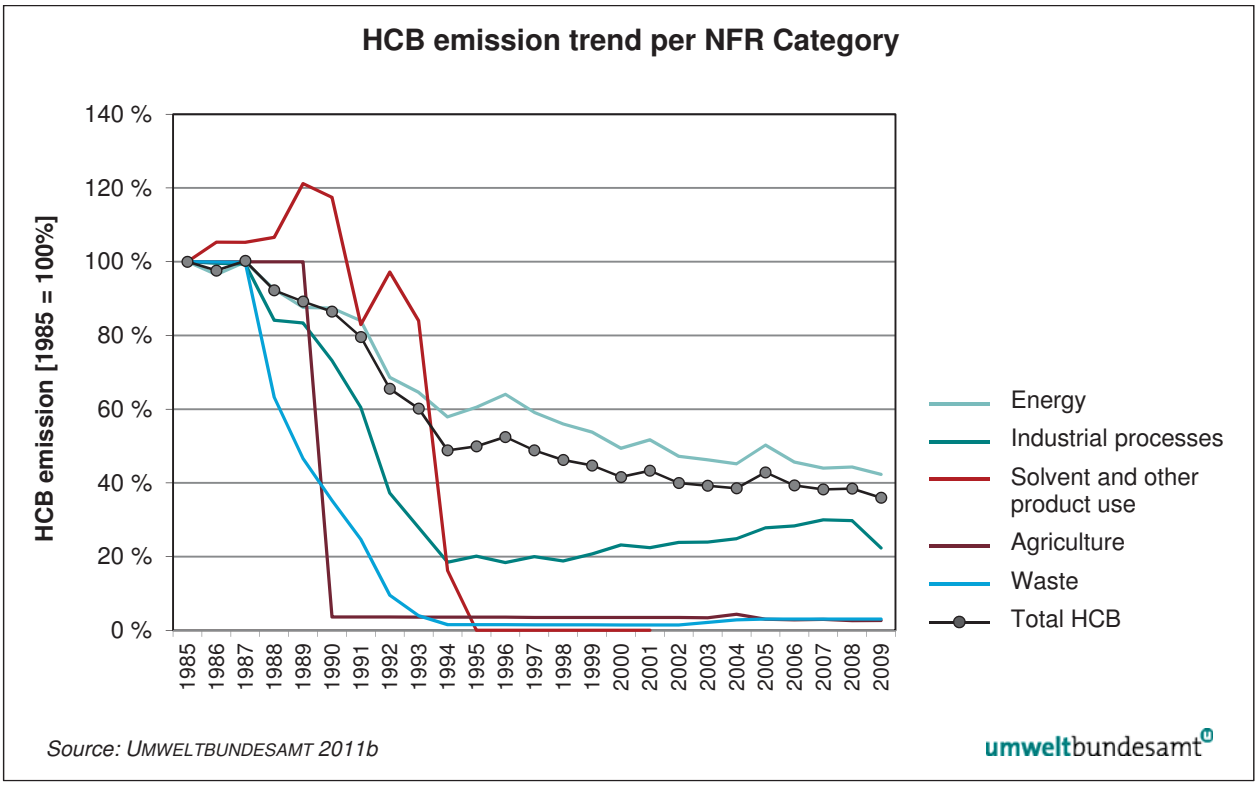

Figure 7: HCB emission trend per NFR Category 1985–2004 (base year 1985 = 100%).

From 1985 to 2009 HCB emissions from the NFR-sectors Waste and Agriculture as well as Solvents and Other Products decreased remarkably by 97% andmore due to stringent legislation and modern technology. HCB emissions from the NFR-sectors Industrial processes decreased until 1994; since then they have been increasing slightly but steadily.

2.4 Releases of polychlorinated biphenyls (PCB) – Source categories of the Stockholm Convention

Due to limited availability of qualified data releases of PCB could not be calculated.

2.5 Releases of polycyclic aromatic hydrocarbons (PAH) – Source categories of the Stockholm Convention

Emission factors used by the Austrian Air Emissions Inventory for calculating emissions have been checked and considered appropriate. Minor changes were observed in the source category “Motor vehicles” only.

2.5.1 Motor vehicles, particularly those burning leaded gasoline

2.5.1.1 Activity data – "Road Transportation, Other Mobile Sources and Machinery"

Activity data can be found in chapter 2.2.12.2.

2.5.1.2 Emission factors – NFR-code: "Road Transportation, Other Mobile Sources and Machinery"

The emission factors used in the Austrian air emission inventory are also used for emission projection. These emission factors are based on a study "Österreichische Emissionsinventur für POPs, Forschungsgesellschaft Techn. Umweltschutz GmbH".

In the next table emission factors for relevant fuels are compiled:

Table 27: Emission factors for Road Transportation and other Mobile Sources and Machinery (HÜBNER 2001).

Source Category	NFR Code	SNAP Code	Split	Fueltype	EF [mg/GJ]
Passenger cars (r)	1 A 3 b 1	701	Conventional	Gasoline	5.3
Passenger cars (r)	1 A 3 b 1	701	Catalyst	Gasoline	0.3
Passenger cars (r)	1 A 3 b 1	701	XXX	Diesel	6.4
Passenger cars (r)	1 A 3 b 1	701	XXX	Liquid Biofuels	6.4
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Diesel	6.4
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Gasoline	5.3
Light duty vehicles < 3.5 t (r)	1 A 3 b 2	702	XXX	Liquid Biofuels	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	HDV > 3.5 conv.	Diesel	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	Buses convent.	Diesel	6.4
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Gasoline	5.3
Heavy duty vehicles > 3.5 t and buses (r)	1 A 3 b 3	703	XXX	Liquid Biofuels	6.4
Mopeds and Motorcycles < 50 cm^3	1 A 3 b 4	704	737	Gasoline	21.0
Mopeds and Motorcycles < 50 cm^3	1 A 3 b 4	704	738	Gasoline	2.1
Motorcycles > 50 cm^3	1 A 3 b 4	705	XXX	Gasoline	33.0
Military	1 A 5 b	801	XXX	Diesel	6.4
Military	1 A 5 b	801	XXX	Gasoline	0.0
Military	1 A 5 b	801	XXX	Liquid Biofuels	6.4
Shunting locs	1 A 3 c	80201	XXX	Diesel	6.4
Rail-cars	1 A 3 c	80202	XXX	Diesel	6.4
Locomotives	1 A 3 c	80203	XXX	Coal	85.0
Locomotives	1 A 3 c	80203	XXX	Diesel	6.4
Inland waterways	1 A 3 d 2	80303	XXX	Liquid Biofuels	6.4
Personal watercraft	1 A 3 d 2	80303	XXX	Diesel	0.0
Personal watercraft	1 A 3 d 2	80303	XXX	Gasoline	5.3

Source Category	NFR Code	SNAP Code	Split	Fueltype	EF [mg/GJ]
Inland goods carrying vessels	1 A 3 d 2	80304	XXX	Diesel	6.4
Agriculture	1 A 4 c 2	806	XXX	Diesel	6.4
Agriculture	1 A 4 c 2	806	XXX	Gasoline	5.3
Agriculture	1 A 4 c 2	806	XXX	Liquid Biofuels	6.4
Forestry	1 A 4 c 2	807	XXX	Diesel	6.4
Forestry	1 A 4 c 2	807	XXX	Gasoline	21.0
Forestry	1 A 4 c 2	807	XXX	Liquid Biofuels	6.4
Industry	1 A 2 f 1	808	XXX	Diesel	6.4
Industry	1 A 2 f 1	808	XXX	Gasoline	21.0
Industry	1 A 2 f 1	808	XXX	Liquid Biofuels	6.4
Household and gardening	1 A 4 b 2	809	XXX	Diesel	6.4
Household and gardening	1 A 4 b 2	809	XXX	Gasoline	21.0
Household and gardening	1 A 4 b 2	809	XXX	Liquid Biofuels	6.4

2.5.1.3 Emissions PAH – NFR-code "Road Transportation" and "Other Mobile Sources and Machinery"

Table 28: Emissions of PAH from Road Transport (UMWELTBUNDESAMT 2011b).

Source category	2004	%	2009	%
Passenger cars	644.74	29	714.33	31
thereof Gasoline conventional	*59.30*	*3*	*40.61*	*2*
thereof Diesel (incl. biofuels)	*585.43*	*26*	*599.16*	*29*
Light duty vehicles <3.5 t (r)	147.55	7	161.56	7
Heavy duty vehicles >3.5 t and buses (r)	765.66	34	640.51	28
Mopeds and Motorcycles <50 cm^3	2.17	0	1.57	0
Motorcycles >50 cm^3	47.05	2	55.60	2
Emissions [kg]	**1607.17**	**100**	**1573.57**	**100**

Table 29: Emissions of PAH from Other Mobile Sources and Machinery (UMWELTBUNDESAMT 2011b).

Source category	2004	%	2009	%
Military	0.2	0	0.2	0
Railways	12.6	7	14.3	6
Inland Waterways	5.2	3	3.2	1
International Sea Traffic	1.5	1	2.67	1
Agriculture	61.7	36	67.8	30
Forestry	10.6	6	12.1	5
Industry	51.0	30	105.7	46
Household and gardening	27.8	16	26.1	11
Emissions [kg]	**170.71**	**100**	**232.01**	**100**

2.5.2 Summary of Source Categories of the Stockholm Convention: PAHs – Releases to Air

In the year 2009 7,462 kg PAH were emitted in Austria. PAH emissions are mainly caused by two source categories (Figure 8, Table 30 and Figure 9). Residential combustion sources accounted for the lion's share of 69.7% and mobile vehicles for a share of 24.2%. Other notable sources were open burning of waste (2.5%) and sinter plants (1.9%).

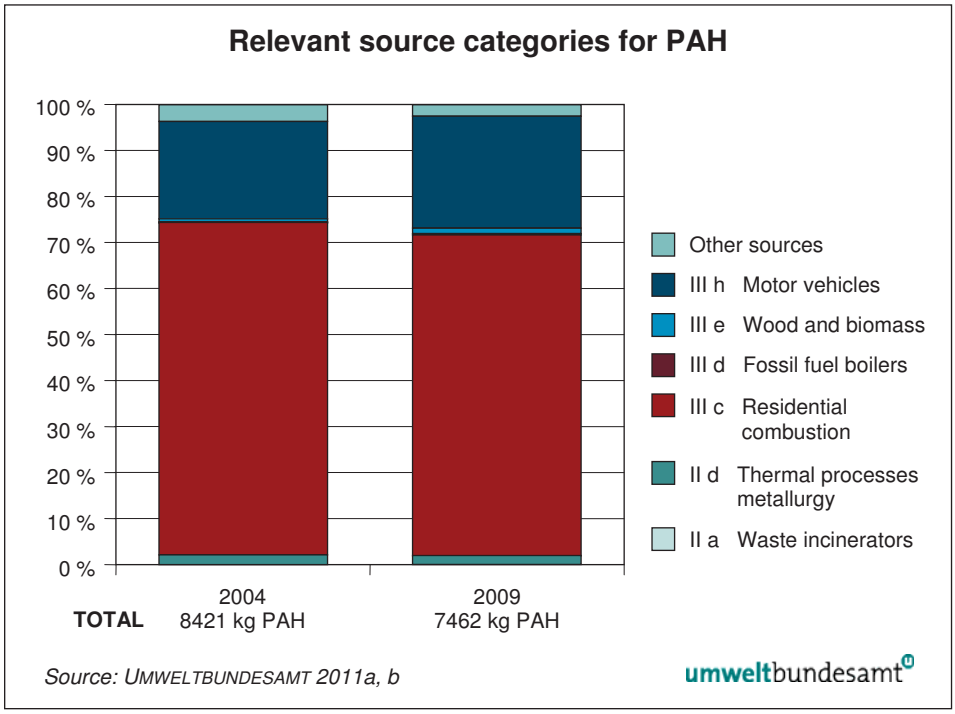

Figure 8: Relevant source categories for PAH.

Table 30: PAH emissions in Source Category Part II for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source Category Part II	2004 [kg PAH]	2009 [kg PAH]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	24.1	11.5
Cement kilns firing hazardous waste[1]	3.2	3.7
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching[2]	IE	IE
The following thermal processes in the metallurgical industry		
(i) Secondary copper production	NE	NE
(ii) Sinter plants in the iron and steel industry	156.5	140.9
(iii) Secondary aluminium production	NE	NE
(iv) Secondary zinc production	NO	NO
Total (Part II)	**183.8**	**156.1**

[1] *figures represent total emissions from cement kilns*

[2] *only process emissions are covered here; PCDD/F emissions from combustion processes are included in fossil fuel fired utility and industrial boilers and in firing installations for wood and other biomass fuels.*

NO: not occurring; NE: not estimated; IE: included elsewhere.

Table 31: PAH emissions in Source Category Part III for 2004 and 2009 (UMWELTBUNDESAMT 2011a, b).

Source Category Part III	2004 [kg PAH]	2009 [kg PAH]
Open burning of waste, including burning of landfill sites	304.1	183.5
Thermal processes in the metallurgical industry not mentioned in Part II	2.9	2.8
Residential combustion sources	6 080.0	5 198.3
Fossil fuel-fired utility and industrial boilers	16.5	27.1
Firing installations for wood and other biomass fuels	47.0	89.1
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA	NA
Crematoria	<0.1	<0.0
Motor vehicles, particularly those burning leaded gasoline	1 777.9	1 805.6
Destruction of animal carcasses	NA	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA	NA
Shredder plants for treatment of end of life vehicles	NE	NE
Smouldering of copper cables	NO	NO
Waste oil refineries	NO	NO
Total (Part III)	**8 228.3**	**7 306.3**

NA: not applicable

NE: not estimated

NO: not occurring

2.5.3 Austrian Air Emissions Inventory – Polycyclic Aromatic Hydrocarbons (PAH)

In 1985 national total PAH emissions were 27 Mg; they decreased to 17 Mg in 1990; emissions have decreased steadily since then and by the year 2009 emissions had gone down by about 72% (to 7.5 Mg in 2009).

In 1985 the main emission sources for PAH emissions were the NFR-sectors Energy (44%; note: the NFR-code *Energy* includes Energy consumption in industry and energy as well as in the traffic sector), Industrial processes (29%) and Agriculture (26%). In 2009 the main NFR-sector regarding PAH emissions was *Energy* with a share of 95% of the national total. From 1985 to 2009 PAH emissions from Agriculture decreased remarkably by 97% due to a prohibition of open field burning, PAH emissions from the sector Industrial processes decreased by 98% due to the shut down of primary aluminium production plants in Austria, a main source for PAH emissions.

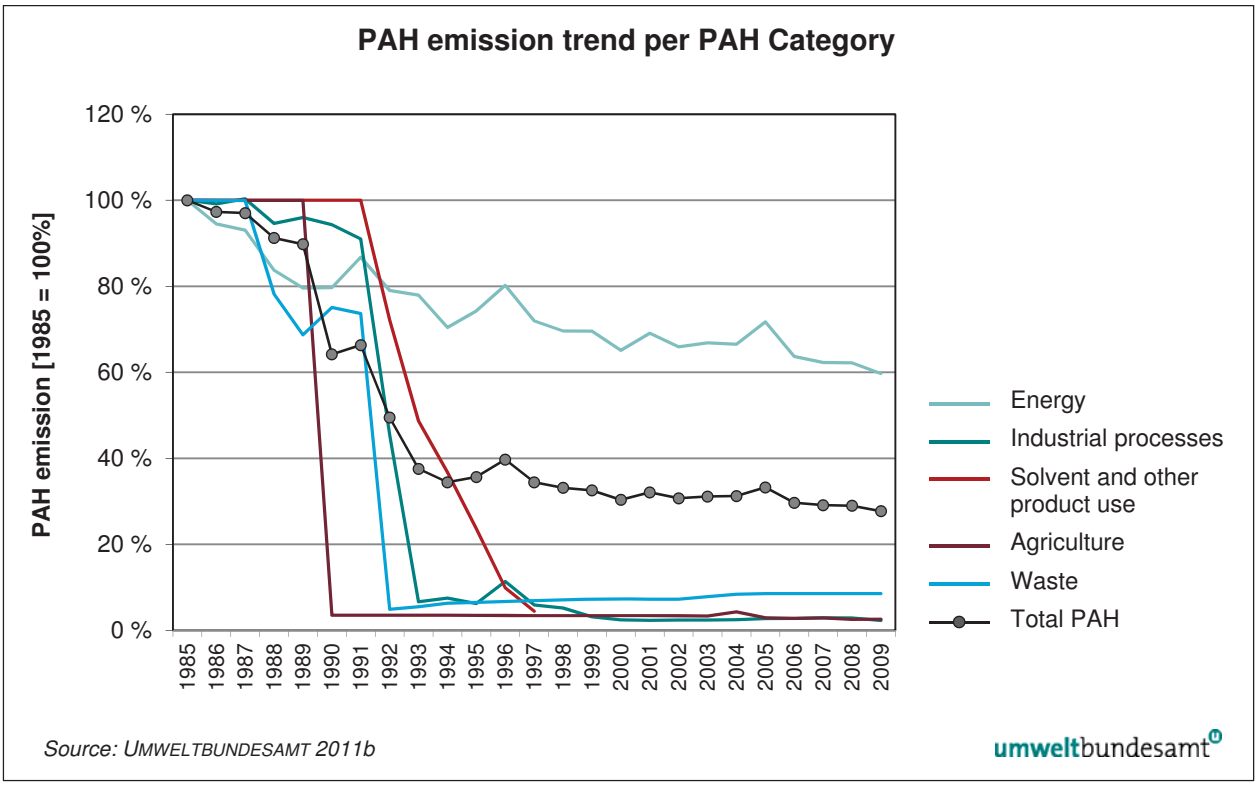

Figure 9: PAH emission trend per NFR Category 1985–2004 (base year 1985 = 100%).

2.6 Releases of Pentachlorobenzene (PeCB) – Source categories of the Stockholm Convention

The most relevant source of PeCB emitted to the environment is caused by unintentional production due to different processes (i.e. municipal solid waste incineration, hazardous waste incineration, power production from coal, domestic burning and waste water treatment which leads to the generation of sewage sludge containing PeCB). Table 32 shows which sectors are considered relevant for the emissions of PeCB and which are considered of low relevance due to the low amounts (BIPRO 2011).

Table 32: Overview on sectors and their relevance for PeCB emissions (BIPRO 2011).

Sector	Considered relevant	Not considered relevant
Municipal solid waste incineration (MSWI) including incineration of biomass	x	
Hazardous waste incineration (HWI)	x	
Power production (coal) including power production in iron and steel industry	x	
Domestic burning	x	
Sewage sludge (waste water treatment)	x	
Chemical industry		x
Non-ferrous metal industry (aluminium, secondary copper, magnesium)		x

2.6.1 Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge

Municipal solid waste

Since PeCB is not commercially used anymore within Europe it can be assumed that municipal solid waste (MSW) is not contaminated with PeCB. But due to the heterogeneous composition of municipal solid waste PeCB can be formed unintentionally when municipal solid waste is burned since PeCB is produced whenever organic compounds are burned or exposed to high energy in the presence of a chlorine source (BIPRO 2011).

There exist only few data on PeCB concentrations in the flue gas of municipal waste incineration facilities. Kato and Urano found, that under normal operating conditions PeCB correlated with PCDD/F within a factor of 3 (KATO & URANO 2001). Both authors derived from emission data on 24 municipal solid waste incinerators in Japan an emission factor for PeCB of 7 mg/t. However, other studies found other factors significantly influencing concentration levels in the flue gas such as combustion conditions and fuel composition. Investigations performed between 1983 and 2001 resulted in emission factors in the range of 3–273 mg/t incinerated waste.

REIMANN et al. (2006) measured a value of 750 ng/m^3 PeCB in the flue gas of a municipal waste incineration plant. This value would correspond to an emission factor of 4 mg/t of incinerated waste.

Given the available data it is suggested that, for the purpose of this emission inventory, an emission factor of **4 mg/t of waste** should be used, independent of the source (i.e. household or industrial waste). This emission factor should also be used for sewage sludge.

In 2009, an amount of about 4.9 million t of municipal solid waste was generated in Austria (EUROSTAT 2011), 1.172 million t were incinerated (BMLFUW 2011).

Hazardous waste

For hazardous waste it has been reported that an average of 7 mg PeCB is found in flue gas per tonne HW incinerated (KAUNE et al. 1994).

In 2009, 0.975 million t of hazardous waste were treated (BMLFUW 2011), 0.16 million t were incinerated in 2008 (EUROSTAT 2011). The assumption was made that the same amount of hazardous waste was incinerated in 2009 since there were no significant changes during the last few years.

Sewage sludge

In 2008 an amount of 0.26 million t of sewage sludge was produced in Austria (BMLFUW 2011). Since there were no significant changes in the amounts of sewage sludge generated it is assumed that the same amount was generated in 2009. 7% of the sewage sludge was landfilled, 36% incinerated, 15% applied on land, 19% treated in another way and 23% stored (BMLFUW 2011).

Emission into air caused by the incineration of sewage sludge is calculated by using the emission factor for municipal solid waste (4 mg/t of sewage sludge).

Table 33: PeCB emissions into air from the source category waste incineration (EUROSTAT 2011, BMLFUW 2011; UMWELTBUNDESAMT 2011, own calculation).

	Mio t incinerated 2009	PeCB Emissions [kg]
Municipal Solid Waste	1.172	4.69
Hazardous Waste	0.16	1.12
Sewage Sludge	0.09	0.4
Sum		6.21

2.6.2 Thermal processes in the metallurgical industry (secondary copper production; sinter plants in the iron steel industry; secondary aluminum production; secondary zinc production)

In iron and steel industries an amount of 1.69 million t of coal was used in 2009 (STATISTIK AUSTRIA 2010).

In the case of coal combustion, the emission factor available in the literature is 2.5 mg/t of coal (HOGENDOORN et al 2009).

Table 34: PeCB emissions from the source category thermal processes in the metallurgical industry (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Million t incinerated 2009	PeCB emissions [kg]
Coal	1.69	4.2

2.6.3 Fossil fuel-fired utility and industrial boilers

In 2009 about 1.2 million t of coal were incinerated in coal fired power plants (STATISTIK AUSTRIA 2010).

In the case of coal combustion, the emission factor which can be found in the literature is 2.5 mg/t of coal (HOGENDOORN et al. 2009).

Table 35: PeCB emissions of the source category fossil fuel-fired utility and industrial boilers (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Million t incinerated 2009	PeCB emissions [kg]
Coal	1.2	3.0

2.6.4 Firing installations for wood and other biomass

For biomass incineration, emission data are scarce as well. Zimmermann et al. reported a value of 87 ng/nm^3 (ZIMMERMANN et al. 2001) corresponding to an emission factor of 54 mg/TJ. However, this emission value was obtained under controlled incineration processes in a 1 MW combustion plant to study emission

profiles of products of incomplete combustion with shredded waste wood contaminated with plastics and paints as feed materials. Thus this value might not be representative for the incineration of biomass in general.

Table 36: PeCB emissions from the source category firing installations for wood and other biomass (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated wood 2009 [TJ]	PeCB emissions [kg]
Wood	43,857	2.37

2.6.5 Residential combustion sources

Domestic burning of wood, fossil fuels and mixed wastes is private burning in single stoves or open burning places. Domestic burning is associated with higher levels of air emissions as no flue gas treatment is performed. In addition, process conditions can vary strongly due to specific oven characteristics and the properties of the used fuel. As a consequence, measured contamination and emission data as well as derived emission factors, are highly inhomogeneous within a wide range of possible results. In general it can be assumed that the emissions exceed the discharge via residues by far and that burning of treated wood or co-combustion of waste significantly increases formation and discharge of PeCB (BIPRO 2011).

Information about emissions of PeCB from residential combustion is scarce as well. For domestic burning of wood, an emission factor of 1.2 mg/t of wood burned is used (ZIMMERMANN et al.2001).

Residential combustion of coal is not considered relevant in Austria since the amounts are low.

Table 37: PeCB emissions from the source category residential combustion (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated biomass 2009 [million t]	PeCB emissions [kg]
Wood	4.6	5.5

2.6.6 Summary of PeCB – Releases to Air from Source Categories of the Stockholm Convention

In the year 2009 a total of 21.28 kg of PeCB were emitted in Austria from the source categories according to the Stockholm Convention.

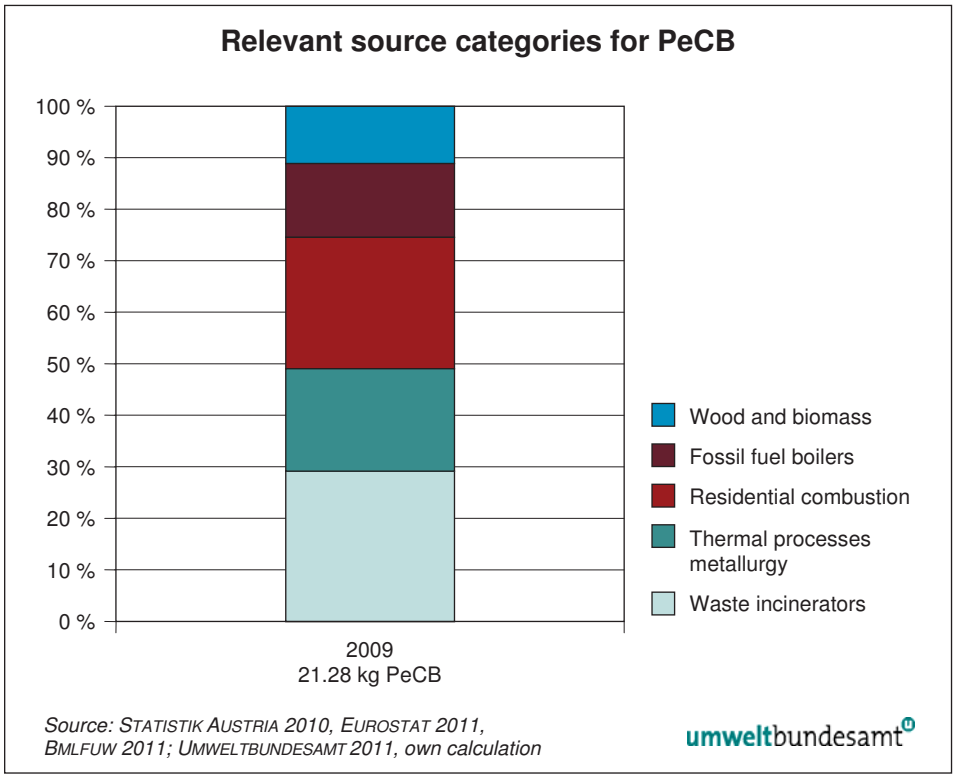

Figure 10: Relevant source categories for PeCB.

Source Category Part II	2009 [kg PeCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	6.21
Cement kilns firing hazardous waste	NA
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching	NA
The following thermal processes in the metallurgical industry	
(i) Secondary copper production	NA
(ii) Sinter plants in the iron and steel industry	4.2
(iii) Secondary aluminium production	NA
(iv) Secondary zinc production	NO
Total (Part II)	**10.41**

NO: not occurring

NA: not applicable.

Table 38: PeCB emissions from Source Category Part II for 2009 (Statistik Austria 2010, Eurostat 2011, BMLFUW 2011; Umweltbundesamt 2011, own calculation).

Table 39: PeCB emissions in Source Category Part III for 2009 (STATISTIK AUSTRIA 2010, EUROSTAT 2011, BMLFUW 2011, UMWELTBUNDESAMT 2011, own calculation).

Source Category Part III	2009 [kg PeCB]
Open burning of waste, including burning of landfill sites	NA
Thermal processes in the metallurgical industry not mentioned in Part II	NA
Residential combustion sources	5.5
Fossil fuel-fired utility and industrial boilers	3.00
Firing installations for wood and other biomass fuels	2.37
Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil	NA
Crematoria	NA
Motor vehicles, particularly those burning leaded gasoline	NA
Destruction of animal carcasses	NA
Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)	NA
Shredder plants for treatment of end of life vehicles	NA
Smouldering of copper cables	NO
Waste oil refineries	NO
Total (Part III)	10.87

NA: not applicable.

NO: not occurring

3 SOURCE INVENTORY OF POPS RELEASES INTO WATER

For the time being data on sources for POPs releases into water are gathered in two registers in Austria:

In the European Pollutant Release and Transfer Register – PRTR[6] point sources and emissions to water for all POPs are included in principle. In fact for most industrial sectors a reporting obligation to PRTR exists only for facilities exceeding a certain production capacity threshold and for emissions which exceed a pollutant release threshold. For Austria, with its mainly small and medium-sized enterprises and thus lower production capacity thresholds, only some 80 facilities with emissions to water or waste water are listed in the PRTR. In 2007, 2008 and 2009 no emissions of POPs were reported for these facilities. So far no data on diffuse sources of POPs have been available in the PRTR.

In 2009 a national inventory on pollutant emissions to surface waters was established[7]. The national register comprises the emissions of the following point sources: PRTR facilities, urban waste water treatment plants with a capacity from 2000 population equivalents upwards and waste incineration facilities with a capacity of more than 2 tonnes of waste per hour. There is no release threshold for reporting. In practice the lower limit is determined by the limit of quantification of the specified analytical method and the waste water discharge. The first reporting cycle for the data of 2009 covered only basic waste water parameters. The second more comprehensive reporting cycle in 2010 was finalized and partly evaluated in 2011.

Additional information on POPs releases was gathered within a supporting project for the setup of the national emissions inventory in 2007/2008[8]. Some 70 substances were analysed for intake and outlet of 15 urban waste water treatment plants of different capacity, purification technology and waste water composition. The analytical programme comprised the priority substances and certain other substances according to the daughter Directive 2008/105/EC[9] of the Water Framework Directive [10] and pollutants of national relevance regulated in

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[6] Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18 January 2006 concerning the establishment of a European Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC, http://prtr.ec.europa.eu/.

[7] Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über ein elektronisches Register zur Erfassung aller wesentlichen Belastungen von Oberflächenwasserkörpern durch Emissionen von Stoffen aus Punktquellen (EmRegV-OW), BGBl. II Nr. 29/2009, (Web based inventory, for the time being only with limited access)

[8] Qualitätszielverordnung ChemieOberflächengewässer:Emissionen aus kommunalen Kläranlagen, Endbericht, Umweltbundesamt 2009.

[9] Directive 2008/105/EC of the European Parliament and of the Councilof 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC andamending Directive 2000/60/EC of the European Parliament and of the Council.

[10] Directive 2000/60/ECof the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

the Austrian Ordinance on Quality Standards for Surface Waters[11]. DDT, chlordane, aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene and pentachlorobenzene could not be detected in crude waste water. With the exception of one facility, PAHs were only detectable in crude waste water. Only polybrominated diphenylethers were detectable in effluents in the sub-ng/l range and hexachlorocyclohexane (lindane) in the ng/l range. The use of lindane was allowed for some selected minor applications until 1. January 2008.

3.1.1 Other sources: Contaminated Sites & Persistent Organic Pollutants

The most important problem regarding POPs and especially HCB stems from a contaminated site resulting from the production of chloroalkanes. The production was shut down in 1992. A nearby river has ben affected by the contaminated site via groundwater exchange. Remediation measures to reduce the spreading of contaminants have been under way since 1995.

Other most commonly recognised and wide spread contaminated sites problems correlated to persistent organic pollutants in Austria are old gaswork sites and tar manufacturing facilities. Regarding PCDD/F, HCB and PCB, hardly any data on site pollution or wider environmental impacts is available.

Most gasworks in Austria were shut down during the early 1960ies. Due to the usual practices of operation and closure it is in general likely that severe soil and groundwater contamination exists. Persistent organic pollutants of concern stem from tar oil spills and losses. The main components of tar oils are PAH (~ 85%), heterocyclic PAH (N,S,O-PAH 5 to 13%), phenols (1–10%). The fate and transport of those pollutants in the underground environment is governed by their physical-chemical properties and interactions to a specific geological and hydrogeological situation. According to the available literature and experiences in Austria the environmental impacts of sites contaminated with PAH are generally limited. Especially benzo(a)pyrene and also other regulated PAH substances are to be characterised by hardly any significant volatilisation to soil vapour, only a low solution to groundwater but a strong sorption to the solid phase. Also because of the high retardation of these higher molecular PAHs, reports on travel distances show that pollutant plumes in groundwater are rather short (<100 m) even after several decades. It can be concluded that underground pollution by PAH causes in general only local impacts to soil and groundwater. Nevertheless, it must be recognised that, depending on the site-specific situation and where sensitive land uses are concerned, risks to human health or to ecosystems need to be analysed.

Investigations at a coking plant near the Danube proved that major local groundwater damage exists, which for already more than 60 years provides a continuous PAH-input in the order of 0.2 kg per day.Although the water quality of the Danube meets the respective environmental target criteria for PAH, a remediation project to reduce groundwater pollution and thereby PAH inputs to the Danube is under preparation.

[11] Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt undWasserwirtschaft über die Festlegung des Zielzustandes für Oberflächengewässer (Qualitätszielverordnung Chemie Oberflächengewässer – QZV Chemie OG), BGBl. II Nr. 96/2006 i.d.F. BGBl. II Nr. 461/2010.

Whereas underground pollution by PAH is a well known problem the available information on sites contaminated by PCDD/F, HCB and PCB is scarce. As for the sites recorded in the register of polluted sites (**www.umweltbundesamt.at/prtr**) the share of such sites can be estimated as being rather low (<5%). Referring to the experiences regarding fate and transport of PAH in the underground environment and given the physical-chemical properties of PCDD/F, HCB or PCB wider environmental impacts seem to be unlikely in general, but may appear in the presence of sensitive land use patterns in the surroundings of a specific site.

As for old municipal landfill sites, where it is likely that ashes and slags have been disposed of, there are hardly any data on PCDD/F, HCB and PCB. Regarding PAHs, which might be addressed as an 'indicator' for POPs, the available data do not show significant loads in percolating water or groundwater. Apart from old landfill sites which were built before 1997, there is no information available on new landfills in compliance with the Landfill Ordinance.

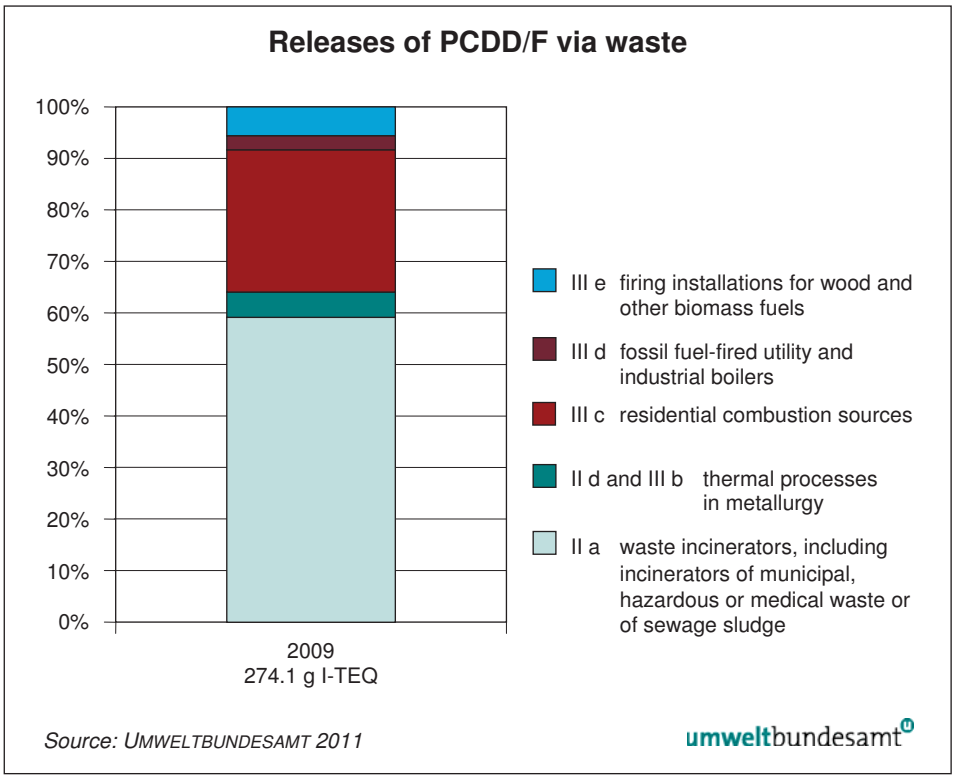
4 SOURCE INVENTORY OF POPS RELEASES VIA WASTE

With regard to waste an estimation of releases can be done for PCDD/F and PeCB. In the case of the other POPs qualified data are not available.

4.1 Releases of Polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)

Figure 11 gives an overview of the contribution of the source categories to PCDD/F emissions via waste. In the year 2009 a total of 274.1 g I-TEQ were emitted, which is approximately seven times as much as the emissions to air (see 2.2.18). Solid waste from waste incineration contributes most (59%) to the overall releases. Waste from residential sources also presents a significant release (28%). Other releases come from thermal processes in the metallurgical sector and from fossil fuel and biomass combustion.

Figure 11: Releases (although hardly bio-available) of PCDD/F via waste (own calculation).



Note: Total releases may be higher since for many source categories (e.g. the metallurgical sector) which have the potential of POPs releases via waste qualified emission factors are not available.

4.1.1 Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge

Table 40 gives an estimation of PCDD/F releases via waste. Concentrations as well as loads are considerably high and follow an upward trend. However, it must be statedthat all waste streams resulting from waste incineration are sent to landfills (mass waste, residual waste, underground disposal) and in case provided they are properly designed and operated, these landfills no longer present a risk for the environment.

	PCDD/F		
Type of Waste	**Average concentration (µg/kg)**	**Total mass 2004 (g/a)**	**Total mass 2009 (g/a)**
Bottom Ash	0.046	11.4	15.04
Fly Ash	2.95	138.29	140.24
Filtercake	4.0	6.68	6.77
Total		**156.37**	**162.05**

Table 40: Estimation of PCDD/F releases via waste from waste incineration (municipal solid waste, hazardous waste, medical waste; own calculation).

4.1.2 Secondary aluminium production

Wastes/residues from secondary aluminium production are salt slag, filter dust, furnace linings and drosses/skimmings (UMWELTBUNDESAMT 2000).

The following table gives an overview of wastes/residues arising from secondary aluminum production, as well as their treatment and disposal.

Estimated releases using the reported values of “Stand der Technik in der Sekundäraluminiumerzeugung im Hinblick auf die IPPC-Richtlinie” (UMWELTBUNDESAMT 2000) and the BREF “Non Ferrous Metals Industries” (EUROPEAN COMMISSION 2001) are given in the next table:

Waste/Residue	**Release (g/a)**	**Treatment**
Filter dust	1.25	Underground disposal, disposal with pre-treatment, partly reconditioned with salt slag, use in steel industry.
Salt slag	0.175	Treatment via dissolution and crystallization technique → reusable substances Al-granulate, mixed salt, non metallic products. Also other treatment techniques are used which are not state of the art.
Furnace lining	No data available	Leaching and landfill, potential for reconditioning with skimmings
Drosses/skimmings	No data available	Recovery

Table 41: Estimation of PCDD/F releases via wastes/ residues arising from secondary aluminum production (UMWELTBUNDESAMT 2000).

Table 42: Composition of salt slag (UMWELTBUNDESAMT 2000).

Pollutant	Typical value	Range
PCDD/F	5 ng/kg	2–20 ng/kg

Table 43: Composition of filter dust (UMWELTBUNDESAMT 2000).

Pollutant	Typical value	Range
PCDD/F	5 µg/kg	3–10 µg/kg

No new values for the year 2009 were calculated or estimated.

4.1.3 Secondary copper production

In Austria there is one secondary copper plant in operation which produces approximately 74,000 t of copper-cathodes and 100,000 t of bolts per year (UMWELTBUNDESAMT 2004). Wastes/residues from the secondary copper plant are given in the table below. Releases in g/a could not be estimated due to a lack of data.

Table 44: PCDD/F releases via wastes/residues arising from secondary copper production (UMWELTBUNDESAMT 1999b).

Residue	Treatment
Filter dust from the shaft furnace	Exported
Filter dust from the converter	exported
Filter dust from the anode furnace	Use in shaft furnace
Furnace linings	Use in furnace
Slag from the shaft furnace	Construction material
Slag from the converter	Use in shaft furnace
Slag from the anode furnace	Use in shaft furnace

4.1.4 Secondary lead production

The only secondary lead plant in Austria produces approximately 23,000 t lead/a. Residues/wastes from the secondary lead plant are given below (UMWELTBUNDESAMT 2004). Releases in g/a could not be estimated due to a lack of data.

Table 45: PCDD/F releases via wastes/residues arising from secondary lead production (UMWELTBUNDESAMT 2004).

Residue	Treatment
Filter dust	Reuse in furnace
Furnace linings	Landfill
Slag	Landfill

4.1.5 Thermal processes in the metallurgical industry

PCDD/F releases are summarised in Table 46:

Residue	Release (g/a)
Sinter plant – residue from flue gas cleaning	n.a.
Electric arc furnace – slag	0.08
Electric arc furnace – residue from flue gas cleaning	9.78
Ferrous metal foundries – residue from flue gas cleaning	1.90
Ferrous metal foundries – sand	0.10
Total	**11.86**

Table 46: PCDD/F releases via waste from thermal processes in the metallurgical industry (own calculation).

No new values for the year 2009 were calculated or estimated. As regards the sinter plant residues from flue gas cleaning, a release of 2.0 g/a has been reported from the larger plant (ENVIRONMENTAL IMPACT STATEMENT 2006, ENVIRONMENTAL IMPACT ASSESSMENT 2004). However, the fine scrubber, which had been installed at the larger plant, was replaced by a fabric filter in 2007. There are no values available for the fabric filter.

4.1.6 Residential combustion sources

The Dioxin Toolkit reports concentrations of PCDD/F in the ash of 10 µg/kg ash for clean biomass and 1,000 µg/kg ash for contaminated biomass, respectively. Both values seem to be unreasonably high (UNEP 2005).

Another study (UMWELTBUNDESAMT 2002) gives emission factors based on the fuel input for chimney soot of 5 ng/kg fuel (coal) and 1 ng/kg fuel in the case of biomass combustion. According to this study, releases via bottom ash are below 1 ng/kg combusted fuel (both for biomass and coal).

BIPRO based their calculations on average values of 0.11 µg/kg (ash from wood combustion) and 0.056 µg/kg (ash from coal combustion). As regards chimney soot BIPRO uses values of 6.15 µg/kg (coal) and 3.19 µg/kg (wood) (BIPRO 2005).

In the field tests described in (UMWELTBUNDESAMT 2002) untreated beech wood was used, whereas the value used by (BIPRO 2005) includes all kind of treated and untreated wood.

The ash content of biomass is in the range of 1% (wood) and 5% (bark). Normally, only bottom ash accumulates in residential plants.

Estimated releases based on reported values are given in the next table:

Table 47: Calculation of PCDD/F releases via waste based on available literature (UMWELTBUNDESAMT 2002, BIPRO 2005, own calculation).

Residue	Release (g/a)	Treatment
Bottom ash from biomass combustion	0.1–6.98[1]	Disposal with MSW; spreading on land
Bottom ash from coal combustion	0.24–0.589[1]	Disposal with MSW; spreading on land
Chimney soot – wood combustion	6.34–60.69[1]	Disposal with MSW; spreading on land; others?
Chimney soot – coal combustion	1.18–7.25[1]	Disposal with MSW; spreading on land; others?

[1] *Higher value more often supported by data from the literature.*

MSW: municipal solid waste

As can be seen from the results given in the table above, the calculation of releases via waste from residential combustion sources is associated with great uncertainties. The reasons for these uncertainties are (among others) a wide variety of types (including some types of waste) and quality of fuels used (e.g. water content, ash content, calorific value, chlorine content), the wide variety of firing systems with different combustion conditions and a wide variety of "local" factors (such as the manual loading of the firing system).

However, these releases are relevant because a certain part of this waste is re-transferred to the environment (e.g. when ash is used as "fertiliser" in private gardens).

No new values for the year 2009 were calculated or estimated.

4.1.7 Fossil fuel-fired utility and industrial boilers

Few data are available on POPs concentrations of solid residues/wastes from fossil fuel fired utility and industrial boilers. The Dioxin Toolkit (UNEP 2005) gives a value of 14 µg/TJ for the combustion of coal and a value of 15 µg/TJ for biomass combustion. Concentrations in fly ash from coal combustion range from 0.23–8.7 ng/kg and for bottom ash from 0.02–13.5 ng/kg (UNEP 2005). For the following calculation concentrations of 5 ng/kg (fly ash) and 10 ng/kg (bottom ash) have been used. The total emission factors for coal and lignite combustion reported by BIPRO do not differentiate between fly ash and bottom ash and result in much higher release estimations (see Table 48).

Table 48: Calculation of PCDD/F releases via ashes from coal combustion based on available literature (UNEP 2005, BIPRO 2005, own calculation).

Type of Residue/Waste	Release (g/a)	Treatment
Fly ash (coal combustion)	0.70	Use in cement, brick and construction industry
Bottom ash (coal combustion)	0.46	Use in cement, brick and construction industry
All ashes from coal combustion – BIPRO	3.00	Use in cement, brick and construction industry
Ashes from lignite – BIPRO (other data not available)	3.52	Backfilling of coal mine

Total releases are estimated to be in the range of 1.16 g/a (UNEP 2005) and 6.62 g/a (BIPRO 2005).

No new values for the year 2009 were calculated or estimated.

4.1.8 Firing installations for wood and other biomass fuels

For biomass combustion a wide range of emission factors are reported:

- UNEP (2005): Fly ash: 30–23,300 ng/kg; bottom ash: 30–3,000 ng/kg
- BIPRO (2005): all ashes: 1,135 µg/kg
- UMWELTBUNDESAMT (2002): 0.03 µg/kg (both for fly ash and bottom ash)

The results (using the concentration figures described) are presented in the table below:

Table 49: Calculation of PCDD/F releases via ashes from biomass combustion based on available literature (UNEP 2005, BIPRO 2005, UMWELTBUNDESAMT 2002, own calculation).

Type of Residue/Waste	Release (g/a)	Treatment
Fly ash (conc: 0.03 µg/kg)	0.67	Landfill
Bottom ash (conc: 0.03 µg/kg)	2.67	Application on land; composting
Ashes from Biomass combustion (conc: 0.11 µg/kg)	12.21	Fly ash: landfilled; bottom ash: use as composting agent

These releases are potentially relevant because some part of bottom ash is used as composting agent and applied on soil.

No new values for the year 2009 were calculated or estimated.

4.2 Releases of Pentachlorobenzene (PeCB)

Table 50 and Figure 12 give an overview of the contribution of the source categories to PeCB emissions to waste. In the year 2009 a total of 3.08 kg PeCB was emitted, which is approximately seven times less than the emissions to air (see 2.6.6). Solid waste from waste incineration contributes most (81%) to the overall releases. Other releases come from thermal processes in the metallurgical sector and from fossil fuel and biomass combustion. However, it should be mentioned that the availability of data was scarce.

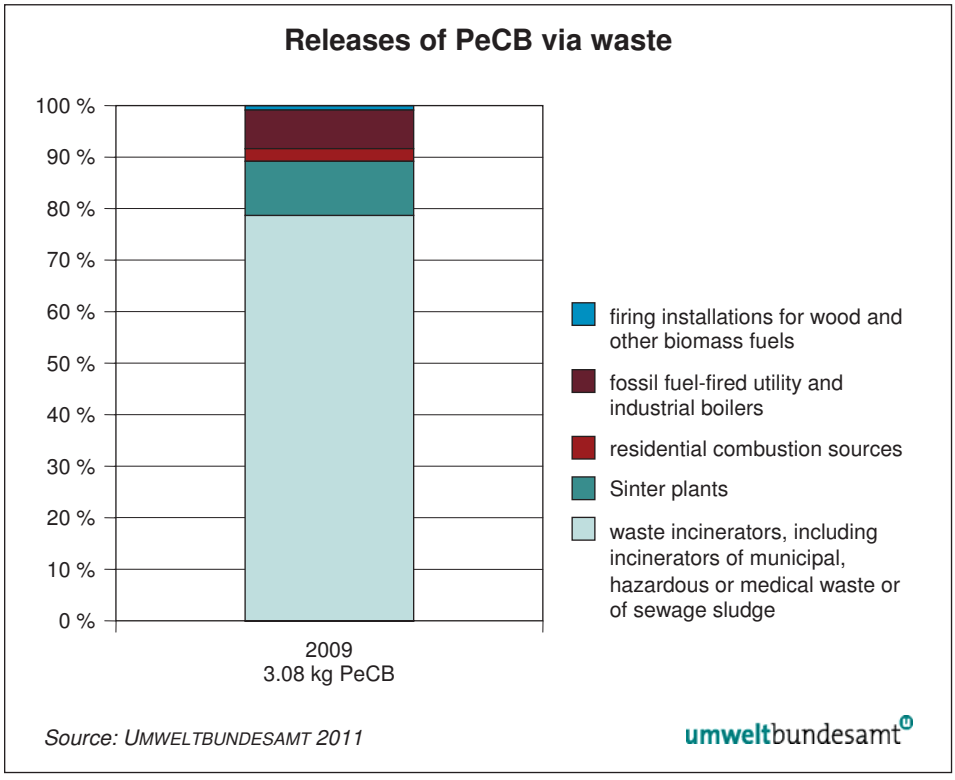


Figure 12: Releases of PeCB via waste (own calculation).

Table 50: PeCB discharge into waste in 2009 (own calculation).

Source Category	2009 [kg PeCB]
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	2.42
The following thermal processes in the metallurgical industry	
(ii) Sinter plants in the iron and steel industry	0.33
Residential combustion sources	0.07
Fossil fuel-fired utility and industrial boilers	0.23
Firing installations for wood and other biomass fuels	0.03
Total	**3.08**

4.2.1 Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge

Solid waste from waste incineration contributes most to the overall releases.

Significant amounts of PeCB have been found in fly-ash samples. Korenkova et al. reported that PeCB concentrations in a fly-ash sample taken from an Italian municipal solid waste incinerator amounted to 31 ng/g of fly-ash (IPEN 2007); in Norway fly-ash samples from a municipal solid waste incinerator contained 50 ng/g (VIAU et al. 1983), in the UK 11.5 ng/g (BALAMPANIS et al. 2010), in Sweden 240 ng/g (ÖBERG et al. 2007) and in Germany 39.6 ng/g (SCHREINER et al. 1986). An average contamination factor of 74.4 ng PeCB/g fly ash has been used for the calculation of the mass flows (BIPRO 2011).

Through incineration of municipal waste, residues amounting to 37.75 kg/t are generated. Of these, 22.25 kg/t are fly ash and filter dust and 15.5 kg/t are remaining ACP residues (BIPRO 2011).

As regards the hazardous waste reported PeCB values in fly ash amount to an average of 9.57 ng PeCB/g fly ash (SCHREINER et al. 1986). It has been assumed that the amount of fly ash and filter dust generated is the same as for municipal waste (22.25 kg/t MW incinerated).

Sewage sludge

As PeCB tends to adsorb on particles, a relevant share of the PeCB content of waste water accumulates in sewage sludge during waste water treatment.

In terms of PeCB contamination data on sewage sludge, a median of 4.85 mg PeCB/t sewage sludge has been used according to a study of Wang et al. for sewage sludge samples analysed in the UK (WANG et al. 1994).

In 2008 an amount of 0.26 million t of sewage sludge was produced in Austria (BMLFUW 2011). Since this amount has not changed significantly in the last few years, it has been assumed that in 2009 the same amount of sewage sludge was generated. The PeCB content of this amount is 1.26 kg/a.

7% of sewage sludge was landfilled, 36% incinerated, 15% applied on land, 19% treated in another way and 23% was stored (BMLFUW 2011).

The following table shows the amounts PeCB in fly ash and filter dust:

Table 51: PeCB-discharge via waste (fly ash and filter dust) for the source category Waste Incineration (BMLFUW 2011, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated waste 2009 [Million t]	PeCB Emissions [kg]
Municipal Solid Waste	1.172	1.94
Hazardous Waste	0.16	0.03
Sewage Sludge	0.09	0.45
Sum		**2.42**

4.2.2 Thermal processes in the metallurgical industry (secondary copper production; sinter plants in the iron steel industry; secondary aluminium production; secondary zinc production)

Compared to incineration and combustion processes, industrial processes, where PeCB can be produced as a by-product are of comparatively low relevance. Nevertheless, it should be mentioned that most industrial processes use incineration or combustion processes, e.g. the industrial production of steel and iron, which according to Eurostat data uses more than 50% of the coal finally consumed within Europe (BIPRO 2011).

In iron and steel mills an amount of 1.69 million t of coal was used in 2009 (STATISTIK AUSTRIA 2010).

Contamination values for fly ashes from coal incineration range from 0.0004 to 7.0 ng/g. The PeCB flow is calculated on the basis of an estimated average of 2.40 ng/g (SCHREINER et al.1986; BIPRO 2011).

The available data and assumptions allow an estimation of PeCB emissions to solid residues (general estimation for ashes: bottom ash, fluidised bed ash, fly ash including FGT residues) resulting from power production from coal. An average of 80 kg ash (no differentiation of ashes) per tonne solid fuel has been taken as the basis for the calculation of the PeCB flow into waste (BIPRO 2011).

Table 52: PeCB discharge to waste of iron and steel mills (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated Coal [Million t]	PeCB Emissions [kg]
Coal	1.69	0.33

4.2.3 Residential combustion sources

For wood, the waste generation factor amounts to 0.017 t ash/t wood and 0.0003 t soot/t wood. A contamination factor of 0.2 ng/g for the resulting ash has been used according to Schreiner et al. (SCHREINER et al. 1986). No information has been available on the PeCB contamination in soot. Since the generation factor of soot for wood is relatively small, it is considered as insignificant (BIPRO 2005).

The available data and assumptions allow an estimation of PeCB discharge to ashes:

Table 53: PeCB discharge to waste (ash) of residential combustion (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011; own calculation).

	Incinerated wood 2009 [Million t]	PeCB Emissions [kg]
Wood	4.6	0.07

4.2.4 Fossil fuel-fired utility and industrial boilers

The available data and assumptions allow an estimation of PeCB concentrations in solid residues (general estimation for ashes: bottom ash, fluidised bed ash, fly ash including FGT residues) resulting from power production from coal.

An average of 80 kg of ash (no differentiation of ashes) per tone of solid fuel has been taken as the basis for the calculation of the PeCB flow into waste (BIPRO 2011).

Contamination values for fly ashes from coal incineration range from 0.0004 to 7.0 ng/g. The PeCB flow is calculated on the basis of an estimated average of 2.40 ng/g (SCHREINER et al.1986; BIPRO 2011).

In 2009 about 1.2 million t were incinerated in coal fired power plants (STATISTIK AUSTRIA 2010).

Table 54: PeCB discharge to waste of power plants, 2009 (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated coal [Million t]	PeCB Emissions [kg]
Coal	1.2	0.23

4.2.5 Firing installations for wood and other biomass fuels

For wood, the waste generation factor amounts to 0.017 t ash/t wood and 0.0003 t soot/t wood. A contamination factor of 0.2 ng/g for the resulting ash has been used according to Schreiner et al. (SCHREINER et al. 1986). No information was available on PeCB contamination of soot.

The available data and assumptions allow an estimation of PeCB discharge to ashes.

Table 55: Emissions to ashes from Incinerated wood, source category firing installations for wood and other biomass fuels, 2009 (STATISTIK AUSTRIA 2010, UMWELTBUNDESAMT 2011, own calculation).

	Incinerated wood 2009 [Million t]	PeCB Emissions [kg]
Wood	1.6	0.03

5 SOURCE INVENTORY OF POPS RELEASES VIA PRODUCTS

Action in relation to POPs in products stems from Annex C Part V A (g) of the Convention ("minimization of these chemicals as contaminants in products"). Some data can be found in the literature relating to concentrations of PCDD/F in the sold products cement and pulp and paper (KARSTENSEN 2006, UNEP 2005, GRUBER 1996). Concerning the other POPs described in this report there are no proven data available.

However, for most source categories there are no relevant releases via the product.

Table 56: PCDD/F-Releases via the products cement and pulp and paper – calculations were based on data from literature (KARSTENSEN 2006, UNEP 2005, GRUBER 1996).

	Release (g I-TEQ/a)
Cement	4.02
Paper	4.98
Pulp exported[1)]	0.123

[1)] *Releases via pulp occur only via export; Releases via pulp which is not exported is included in the figure for paper.*

The PCDD/F-releases via the products cement and pulp and paper in 2009 were the same as in 2004 since there were no significant changes in production.

Concentrations of PCDD/F in cement are considered to be low and can be explained by the fact that filter dust from the clinker process (average PCDD/F concentration: 6.7 ng I-TEQ/kg) is added to the product and that secondary raw materials (e.g. fly ash, gypsum from flue gas desulphurisation) are used. On the other hand the cement clinker itself is contaminated with low concentrations of PCDD/F (average: 0.9 ng I-TEQ/kg clinker) (KARSTENSEN 2006).

Here again, it should be mentioned that the bio-availability of POPs in cement has been greatly reduced.

Austria participates in the revision of the Dioxin Toolkit (UNEP 2005). The current draft states the following: „This section summarizes high-temperature processes in the mineral industry. Raw materials or fuels that contain chlorides may potentially cause the formation of PCDD/PCDF at various steps of the processes, e.g., during the cooling phase of the gases or in the heat zone. Due to the long residence time in kilns and the high temperatures needed for the product, emissions of PCDD/PCDF are generally low in these processes." Cement kilns firing hazardous waste are a source as mentioned in Annex C Part II (b) of the Convention concerning emissions of PCDD/F, HCB, PAH and PeCB. Therefore the quantification of these POPs in the media as well as residues and products is desirable.

In the case of the pulp and paper production PCDD/F are introduced into the products mainly via bleached (Kraft-)pulp and via recycled papers.

In Austria total pulp production (reference year 2009) amounted to 1,514 kt (2004: 1,509 kt) with bleached sulphite pulp (TCF bleaching) having a share of 24%, bleached Kraft-pulp (ECF-bleaching) 26%, unbleached Kraft-pulp for 32% and textile pulp for 18% (AUSTROPAPIER 2009).

Calculation of releases from pulp was based on emission factors of 0.5 µg/t (bleached Kraft-pulp) and 0.1 µg/t (other pulp) (UNEP 2005). Thus total releases via pulp amounted to 0.28 g in the year 2009.

Relevant raw materials for paper production are pulp (both from national production and from imports), wood pulp and recovered paper (either de-inked or not de-inked).

In addition to the pulp produced in Austria (see above) imported pulp has to be taken into account: In 2009 about 690,000 t of bleached (Kraft-)pulp was imported. Part of the imported pulp came from countries where chlorine is still used as a bleaching agent (AUSTROPAPIER 2009). For the calculation of the PCDD/F content it is assumed that 10% of the imported pulp has an emission factor of 0.5 µg/t, whereas the other imported pulp is less contaminated (0.1 µg/t). This leads to a total import of 0.096 g I-TEQ via pulp. In the year 2009 about 0.123 g I-TEQ were exported via pulp.

Input of PCDD/F via wood pulp has been calculated using an emission factor of 0.1 µg/t (UNEP 2005; total input: 0.044 g I-TEQ).

On the other hand PCDD/F is introduced via the recycled paper and more specific via impurities in the used inks. In case de-inking is applied (about 40% of recovered paper is de-inked in Austria) PCDD/F will be reduced by a factor of 3 (GRUBER 1996). Comparable high concentrations (up to 12 ng/kg) were found in packaging papers and paper board in the early nineties. In general a sharp decline in average concentrations could be observed between 1989 and 1994 whereas concentrations have been decreasing slowly since 1994 (GRUBER 1996).

Based on that information and on data given in the Dioxin Toolkit (UNEP 2005) it has been assumed that the PCDD/F concentration in recovered paper is 3 µg/t (without de-inking) and 0.99 µg/t (with de-inking). These assumptions result in an average emission factor of 2.18 µg/t (averaged over paper which undergoes a de-inking step and which does not). Thus the total release via paper amounts to 4.98 g (reference year: 2004).

Publications in scientific literature give some indication, that waste paper could be contaminated by printing inks containing significant residues of PCDD/F, e.g. through pigments. In 2011 the Environment Agency Austria accomplished a survey assessing the PCDD/F contents of cardboard-boxes which are known to be produced from waste paper as the predominant raw material. Comparing the PCDD/F contents of brand-new non printed cardboard-boxes with used cardboard-boxes imprinted to a large extent this limited study did not show any indication of PCDD/F input via printing inks. The cardboard-box samples analysed in this study showed PCDD/F contents in the range of 1.2 to 1.9 ng TEQ/kg (UMWELTBUNDESAMT 2011c).

In 2010 Austropapier, the Association of the Austrian Paper Industry, submitted new data on PCDD/F contents of selected paper products in order to refine the calculations based on the emissions factors taken from the Dioxin Toolkit (UNEP 2005). Emission factors derived from the new data indicate a reduction of the overall PCDD/F release via paper products by a factor of three. Although there

are still certain concerns about the representativeness of the data presented by Austropapier this information will be forwarded to the expert panel of the Dioxin Toolkit to initiate a discussion about a revision of the respective emission factors.

A new calculation was performed in 2011:

Table 57: Releases of PCDD/F via products (calculation on the basis of the output of Austropapier and transmitted results of analysis)

Product	Production (t/a)	Emission factor (µg TEQ/t)	Releases (g PCDD/F TEQ/a)	Percentage (%)
Newspaper printing paper	299,205	0.068	0.02	1.2
Printing and writing paper				
• deinked	902,421	0.068	0.06	3.7
• from pulp	1,346,070	0.050	0.07	4.0
Folding box cardboard	487,214	0.723	0.35	21.1
Packaging paper	676,177	1.141	0.77	46.2
Kraft paper				0.0
• with recovered paper	374,855	0.858	0.32	19.3
• only from pulp	250,743	0.050	0.01	0.8
Thin- and special papers				0.0
Sanitary paper	128,660	0.068	0.01	0.5
Others	126,896	0.050	0.01	0.4
Packing and spezial board	13,299	0.858	0.01	0.7
Market pulp exported	95,471	0.070	0.01	0.4
Market pulp (ECF)	313,818	0.090	0.03	1.7
Total	**5,014,829**		**1.67**	**100.0**

6 POLICIES (PROVISIONS) AND MEASURES

This chapter gives an overview of the relevant international, European and national legislation applicable to unintentionally produced POPs. It should be noted that chapter 6 of the National Action Plan 2008 (UMWELTBUNDESAMT 2008b) already contained comprehensive information on policies and measures. Therefore, this review of the National Action Plan only focuses on new developments or amendments of the relevant policies. For more general information please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

6.1 New developments in International and European Legislation since 2008

6.1.1 Stockholm Convention

The Stockholm Convention on POPs was formally adopted on 22–23 May 2001 and entered into force 17 May 2004.

This international regime promotes global action on a cluster of 21 POP substances:

- *Pesticides:* aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene; chlordecone, alpha hexachlorocyclohexane (HCH), beta hexachlorocyclohexane, lindane, pentachlorobenzene;
- *Industrial chemicals:* hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), hexabromobiphenyl (HBB), tetra-, penta-, hexa-, and heptabromodiphenyl ether (PBDEs), pentachlorobenzene(PeCB), perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride;
- *By-products:* HCB; PCDD/PCDF, PCBs, alpha- and beta-HCH and PeCB.

Releases of unintentionally produced by-products listed in Annex C (dioxins, furans, PCBs, HCB and PeCB) are subject to continuous reduction with the objective to achieve ultimate elimination where feasible. The main tool for this is the National Action Plan which should cover the source inventories and release estimates as well as plans for release reductions.

Under the Stockholm Convention on Persistent Organic Pollutants, Parties shall promote in some cases and prescribe in others the use of best available techniques, and promote the application of best environmental practices. In short, each Party shall:

- Develop, within two years of the date of entry into force of the Convention, an action plan (national or regional) where releases of chemicals listed in Annex C of the Convention are identified, characterized and addressed; the plan shall include source inventories and take into consideration the source categories listed in Parts II and II of Annex C (subparagraph (a) of Article 5);
- For new sources:
  - Promote and, in accordance with the schedule in its action plan, prescribe the use of best available techniques within the source categories identified as warranting such action, with particular initial focus on sources categories identified in Part II of Annex C; the requirement to use best available tech-

niques for Part II source categories shall be phased in a soon as practicable, but no later than four years after entry into force of the Convention for the Party (subparagraph (d) of Article 5);

- Promote, for those categories identified above, the use of best environmental practices (subparagraph (d) of Article 5);
- Promote in accordance with the action plan, best available techniques and best environmental practices within source categories such as those listed in Part III of Annex C which a Party has not addressed above (subparagraph (d) (ii) of Article 5);

- For existing sources:
  - Promote, in accordance with the action plan the use of best available techniques and best environmental practices for source categories listed in Part II of Annex C and such sources as those in Part III of the Annex (subparagraph (d) (i) of Article 5).

Table 58: Source Categories according to Annex C of the Stockholm Convention on POPs.

Part II: Source categories	**Part III: Source categories**
Waste incinerators, including co-incinerators of municipal, hazardous or medical waste or of sewage sludge	Open burning of waste, including burning of landfill sites
Cement kilns firing hazardous waste	Thermal processes in the metallurgical industry not mentioned in Part II
Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching	Residential combustion sources
The following thermal processes in the metallurgical industry: (i) Secondary copper production; (ii) Sinter plants in the iron and steel industry; (iii) Secondary aluminium production; (iv) Secondary zinc production	Fossil fuel-fired utility and industrial boilers
	Firing installations for wood and other biomass fuels
	Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil
	Crematoria
	Motor vehicles, particularly those burning leaded gasoline
	Destruction of animal carcasses
	Textile and leather dyeing (with chloranil) and finishing (with alkaline extraction)
	Shredder plants for the treatment of end of life vehicles
	Smouldering of coppper cables
	Waste Oil Refineries

When applying best available techniques and best environmental practices for the activities listed above, Parties should take into consideration the general guidance on prevention and release reduction measures in Annex C and guidelines on best available techniques and best environmental practices. These Guidelines were finalised by an international Expert Group in November 2006 and were adopted by the Conference of the Parties (May 2007).

6.1.1.1 EU POP-Regulation

The main legal instrument for implementing the Stockholm Convention and the UNECE Protocol in the EU is the **Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants and the amending Directives 79/117/EEC**[12]**, 757/2010/EEC and 756/2010/EEC**[13].

The Regulation obliges Member States to draw up and maintain comprehensive release inventories for dioxins, furans, PCBs and polyaromatic hydrocarbons (PAH) and to communicate their national action plans on measures to identify, characterise and minimise total releases of these substances to the Commission and to the other Member States. The action plan shall include an evaluation of the efficacy of the laws and policies related to the management of the releases.

The action plan shall also include measures to promote the development of substitute or modified materials, products and processes to prevent the formation and releases of POPs. Producers and holders of waste are obliged to undertake measures to avoid contamination of waste with POP substances. The control measures on waste follow closely those of the Stockholm Convention and provide more details in some aspects.

For detailed information on the POP Regulation please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

Amendment of the POP Regulation

On 26 August 2010, a number of amendments of the EU POP Regulation entered into force.These amendments implement the international agreement reached at the 4th Conference of the Parties (COP) to the Stockholm Convention in 2009, which also entered into force on the same date. The dangerous chemicals newly added to the EU Regulation on POPs have already been subject to prohibition or severe restrictions in the EU. With the new amendments certain restrictions go further than previously in order to comply with the new international commitments.

The new chemicals listed are: 4 types of polybromodiphenyl ether (PBDEs), alpha hexachlorocyclohexane, beta hexachlorocyclohexane, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride and pentachlorobenzene. The original POPs are mainly pesticides but some of the new substances have been widely used in consumer products, such as perfluorooctane sulfonic acid (PFOS) which is used for example in metal plating and fire fighting foams but also in stain repellents.[14]

New legislation:

Commission Regulation (EU) No 757/2010 of 24 August 2010 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes I and III

[12] OJ L 229, 29.6.2004, p. 5.

[13] **http://ec.europa.eu/environment/pops/index_en.htm**

[14] **http://ec.europa.eu/environment/pops/index_en.htm**

Commission Regulation (EU) No 756/2010 of 24 August 2010 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes IV and V

6.1.2 UNECEConvention on Long-range Transboundary Air Pollution (LRTAP)

Since 1979 the Convention on Long-range Transboundary Air Pollution (LRTAP)[15] has addressed some of the major environmental problems of the UNECE region through scientific collaboration and policy negotiation. The Convention has been extended by eight protocols that identify specific measures to be taken by Parties to cut their emissions of air pollutants.

The aim of the Convention is that Parties shall endeavour to limit and, as far as possible, gradually reduce and prevent air pollution including long-range transboundary air pollution. Parties develop policies and strategies to combat the discharge of air pollutants through exchange of information, consultation, research and monitoring.

The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs)

The Executive Body to the UNECE (United Nations Economic Commission for Europe) Convention on Long-Range Transboundary Air Pollution (LRTAP) adopted the Protocol on POPs[16] on 24 June 1998 inAarhus, Denmark. The Protocol entered into force on 23 October 2003. By January 2011, 30 Parties, including the European Community, 22 Member States and two Acceding Countries had ratified the Protocol.

The Protocol comprises currently a list of 16 substances including eleven pesticides, two industrial chemicals and three unintentional by-products. The ultimate objective is to eliminate any discharges, emissions and losses of these POP substances.

For detailed information on the POP Protocol please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

On 18 December 2009, Parties to the Protocol on POPs adopted decisions 2009/1, 2009/2 and 2009/3 to amend the Protocol to include seven new substances: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, pentabromodiphenyl ether, perfluorooctane sulfonates, polychlorinated naphthalenes and short-chain chlorinated paraffins. Furthermore, the Parties revised obligations for DDT, heptachlor, hexachlorobenzene and PCBs as well as emission limit values (ELVs) from waste incineration. Parallel to this, with a view to facilitating the Protocol's ratification by countries with economies in transition, the Parties introduced a certain amount of flexibility for these countries regarding the time frames for the application of ELVs and best available technologies (BAT). Finally, the Parties adopted Decision 2009/4 to update guidance on BAT

[15] http://www.unece.org/env/lrtap/welcome.html

[16] http://www.unece.org/env/lrtap/pops_h1.htm

for controlling emissions of POPs in Annex V and turned parts of it into a guidance document (ECE/EB.AIR/2009/14). These amendments have not yet entered into force in the countries that adopted them[17].

6.1.3 IPPC-Directive (2008/1/EC) and Directive on Industrial Emissions (2010/75/EU)

The Directive on Integrated Pollution Prevention and Control (IPPC Directive; 96/61/EC codified 2008/1/EC) aims at preventing or at least reducing pollution based on the best available technologies in order to achieve a high level of protection for the environment as a whole.

The IPPC Directive has been under revision since 2007. The new Directive on Industrial Emissions 2010/75/EU (IED) was adopted on 24 November 2010 and published in the Official Journal on 17 December 2010. It entered into force on 6 January 2011 and has to be transposed into national legislation by Member States by 7 January 2013.

Seven Directives have been integrated in the Industrial Emissions Directive (IPPC-Directive, Waste Incineration Directive, Large Combustion Plants Directive, VOC-Directive, three TiO_2-Directives). The IPPC-Directive (2008/1/EC) will be repealed with effect from 7 January 2014.

For detailed information on the IPPC Directive and the original Directives on Waste Incineration and Large Combustion Plants please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

The Directive on Industrial Emissions is like the IPPC Directive based on several principles, namely an integrated approach, best available techniques, flexibility and public participation.

The **integrated approach** means that the permits must take into account the whole environmental performance of the plant, covering e.g. emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure. The purpose of the Directive is to ensure a high level of protection of the environment taken as a whole.

The permit conditions of a permit have to include emission limit values (ELVs) for those substances which are likely to be emitted in significant quantities. They must be based on ***Best Available Techniques*** (***BAT***), as defined in the IED. To assist the licensing authorities and companies to determine BAT, the Commission organises an exchange of information between experts from the EU Member States, industry and environmental organisations. This work is coordinated by the **European IPPC Bureau** of the Institute for Prospective Technology Studies at the EU Joint Research Centre in Seville (Spain). This results in the adoption and publication by the Commission of the **BAT Reference Documents** (the so-called BREFs).

It must be noted that the types of installations listed in Annex I of the IPPC-Directive do not directly correspond to the source categories of Annex C of the Stockholm Convention. Annex I of the IPPC-Directive gives a list of major indus-

[17] **http://www.unece.org/env/popsxg/welcome.html**

trial activities which may give cause to general environmental impacts, whereas Annex C of the Stockholm Convention lists source categories which have the potential to release POPs. Therefore the Stockholm Convention is more specific with regard to pollutants, covering also small scale sources (e.g. residential combustion plants, crematoria, open burning).

The BAT Reference Documents (BREFs) give a detailed overview of what represents Best Available Techniques for the sectors in question together with emission and consumption levels.

Table 59: Type of installations listed in Annex I of the IPPC-Directive.

Name of European BREF	Corresponding Source category of Stockholm Convention (annex C)	BAT associated emission level for PCDD/F	BAT associated emission level for PAH
Waste incineration	II a (Waste incinerators, …) II b (Cement kilns …)	air: 0.01–0.1 ng TEQ/Nm^3 (split view 0.01–0.05) water: 0.01–0.1 ng TEQ/l (split view <0.01)	
Non-Ferrous Metals	II d i (Sec. copper prod.) II d iii (Sec. aluminium prod.) II d iv (Sec. zinc prod.) III b (Thermal processes in metallurgy …)	air: < 0.1–0.5 ng TEQ/Nm^3 **)	air: <200 µgC/Nm^3)*
Iron and Steel	II d ii (Sinter Plants) III b (Thermal processes …)	air: <0.05 – 0.2 ng I-TEQ/Nm^3 (bag-filter); <0.2 – 0.4 ng-ITEQ/Nm^3 (advanced electrostatic precipitator***) EAF: <0.1 ng I-TEQ/Nm^3	
Large Combustion Plants	III e (biomass fuels)	air: < 0.1 ng/Nm^3 **)	
Wastewater and Waste Gas	III f (Specific chemical prod. ...)	air: 0.1 ng TEQ/Nm^3 (combustion exhaust gas treatment)	

** for the 11 compounds (phenanthrene, anthracene, fluoranthene, benzo(a)pyrene, dibenzo(a,h)anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3,-cd)pyrene, benzo(ghi)perylene*

*** BREF is under review, values will change/might be changed*

**** where bag filters are not applicable*

No specific BREF is available for the source categories III a (Open burning of waste, including burning of landfill sites), III c (Residential combustion sources), III g (Crematoria), III h (Motor vehicles, particularly those burning leaded gasoline), III i (Destruction of animal carcasses), III k (Shredder plants for the treatment of end of life vehicles) and III l (Smouldering of copper cables). For Shredder plants a BREF will have to be written according to Annex I of the new Industrial Emission Directive (2010/75/EU).

On the other hand the relevant BREFs for the source categories II b (Cement kilns firing hazardous waste; BREF "Cement and Lime"), II c (Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching; BREF "Pulp and Paper"), III d (Fossil fuel-fired utility and industrial boilers; BREF LCP), III j (Textile and leather dyeing (with chloranil) and finishing (with

alkaline extraction); BREF “Textile Manufacturing”) and III m (Waste oil refineries; BREF “Waste Treatment”) do not define BAT associated emission levels for PCDD/F or PAH.

Large Combustion Plants

The Large Combustion Plants Directive (LCPD, 2001/80/EC) has been integrated in the Industrial Emissions Directive (2010/75/EC). It does not cover POP emission directly. However, it has some effect on emissions of POPs as it sets definition of emission limit values for dust. Some of these values have been made stricter in the IED.

Waste Incineration Plants

The WID has been integrated in the Industrial Emissions Directive (2010/75/EU).**Annex VI of the IED** lists special provisions for cement kilns, combustion plants and for industrial sectors co-incinerating waste. In comparison to the Waste Incineration Directive 2000/76/EC some of the POP relevant air emission limit values for dust have been made stricter. The emission limit values for dioxins and furans have remained the same (0.1 ng/Nm^3) as well as the emission limit values for discharges of waste water from the cleaning of exhaust gases.

6.1.4 Water Framework Directive 2000/60/EC

The Water Framework Directive has three major goals:

- prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of **hazardous substances**;
- protect, enhance and restore all bodies of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between abstraction and recharge of groundwater;
- preserve protected areas.

The Commission submitted a **list of priority substances** selected amongst those which present a significant risk to or via the aquatic environment (2455/2001 EC). This list forms Annex X to the present Directive. For these priority substances environmental quality standards have been established by Directive 2008/105/EC) and measures to control such substances have to be proposed. The aim of such measures is to reduce, stop or eliminate discharges, emissions and losses of priority substances.

In the list of priority hazardous substances the following POPs are listed as “priority substance” (PS) and some are even identified as “priority hazardous substances” (PHS):

- hexachlorobenzene (PHS)
- polyaromatic hydrocarbons (all PHS) (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene)
- pentachlorobenzene (PHS)

The environmental quality standards for these pollutants as defined in Annex I of Directive 2008/105/EC are summarised below.

Table 60: Environmental quality standards (EQS) as defined in Annex I of directive 2008/105/EC.

Pollutant	AA-EQS* Inland surface waters	AA-EQS* Other surface waters	MAC-EQS** Inland surface waters	MAC-EQS** Other surface waters
Hexachlorobenzene	0.01 µg/l	0.01 µg/l	0.05 µg/l	0.05 µg/l
Pentachlorobenzene	0.007 µg/l	0.007 µg/l	Not applicable	Not applicable
Polyaromatic hydrocarbons (PAH)				
Benzo(a)pyrene	0.05 µg/l	0.05 µg/l	0.1 µg/l	0.1 µg/l
Benzo(b)fluoranthene Benzo(k)fluoranthene	Σ=0.03 µg/l	Σ=0.03 µg/l	Not applicable	Not applicable
Benzo(g,h,i)perylene Indeno(1,2,3-cd)-pyrene	Σ=0.002 µg/l	Σ=0.002 µg/l	Not applicable	Not applicable

** AA-EQS … Annual average value for the EQS*

*** MAC-EQS … maximum allowable concentration*

In 2006 the Directive of the European Parliament and of the Council on the Protection of Groundwater against Pollution and Deterioration (2006/118/EC) was adopted. Article 6 describes the measures which shall be established by the Member States in order to achieve the objective of preventing or limiting inputs of pollutants into groundwater.

6.1.5 Air Quality Directive 2008/50/EC (CAFE)

The **Clean Air For Europe (CAFE) Directive** (2008/50/EC) was published in May 2008. It has now entered into force and replaces the Framework Directive and the first, second and third Daughter Directives. The fourth Daughter Directive (2004/107EC) will be included in the CAFE legislation at a later stage.

This new Directive includes the following key elements:

- the merging of most of the existing legislation into a single directive (except for the fourth daughter directive) with no change to existing air quality objectives
- new air quality objectives for PM2.5 (fine particles) including the limit value and exposure related objectives – exposure concentration obligation and exposure reduction target
- the possibility to discount natural sources of pollution when assessing compliance against limit values
- the possibility for time extensions of three years (PM10) or up to five years (NO_2, benzene) for complying with limit values, based on conditions and an assessment by the European Commission

Also the new Air Quality Directive does not address POPs directly but might be of relevance as it covers pollutants associated with combustion processes.

The **4th Daughter Directive 2004/107/EC** deals with arsenic, nickel, cadmium, mercury and PAHs[18].

The fourth Daughter Directive specifies limit or target values together with deadlines for meeting these values. In addition obligations are laid down for monitoring these pollutants in ambient air.

POPs are not addressed directly with the exception of PAH. However, as unintentionally produced POPs are mostly formed during combustion processes and emitted into air either in gaseous form or bound to particles, every measure aiming at the reduction of emissions of particulate matter, metals and CO has the co-benefit of reducing POPs emissions. For benzo(a)pyrene a target value of 1 ng/m³ has been laid down in the 4th Daughter Directive. From 2013 onwards this target value shall not be exceeded. Member States shall take all necessary measures not entailing disproportionate costs to ensure this.

6.1.6 Pollutant Release and Transfer Register (PRTR)

Regulation No. 166/2006(EC) of the European Parliament and of the Council of 18 January 2006 provided for the setting up of a Pollutant Release and Transfer Register (PRTR) at European Union (EU) level in the form of a publicly accessible electronic database. This database meets the requirements of the UNECE Protocol on Pollutant Release and Transfer Registers, signed by the Community in May 2003.

The public is able to access this register free of charge on the internet and is able to find information using various search criteria (type of pollutant, geographical location, affected environment, source facility, etc.).

The register contains information on releases of pollutants to air, water and land, as well as transfers of waste and pollutants, where emissions exceed certain threshold values and result from specific activities. The register also covers releases of pollutants from diffuse sources (such as transport). The UN-ECE Protocol and the European PRTR have the same structure as the former EPER (European Pollutant Emission Register) but are more comprehensive as they cover a greater number of pollutants and activities as well as releases to land, releases from diffuse sources and off-site transfers.

Apart from their releases of pollutants to air, water, land and wastewater destined for treatment in external wastewater treatment plants, industrial facilities subject to the IDE regime have to report their transfers of waste if they exceed annual threshold levels as laid down in the Regulation. Reporting obligations include also PeCB (BIPRO 2011).

6.1.7 European Regulations aiming at increased Energy Efficiency

Reduction of energy demand and increase of energy efficiency are indirect but very effective tools to minimise fuel consumption and emissions. On an European level the **Action Plan for Energy Efficiency** (SEC(2006) 1173, 1174,

[18] Environmental targets were defined for Ni, As, Cd and benzo(a)pyrene.

1175) has been published, which outlines a framework of policies and measures with a view to intensify the process of realising the over 20% estimated savings potential in EU annual primary energy consumption by 2020.

The purpose of the **Directive on Energy end-use efficiency and energy services (2006/32/EC)** is to make the end use of energy more economic and efficient. Indicative targets for the increase of the energy efficiency (9% within nine years; from 2008–2017) are given and Member States are obliged to develop national Energy Action Plans.

Directive **2002/91/EC** on the energy performance of buildings requires Member States to apply minimum requirements as regards the energy performance of new and existing buildings, ensure the certification of their energy performance. It requires the regular inspection of boilers and air conditioning systems in buildings. The four key points of the Directive are:

- a common methodology for calculating the integrated energy performance of buildings;
- minimum standards on the energy performance of new buildings and existing buildings that are subject to major renovation;
- systems for the energy certification of new and existing buildings and, for public buildings, prominent display of this certification and other relevant information. Certificates must be less than five years old;
- regular inspection of boilers and central air-conditioning systems in buildings and in addition an assessment of heating installations in which the boilers are more than 15 years old.

6.1.8 Waste Framework Directive2008/98/EC/EWC

At EU level, the basic legislation with respect to waste management is the Waste Framework Directive 2008/98/EC (replacing and repealing the former Waste Framework Directive 2006/12/EC with effect of 12 December 2010).

The Directive contains definitions for waste as well as waste categories and disposal and recovery operations; inter alia it sets for the first time criteria for end-of-waste-status of items and introduces “reuse” as favorable option within the waste hierarchy.

Furthermore properties and characteristics rendering waste hazardous as well as specific obligations for hazardous wastes are introduced in the new Waste Framework Directive.

PeCBs are addressed in this directive.

6.1.9 Other relevant EU legislation

The following EU Directives or Regulations are potentially relevant for the control of POPs releases:

- Directive of the European Parliament and of the Council on the Protection of Groundwater against Pollution and Deterioration (2006/118/EG)
- Sewage sludge Directive (86/278/EEC)
- Directives concerning Motor Vehicles

- Directive on Waste Electrical and Electronic Equipment (WEEE) 2002/95/EC
- Directive on the landfill of waste (1999/31/EG)
- Council Regulation (EC) No 1013/2006 on the supervision and control of shipments of waste within, into and out of the Community

For detailed information please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

6.2 Developments in National Legislation since 2008

The following legislation has not undergone any changes. Therefore, for detailed information refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

- Emission Protection Act (BGBl. I No. 2004/150 as amended by BGBl. I No. 85/2005, I No. 84/2006, I No. 65/2010 and II No. 153/2011) as well as the Clean Air Ordinance for Steam Boilers (BGBl. No. 1989/19 as amended by BGBl. II 2005/55, II No. 292/2007, II No. 153/2011)
- Industrial Code 1994 (GewO 1994), BGBl. No. 1994/194
- Ordinance on Iron and Steel Production (BGBl. II No. 160/1997 as amended by BGBl. II No. 2007/290)
- Ordinance on Non Ferrous and Refractory Metals Production (BGBl. II No. 2008/39)

6.2.1 Specific Ordinances

6.2.1.1 Ordinance on Combustion Plants (BGBl. No. II 1997/331 as amended by BGBl. No. II 2011/312)

The Ordinance applies to combustion installations >50 kW in the trade and industrial sector that are not connected to a steam boiler. It describes requirements concerning the monitoring of emissions, operating conditions, inspections of installations and emission limit values for certain pollutants depending on the fuels (such as coal, biomass, oil, and gas) used. Emissions of PCDD/F are not regulated directly. However, the ordinance has some effect on emissions of POPs due to the determinationof emission limit values for dust and CO regarding the combustion of gas, oil and coal. In addition to the mentioned pollutants, there is a limit value for organic carbon which applies to the combustion of biomass.

The amendment in 2011 led to some modifications: The emission limit values for dust became more stringent and the ordinance provides for the first time emission limit values for dust, CO, HC, and NO_x for the combustion of biomass other than wood (such as straw or miscanthus).

6.2.1.2 Ordinance on Sinter Plants (BGBl. II No. 1997/163)

The ordinance covers air emissions from sinter plants. For PCDD/F a limit value (0.4 ng/Nm^3) is set (referred to measured oxygen content), however this limit value is not applicable for installations, which are permitted before 01/2004. A revision of this Ordinance started in 2010.

6.2.1.3 Ordinance on Foundries (BGBl. No. 1994/447)

The Ordinance gives limit values (mass flow and/ or concentration) for dust and organic substances for different furnace types (steel and cast iron, aluminium, lead, other metals, heat treatment). Limit values are also given for these pollutants for activities such as sand regeneration, mould production, cleaning and fettling and core production. Some general limit values are given for special organic substances and heavy metals.There is no general reference oxygen content, in most cases the oxygen content of the exhaust gas is chosen as reference value. A revision of the Ordinance started in spring 2011.

6.2.1.4 Waste Incineration Ordinance (BGBl. II No. 2002/389)

The Waste Incineration Ordinance requires waste incineration and co-incineration plants (such as large combustion plants, cement kilns and industrial boilers) to be built and operated according to Best Available Techniques (= State of the Art). It defines among others operational requirements (such as the minimum temperature for combustion and the residence time of flue gas within a given temperature level), requirements for input control of waste, monitoring and reporting obligations and prescribes emission limit values for a variety of pollutants including PCDD/F. In general the ELV for PCDD/F for incineration and co-incineration plants is 0.1 ng/nm^3 (11% oxygen).

Due to the limitation of emissions of dust, CO and C_{org} (and to a certain extent of NO_x) the Waste Incineration Ordinance also has an indirect influence on the reduction of POP emissions.

Concerning PCDD/F concentrations in wastes from waste incineration or co-incineration plants the Ordinance provides for the environmentally sound disposal where the total content exceeds a limit value of 100 ng/kg PCDD (I-TEQ).

The Ordinance has been amended by BGBl. II No. 475/2010.

Wastes which are incinerated in co-incineration plants have to reach the limit values specified in Annex 8, for waste oils and solvents the limit value for PCB is 10 mg/kg.

6.2.2 Austrian Water Act and Specific Ordinances

The basic document for water-related legislation is the Water Act 1959 (BGBl. No. 215/1959).

For an overviewof the Austrian Water Act and its relevant ordinances please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

New developments:

Based on the requirement to define environmental quality standards (EQS) codified in §30(a) of the Austrian Water Act the Ordinance on the determination of the target state for surface waters (BGBl. No. 96/2006) prescribes environmental quality standards for 72 substances and groups of substances. These EQS determine the criteria for the good chemical status of surface waters and the chemical parameters for the good biological status. Also POPs and POP like substances are included, e.g. hexachlorobenzene, DDT, aldrin, dieldrin, endrin,

heptachlor, etc. In 2010 the Ordinance was amended and the environmental quality standards according to Directive 2008/105/EC were adopted (BGBl. II No. 461/2010).

In order to continuously assess, to monitor and to adapt monitoring programmes to actual necessities the Ordinance on the monitoring of the status of water bodies (BGBl. II No. 479/2006, amended 2010 by BGBl. II No. 465/2010) (originally issued in 1991) was amended in 2006 and 2010. The aim of the monitoring programme is to assess the status of water bodies. The parameters to be considered by the monitoring programme include all pollutants for which EQS have been defined (e.g. POPs and POP like substances such as HCB, PAH, etc.). Beside surface waters, these pollutants also have to be analysed in lake samples and groundwater samples.

In 2010, the Ordinance on Chemical Quality Targets for Groundwater ("Qualitätszielverordnung Chemie Grundwasser" – Austrian Federal Law Gazette II No 98/2010) replaced the former Ordinance on groundwater threshold values ("Grundwasserschwellenwertverordnung" – Austrian Federal Law Gazette No 502/1991). The new Ordinance now fully implements the legal requirements of the new EU Groundwater Daughter Directive (2006/118/EC).

Among other things, the new Ordinance lays down the criteria (groundwater threshold values) and the methodology (compliance regime) for assessing the chemical status of groundwater bodies thus providing a basis for establishing necessary measures.

The new Ordinance gives individual threshold values for a limited number of POPs only (e.g. sum of PAHs, sum of TRI and PER, Aldrin, Dieldrin etc.) and a general groundwater threshold value for pesticides (0.1 µg/l) and the sum of pesticides (0.5 µg/l).

Furthermore, POPs are also mentioned in Annex 2 which lists those substances where direct input into groundwater has to be prevented according to Article 6.

The Ordinance on the establishment of an electronic register for the collection of relevant discharges from point sources into surface water (BGBl. II Nr. 29/2009) entered into force in 2009. The Ordinance requires industrial dischargers as well as municipal wastewater treatment plants with a capacity of more than 10,000 population equivalents to report emissions of relevant pollutants into register. For example, discharges of Pentachlorobenzene have to be measured and reported. Such discharges are attributed to the following industrial activities (classification according to E-PRTR Regulation Annex I):

- 4d, Chemical installations for the production on an industrial scale of basic plant health products and biocides
- 5a, Installations for the recovery or disposal of hazardous waste
- 5c, Installations for the disposal of non-hazardous waste
- 5d, Landfills
- 5g, independently operated industrial waste-water treatment plants
- 6b, Industrial plants for the production of paper and board and other primary wood products (such as chipboard, fibreboard and plywood)

A first evaluation of data in 2011 showed, that concentrations in industrial effluent discharges aldrin, benzo(a)pyren, polybrominated diphenylether, chlordan, chlordecon, dieldrin, endrine heptachlor and mirex are below the respective limit

of detection. For benzo(g,h,i)perylen, dioxine, fluoranthen, hexachlorcyclohexane including lindane, PCB, pentachlorbenzene and toxaphen quantifiable concentrations were found in a number of waste water discharges. A more detailed analysis of these results is not possible for the time being as tools for data retrieval and assessment are still being developed.

For more information on the General Ordinance on Waste Water Emissions (BGBl. No. 186/1996) and on relevant sector specific waste water emission ordinances (e.g. ordinance on waste water emissions from flue gas treatment (BGBl. II No. 271/2003) please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

6.2.3 Ordinance on Landfills (BGBl. II No. 39/2008)

(Amended by BGBl. II No. 185/2009 and 178/2010)

According to the Ordinance on landfills only the disposal of waste with the lowest possible reactivity has been permitted since 2004 (or, in exceptional cases, since 1 January 2009). A large part of waste materials, among them municipal solid waste, must therefore undergo thermal and mechanical-biological pretreatment before being landfilled.

The Landfill Ordinance 2008 implements the EU Directive 1999/31/EG and Council Decision 2003/33/EG.

It determines the following classes of landfills:

1. Landfill for excavated soils
2. Landfill for inert waste
3. Landfill for non hazardous waste
   a) Landfill for demolition waste
   b) Landfill for residual materials
   c) Mass waste landfill
4. Landfill for hazardous waste (exclusively underground waste storage)

Annex 1 of the Landfill Ordinance 2008 gives limit values for the acceptance of different waste streams of landfills.The POP relevant limit valuesforthe landfill classes are listed below. PAHs are defined as the sum of 16 substances according to EPA (naphthalene; acenaphthylene; acenaphthene; fluorene; phenanthrene; anthracene; fluoranthene; pyrene; benzo(a)anthracene; chrysene; benzo-(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; dibenzo(a,h)anthraxcene; indeno(1,2,3-c,d)pyrene; benzo(g,h,i)perylene).

Landfill class	Pollutants, POP relevant	Limit value [mg/kg dry matter]
Landfill for excavated soils	PAH	4
	thereof benzo(a)pyrene	0,4
Landfill for inert waste	PAH	20
	thereof benzo(a)pyrene	2
Landfill for demolition waste	PAH	30
Landfill for residual materials	PAH	300
Landfill for mass waste	PAH	300

Table 61: Landfill classes and limit values according to Annex 1 of the Landfill Ordinance 2008

For detailed information on the Compost Ordinance (BGBl. II No. 2001/292), on Ordinances on Sewage Sludge and Compost and on the protection of soil of the Federal Provinces please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

6.2.4 Ambient Air Quality Act (Immissionschutzgesetz – Luft, IG-L)

The legal regulations for air quality assessment and management in Austria are stipulated in Ambient Air Quality Act (IG-L; BGBl. I No. 115/1997, as amended, implementing Directive 2008/50/EC on ambient air quality and cleaner air for Europe and Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air) and its ordinances. In the case of exceedances of air quality limit values abatement measures have to be applied. Like the Air Quality Directive and the 4th Daughter Directive, the Ambient Air Quality Act does not cover POPs directly, with the exception of benzo(a)pyrene for which a target value (1 ng/m^3) is given (this target value will be a limit value from 31.12.2012 on). However, as unintentionally produced POPs are mostly due to combustion processes, this type of POPs is strongly related to gaseous and particle pollutants for which abatement measures have to be applied in case of exceedances. For benzo(a)pyrene obligations for monitoring are laid down in an ordinance related to the IG-L. Since 2007 monitoring has been conducted at 15 sites across Austria; in 2009 20 sites were operated.

6.2.5 Plans and programmes under Air Quality Framework Directive

In case of an exceedance of the air quality limit value plus margin of tolerance for one or more pollutants, Member States shall take measures to ensure that a plan or programme is prepared or implemented for attaining the limit value within the specific time limit (Air Quality Framework Directive, Article 8 (3)). Plans or programmes have to be sent to the European Commission no later than two years following the year the exceedance has been observed.

Most plans and programmes reported so far to the Commission deal with PM10 and NO_2, some also with SO_2. In most cases, traffic was identified as the main source for PM10 and NO_2 exceedances, followed by industry, commercial and residential sources. The abatement measures foreseen in the plans and programmes therefore also deal with these polluters.

6.2.6 Residential Combustion Sources

The responsibility for regulating the operation of residential combustion sources lies with the federal provinces. As a consequence requirements concerning product certificates, emission limit values, monitoring of emissions and inspections vary.

An agreement pursuant to Article 15a of the Federal Constitution Act concerning the placing on the market and the inspection of combustion plants/firing installations was concluded in January 2011.

It establishes uniform requirements for the operation of these types of installations in all provinces and will help to reduce environmental impacts from these sources. The agreement includes requirements concerning

- placing on the market
- type tests, conformity tests and labelling
- emission limit values for dust, NO_x, CO and TOC
- inspection of combustion installations
- efficiency requirements
- requirements on permitted fuels
- refurbishment
- advisory service

Another relevant agreement (agreement pursuant to Article 15a of the Federal Constitution concerning the setting of consolidated quality standards to support the establishment and refurbishment of residential buildings for the purpose of the reduction of greenhouse gases) aims to reduce energy consumption in residential buildings. It is thus intended to reduce fuel consumption and emissions from combustion installations in this source category.

6.2.7 Open burning of biogenic materials

The Federal Act on Air Pollution Prevention (BGBl. I No. 137/2002, as amended BGBl. I No. 50/2012) imposes a ban on open burning of biomass and other materials. The provincial governor may grant exemptions from this ban in specific cases.

6.3 Other measures

6.3.1 Voluntary Self-Commitment of the Cement Industry ('Positive List')

The voluntary self-commitment is now partly integrated in the revised Waste Incineration Ordinance (BGBl. II No. 475/2010), (see chapter 6.2.1.4).

6.3.2 Paper, paper board and packaging paper

The German Federal Institute for Risk Assessment has published recommendations concerning input, used auxiliary materials, filling agents and additives for paper, paper boards and packaging papers which get in contact with food (BfR-Recommendation No. XXXVI, No. XXXVI/1 and No. XXXVI/2). These recommendations comprise a list of materials which can be used for the described purposes, in line with upper concentration limits for a wide range of chemicals. However, Annex C POPs are not regulated here.

6.3.3 Biomass plants serving the purpose of centralised district heating

Biomass plants serving the purpose of centralised district heating are funded by environmental support schemes when certain requirements with regard to energy efficiency, operating conditions, emissions and reporting of emissions are fulfilled. Plants subject to this funding scheme have to meet ELVs for dust, NO_x, CO and C_{org} depending on their size. However, since most ELVs are the same as prescribed in e.g. the Ordinance on combustion installations (see 6.2.1.1) any additional effect on reduction of POPs emissions is caused by requirements concerning energy efficiency.

6.4 Overview on Monitoring activities and Surveys on federal level since 2008

6.4.1 Ambient Air Monitoring

As described in chapter 6.2.4 benzo(a)pyrene in PM10 is required at 15 monitoring sites at least. At the rural background site Illmitz in addition to benzo(a)-pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene and dibenz(a,h)anthracene as well as the deposition of benzo(a)pyrene are monitored. Results of all monitoring activities are published in an annual air quality report (see e.g. UMWELTBUNDESAMT 2010c, d). The target value of the 4th Daughter Directive of 1 ng/m³ for benzo(a)-pyrene was exceeded in the year 2009 mostly in alpine valleys and basins. The reasons for these exceedances are high emissions due to wood burning and adverse dispersion conditions in winter.

In 1997 a monitoring programme started with the objective to observe long term trends ofPCDD/F and additionally PCB in the air. The monitoring programme comprised eight sampling sites representing urban, rural, industrial and remote locations. (MOCHE & THANNER 2002).

Datasets of 1992/93 compared with those of the monitoring programme showed a slight decrease of PCDD/F in the air during winter, whereas the summer levels are almost equal. The monitoring programme shows that there is still a clear seasonal trend for ambient air concentrations of PCDD/F with a maximum during the winter season. PCDD/F-data compared with ambient temperatures clearly indicates that domestic heating is the major source for increasing dioxin levels in ambient air during winter. Also PCBs show a seasonal trend, but contrary to PCDD/F the PCBs show highest concentrations during the summer season. This observation indicates different sources for PCB in ambient air than for PCDD/F. Since the start of the monitoring programme no significant change, neither increase nor decline, of the annual PCDD/F and PCB levels in ambient air could be observed. The last monitoring cycle has been completed in 2010. An extension of the monitoring scheme is currently under evaluation.

Since 2005 and with the international project MONARPOP (see 6.4.6) the concentrations of all POPs of the Stockholm Convention and the POPs Protocol and of some emerging POPs in ambient air and deposition at three Alpine summits (in Austria: Sonnblick, in Germany: Zugspitze, in Switzerland:

Weißfluhjoch) have been monitored (OFFENTHALER et al. 2008). Air sampling is carried out continuously throughout the year (in subsequent three-months sampling periods) but separately according to source regions of the arriving air masses. Sampling is distributed between separate filters assigned to one of four source regions. Filters are switched according to daily trajectory forecasts.The selected source regions (possibly important for the Alps) are

1. the industrial regions of Germany, Great Britain, Belgium, The Netherlands in the Northwest of the Alps,
2. the industrial region of Czech Republic, Slovakia and Poland in the North East of the Alps,
3. the industrial region of the Po basin in Italy and
4. the remaining source regions.

With its ambient air monitoring activities for POPs at remote sites, MONARPOP has been included in the "Global Monitoring Plan" for the "Effectiveness Evaluation" of the "Stockholm Convention". The results of the air measurements at remote summits until 2007 were included in the 1st Global Monitoring Report under the UN Stockholm Convention (UNEP 2009). Recently an analysis and interpretation of the results of the monitoring period 2008 to 2010 has been carried out.

The detected active air concentrations of POPs at the Alpine summits document well that an air transport of these compounds exists across the Alps – even though it is reduced according to the enhanced deposition of POPs at the peripheral parts. All SOCs (OCPs, PCDD/F, PCB, PBDE, PAH), and even compounds that have been banned in Europe for decades (e.g. DDT) or have not even been used in significant amounts in Central Europe (e.g. mirex), have been detected in air and deposition indicating their steady deposition at the remote summits by atmospheric transport.

Annual mean air concentrations at the summits were somewhat higher than Arctic values (compiled in UNEP 2009). So far (until 2007), no source direction had been correlated with higher air concentrations – a recent analysis of the time period 2008 to 2010 will show if this finding holds also for the last monitoring period.

6.4.2 Emissions Monitoring

For monitoring measures undertaken in previous years please refer to the National Action Plan 2008 (UMWELTBUNDESAMT 2008b).

6.4.3 Food and Feed monitoring

In 2003 the Environment Agency Austria carried out a first Austria-wide milk monitoring study (THANNER &MOCHE 2004) with the objective to obtain an overview of average PCDD/F levels in cow's milk. Additionally dioxin-like PCBs, according to the WHO, and indicator PCBs, as listed by national regulations, were analysed. The results showed that Austrian milk samples are clearly below the current EC limit value of 3 pg WHO-TEQ/g fat. No significant differences, with respect to PCDD/F and dioxin-like PCB, could be found between milk samples originating from dairy factories and alpine dairies with a smaller local collection area. The differences between the levels of indicator PCBs in cow's milk are a clear indication of a still continuing industrial influence: significantly lower levels were measured in milk samples from remote alpine regions.

In addition to its obligations as competent authority for food safety and control, the Austrian Agency for Health and Food Safety carries out a food monitoring programme once a year. Samples are collected from all nine provinces of Austria covering all components of average Austrian diet. All samples investigated since 2004 were well below the EU-limits for food. Estimates of dietary intakes of dioxins and furans based on a combination of food consumption data amount to 209 pg WHO-TEQ/day which on a body weight basis would correspond to approximately 3 pg WHO-TEQ/kg bw/day (HOFSTÄDTER & GROSSGUT 2006). This is within the range of the TDI (TDI: tolerable daily intake) range of 1–4 pg WHO-TEQ/kg bw/day as defined by the WHO.

Feed and food monitoring for PCDD/F and dioxinlike-PCBs is an ongoing process undertaken with the aim to comply with obligations arising from EC- and national legislation.

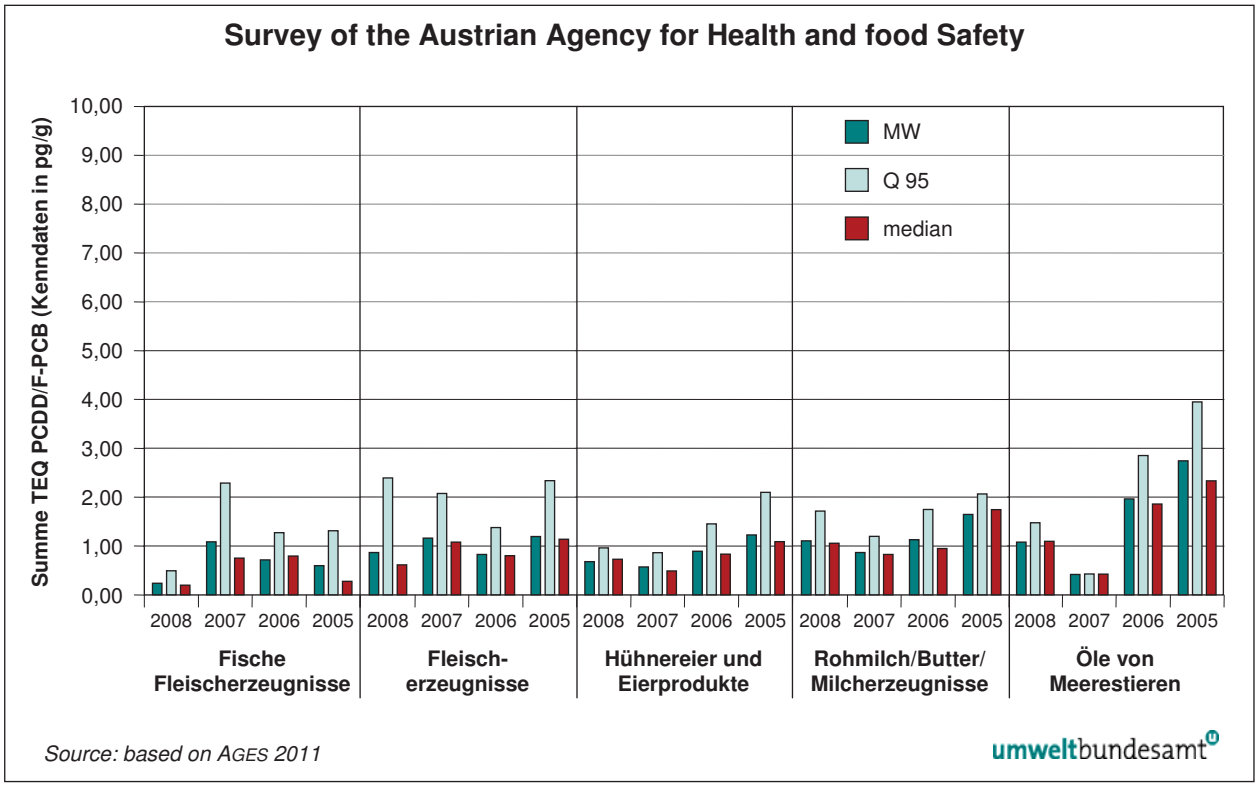


Figure 13: Survey of the Austrian Agency for Health and food Safety 2005-2008.

6.4.4 Water Monitoring

6.4.4.1 Surface water bodies

All large surface water bodies are tested for pollutants – including POPs. Analyses are carried out mostly in water. Some monitoring programmes are accompanied by biomonitoring programmes (accumulation monitoring of fish). The monitoring programmes are constantly updated and focus increasingly on the substances (substances, that describe the ecological and chemical status of the water bodies) listed in the Water Framework Directive and in the respective na-

tional implementation (e.g. *Ordinance on the determination of the target state for surface waters, BGBl. II No. 2006/96*). Of the chemicals listed in the Stockholm Convention or the POPs Protocol, the list of priority substances (Annex X of WFD – chemical status) includes HCB, hexachlorocyclohexane and PAHs. In terms of chemicals with POP-like properties, the list includes polybrominated diphenyl ethers, short-chained chlorinated paraffins, pentachlorophenol and hexachlorobutadiene. POPs and POP-like substances must be taken into consideration in evaluating the chemical and the ecological status of a specific water body. The Directive on environmental quality standards (2008/105/EC) covers HCB, PAH, cyclodiene pesticides (aldrin, dieldrin, endrin and isodrin), DDT and hexachlorcyclohexane.

Monitoring is predominantly based on the *Ordinance on the monitoring of the status of water bodies (BGBl. II No. 2006/479).* In addition to the regular monitoring activities on large surface water bodies, several operative programmes were performed on behalf of the Austrian Federal Ministry of Agriculture and Forestry, Environment and Water Management in the course of the analysis of the current status in line with Art. 5 of the WFD. These monitoring programmes are pressure specific and include pollutants such as hexachlorobenzene and PAH, as well as DDT, aldrin, dieldrin endrin, heptachlor and others.

Concentrations of pollutants in surface water bodies – including a number of substances of the Stockholm Convention – are measured in Austria in the context of various obligations and monitoring programmes and are available to the public on the Internet (**http://wisa.lebensministerium.at**). The monitoring results for the relevant POPs (beside dioxins and PCBs) are summarized in the following table:

Table 62: Summary of the monitoring results for surface waters for hexachlorobenzene (HCB), PAHs (benzo(a)pyrene (B(a)P) and pentachlorobenzene (PeCB).

	2000 in water			2003 in water			2010 in biota (fish)		
	n	n>LOQ	max [µg/l]	n	n>LOQ	max [µg/l]	n	n>LOQ	max [µg/kg]
HCB	68	0	-	341	0	-	32	28	5.1
PeCB	97	0	-	341	0	-	32	23	3.3
B(a)P	133	4	0.009	356	127	0.019			
B(b)F	133	5	0.01	356	57	0.019			
B(k)F	133	3	0.006	356	14	0.012			
BP	133	2	0.005	356	45	0.014			
IP	133	1	0.001	356	48	0.016			

Results of the monitoring programme are published as bi-annual reports. Access to data as well as to the reports is provided via the webpage of the Environment Agency Austria – **http://www.umweltbundesamt.at/en/umweltschutz/wasser/**.

Furthermore, specific substances are analysed in investigative monitoring programmes (run by i.e. regional authorities) and as part of measuring obligations prescribed by international river basin commissions (e.g. ICPDR, Joint Danube Survey). The measuring programmes are constantly updated and increasingly focused on the priority substances specified in the Water Framework Directive.

6.4.4.2 Municipal Wastewater Treatment Plants

Currently no continuous monitoring of effluents of municipal wastewater treatment plants for POPs or POP like substances is performed and the database on emissions of these substances from wastewater treatment plants is very poor. In order to improve the knowledge basis and to generate data on those emissions, a monitoring programme was performed in 2007 and 2008. Besides dioxins and PCBs the relevant POPs hexachlorobenzene, polycyclic aromatic hydrocarbons as well as pentachlorobenzene were investigated. None of these pollutants were detectable in the effluents of municipal wastewater treatment plants (UMWELTBUNDESAMT 2009).

6.4.4.3 Industrial Dischargers

According to the Austrian Federal Ordinance on the establishment of an emission register industrial dischargers have to measure and report emissions of defined pollutants. The Ordinance entered into force in 2009 and the first measurements were performed in 2010. A first evaluation of data in 2011 showed, that concentrations in industrial effluents dischargers of aldrin, benzo(a)pyren, polybrominated diphenylether, chlordan, chlordecon, dieldrin, endrine heptachlor and mirex were below the respective limits of detection. For benzo(g,h,i)perylen, dioxin, fluoranthen, hexachlorcyclohexane including lindane, PCB, pentachlorobenzene and toxaphen quantifiable concentrations were found in a number of waste water discharges. A more detailed analysis of these results is not possible for the time being as tools for data retrieval and assessment are still being developed.

6.4.4.4 Groundwater

In Austria standardised groundwater quality monitoring, based on legal provisions, was established in 1991. Its aim was to ensure the collection of consistent and reliable data to assess the current status of Austrian groundwaters and detect increasing concentrations at an early stage. This information was also to be used as a basis for designing and implementing measures for the protection of groundwater.

The resulting monitoring programme covers groundwater in porous media and in karst and fractured (fissured) rock systems. In total about 2000 groundwater sites are investigated and monitored. Groundwater areas were delineated as monitoring units and the monitoring was carried out on a quarterly basis (up to four times per year) for the whole of Austria.

To comply with the new requirements of the WFD the Austrian Federal Water Act was amended and provided the basis for a new Ordinance for Water Quality Monitoring (BGBl. No. 479/2006). Consequently the groundwater quality monitoring network in Austria was assessed for compliance with the new requirements and, where necessary, the network was amended accordingly. The most important impact resulted from the introduction of WFD groundwater bodies as groundwater management units.

To comply with the WFD and the Austrian Ordinance on Water Quality groundwater monitoring is carried out according to a six year cycle. The cycle starts with an ‘initial investigation’ under a surveillance monitoring programme. This includes monitoring of an extensive number of parameters.

The parameters monitored in groundwater, about 160 in total, are grouped into two parts:

- part 1: important inorganic parameters with relevance to the environment, e.g. nitrate, nitrite, ammonium, phosphate, boron, alkali metaland alkaline earth metal (e.g. potassium, calcium, magnesium);
- part 2: the heavy metal group (e.g. arsenic, mercury, cadmium) and lightly volatile halogenated hydrocarbons (e.g. tetrachloroethylene) and the broad group of pesticide substances (e.g. triazine, phenoxy alkane carbon acids).

For the following substances of concern PCDD and PCDF, PCBs and PAHs there are no monitoring data available, however there are data on HCB in groundwater available. Most of the values are below the limit of detection and below the limit of quantification. In addition the Monitoring programme includes the following POPs as aldrin, chlordan, DDT, dieldrin, endrin, heptachlor and lindan.

In addition the option for “extra-investigations” exists. This is intended to allow for consideration of chemical parameters not mentioned in the Ordinance on Water Quality Monitoring.

Various elements of quality assurance have been integrated in the monitoring programme to ensure confidence in the analytical results. The implementation of the Austrian Water Quality Monitoring System is a shared responsibility between the Federal and Provincial Authorities.

Results of the monitoring programme are published as bi-annual reports. Access to the data as well as to the reports is provided via the webpage of the Environment Agency Austria – http://www.umweltbundesamt.at/en/umweltschutz/wasser/.

6.4.5 Soil Monitoring

There is no common soil monitoring system on organic substances established in Austria. However, several studies were carried out which aim to determine the contents of selected POPs in soil (according to different land uses).

Within the environmental soil surveys of the federal provinces in Austria, some organochlorine pesticides and herbicides were partly analysed in 3 federal provinces (Carinthia, Styria, Upper Austria). These studies were carried out in the 1990ies.

In addition, various screening studies were carried out around potential sources and in industrial conurbations to identify the load of POPs in soils of various uses (e.g. UMWELTBUNDESAMT 1991).

Grassland Soil Monitoring

More up to date data are provided by a study on POPs in grassland soils far away from emission sources. At the moment results from 24 grassland sites under extensive use are available (UMWELTBUNDESAMT 2008a and 2010). Soil samples were taken at depths of 0–5 cm and 5–10 cm and the range of analysed parameters covers the following substances or groups of substances: organochlorine compounds (aldrin, cis- and trans-chlordane, dieldrin, endrine, mirexe, heptachlorine, hexachlorobutadien, endosulfan, DDX, α-, β-, γ-, δ-HCH, HCB),

polychlorinated biphenyls (PCBs), dioxins, furans and dl-PCBs, polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ether (PBDE), nonylphenol and bisphenol A, nitrophenols, chlorophenols, phthalates, organotin compounds, hydrocarbon index, perfluorinated tensides (PFTs)inorganic pollutants, general soil parameters (pH value, humus content, texture, carbonate content).

Overview of the results for PCBs, doxins and furans and PAHs:

Polychlorinated biphenyls (PCBs): Contents of individual PCB congeners are above the chosen limits of determination for all samples. The range for the total content from the sum of the six congeners according to Ballschmiter is between 0.13 and 3.52 µg/kg DS and all values can therefore be considered background concentrations.

DL-PCBs: Contents of coplanar and mono-ortho-substituted PCBs were detected in most of the soil samples. They are within the range of a few nanograms. What is noticeable is that either low chlorinated PCBs are found together on a few sites, or higher chlorinated PCBs. Total values from the sum of PCBs TE-WHO for the sampled grassland sites are between 0.01 and 0.74 ngTE WHO/kg.

Polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs): Total contents from the sum of PCDD/Fs in grassland samples range between 12.5 and 298 ng/kg DS. In order to take into account the varying toxicity of the congeners, PCDD/F contents are assessed according to international toxicity equivalents (I-TEQs). These are between 0.16 and 9.33 ng I-TEQ/kg DS. The upper values are considered high and need further clarification.

Polycyclic aromatic hydrocarbons (PAHs): Contents of EPA PAHs range between 2.4 and 1818.3 µg/kg DS. On 11 sites, values below 100 µg/kg DS were determined. Although none of the grassland sampling sites used for this study showed PAH contents above international background or intervention values, further clarification appears to be necessary with respect to ΣEPA PAH and BaP contents on three sites. For all other sites, PAH contents can be classified as background values.

The results of this study show that persistent organic pollutants can be detected, occasionally in considerable concentrations (e.g. PCDD/F), even in grassland soils under extensive use. On the one hand the substances concerned are those whose use and production have been banned in many countries for several years or decades (e.g. certain pesticides), and on the other hand these substances are so-called upcoming pollutants (e.g. flame retardants, phthalates, chlorophenols), whose environmental relevance is gaining more and more importance at international level.

The study thus provides an initial overview of the verifiability and magnitudes of the levels of selected organic pollutants. Although a more detailed analysis in the light of a correlation between individual soil parameters, or pollutant groups, has not been possible here, it would be an important next step allowing for a better description of the fate and behaviour of these substances in grassland soils.

In general, the data on organic pollutants in soils are considered incomplete. Only a few pollutant groups such as PAHs, PCBs or PCDD/Fs are well documented in the literature. For many other substances however, hardly any comparable data on background values in soils are available. In other mediums such as sewage sludge, sediments and surface waters, these pollutant groups have already been analysed in several studies.

The next part of the study will include further sampling sites throughout Austria and a focus on flame retardants like PBDEs and PFOS.

Forest soils

Several studies on concentrations of POPs in remote forest ecosystems included also forest soils as sampled matrix (see chapter 6.4.6).

6.4.6 Bioindication with tree needles and forest ecosystems

Two major earlier studies (UMWELTBUNDESAMT 1998, 2001) focused on POP concentrations in remote forest ecosystems. The international project "MONARPOP", (an initiative of ministries and institutes in Austria, Germany, Italy, Slovenia and Switzerland started the project MONARPOP in 2004[19)] investigated POPs in Norway spruce needles and soils of remote forests in alpine regions of Europe (Austria, Germany, Italy, Slovenia, Switzerland) from 2004 to 2007. The studies focused on POP background levels at remote sites. The investigations provide information about the following compounds – formerly or still – intentionally produced POPs (organochloropesticides = OCP, PCB, PBDE, chloroparaffins, PFOS and related compounds) and unintentionally released organic pollutants (PCDD/F, PAH). The MONARPOP project also includes extensive air and deposition monitoring (see chapter 6.4.1). The MONARPOP survey on needle and soil concentrations had been finished by end of December 2007, while air and deposition monitoring is still carried out on a continuous basis.

One of the most significant results of MONARPOP is the clear documentation of the barrier effect of the Alps for the long range transport of POPs. Concentrations were higher in the peripheral parts of the Alps than in the more shielded central parts. The location of the lateral parts with higher concentrations (northern, western, southern and/or eastern parts of the Alps) could vary from compound to compound and between the studied matrices (soil, needles). For some compounds like PCDD/F, sites with higher soil concentrations were located in areas of higher precipitation (OFFENTHALER et al. 2009), while the observed regional concentration gradients for other compounds (e.g. single PBDEs, KNOTH et al. 2008) showed no correlation with precipitation and are likely the result of different emission gradients in the neighboring regions of the Alps. These findings from the Alps, given their location in the centre of Europe, may give some general indications of similar differences on a larger geographic scale.

[19] **http://www.monarpop.at**; co-founded by the EU INTERREG IIIb "Alpine Space Programme", the Austrian Ministry for Agriculture, Forestry, Environment and Water Ressources; Bavarian State Ministry of the Environment, Public Health and Consumer Protection; Regional Agency for Environmental Protection of Lombardia; Regional Agency for Environmental Prevention and Protection of Veneto; Swiss Federal Office for the Environment; Swiss Federal Institute for Forest, Snow and Landscape Research; German Helmholtz Research Center for Environmental Health, Munich; German Federal Environment Agency; Environment Agency Austria; Slovenian Forestry Institute

A comparison between POPs bound in the forests of the Alps and their emissions in this region supports the assumption that significant contributions to the POPs load in the Alps comes from sources outside the Alps and suggests that the Alps represent a net sink for these compounds (BELIS et al. 2009).

Industrial chemicals like chlorinated paraffins were detected at remote sites of the Alps, in similar concentration ranges as unintentionally emitted SOCs like PAHs (IOZZA et al. 2009).

Selected MONARPOP sites, which were also studied in previous studies, showed significantly lower loads of some compounds in needles and soil than approximately ten years ago.

Along the remote vertical MONARPOP profiles of the northern and central Alps, marked altitudinal increases in soil concentrations of organochlorine pesticides (including those with suspected faraway sources like mirex) have been detected (e.g. up to 10-fold for DDT). The statistical results suggest temperature as the key parameter for this increase, while it has been found that precipitation is not correlated with the observed gradients (KIRCHNER et al. 2009). Other compounds like chlorinated paraffins (IOZZA et al. 2009), PCDD/F and PCB (OFFENTHALER et al. 2009), PBDE (KNOTH et al. 2008) and PAH (BELIS et al. 2007) have not shown a uniform trend along or among these slopes. Other than with pesticides, local sources as well as the impact of meteorological phenomena like temperature inversions are assumed to be responsible for these findings.

Apart from surveys in remote forest ecosystem, POP levels (PAH, PCB, PCDD/F, OCPs) close to local pollution sources were obtained by some bioindication studies in industrial areas or conurbations using Norway spruce needles (e.g. UMWELTBUNDESAMT 2009). The Austrian Umweltbundesamt also has an archive of perennial spruce needle samples from selected industrial neighborhoods.

6.5 Monitoring activities on States level

Studies and monitoring programmes on POPs are carried out on the level of the federal provinces (Länder) as well.

7 EVALUATION OF THE EFFICACY OF NATIONAL LAWS AND POLICIES AND STRATEGIES FOR MEETING THE OBLIGATIONS OF THE STOCKHOLM CONVENTION AND THE EU POP-REGULATION

As already stated in the National Action Plan 2008 Austria complies to a great extent with the provisions of the Stockholm Convention and the EU POP Regulation. Nevertheless, as one of the goals of the Convention is the “continuous reduction of POPs releases” further efforts are necessary.

POP emissions of major (industrial) sources have considerably declined in the last few years. Between 2004 and 2009 a further decrease in air emissions of POPs took place, partly due to a decline in economic activities in the years 2008 and 2009. Still, if changes in the best available techniques allow for lower or zero emissions from relevant sources policy makers have to react and to adapt the relevant legal provisions accordingly (e.g. by laying down stricter emission limit values).

In general, the findings of the NAP 2008 remain valid for the near future:

The NAP 2008 identified small residential combustion plants as an important target area. They still are responsible for 70.0% of the PCDD/F emissions, 86.4% of the HCB emissions and for 69.7% of the PAH emissions into air. All possible measures have to be investigated and exploited to reduce the POP emissions from these sources.

Anotherset of measures is concerned with awareness-raising to encourage ”low emission” incineration in household stoves or e.g. the use of ashes from these plants for fertilising purposes. Here, an important initiative was launched in 2009 and 2010 (see below).

It should be mentioned that in order to comply with certain national and international obligations a variety of comprehensive and to some extent cross-sectoral measures and instruments are being developed in Austria. These measures are aiming at the reduction of greenhouse gases, NO_x and (fine) particulate matter. Some of these measures (described e.g. in the Climate Strategy 2007 (FEDERAL MINISTRY OF AGRICULTURE, FORESTRY, ENVIRONMENT AND WATER MANAGEMENT 2007) or in the Programme of the Federal Government (FEDERAL GOVERNMENT 2007)) will lead to an indirect reduction of POPs releases (by e.g. reduction of energy consumption or the prescription of stricter air emission limit values for dust), others (such as the increased use of biomass in small scale firing installations) will lead to an increase of POPs releases.

Further, it is important to gain a still deeper knowledge in fields where reliable data are limited or missing. Specific studies e.g. with regard to POP concentrations in certain wastes as well as further POP related monitoring activities are formulated below.

PeCB Management Options: It is common knowledge, that measures which are effective for PCDD/F removal or elimination are also effective for minimisation of PeCB releases. Here, the reader is referred to Annex V of the Stockholm Convention on POPs and in particular to the technical guidelines on best available techniques and guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention.

Therefore, no particular management actions for PeCB are required.

Evaluation and Proposal of Measures (according to § 20 (2) Chemicals Act 1996)

The NAP 2008 listed a variety of measures which on the one hand contribute to lower POPs emissions from relevant sources and which on the other hand would improve the availability of data on POPs in the environment.

Releases of POPs from source categories

The following table shows an overview which of the measures proposed in the NAP 2008 were implemented in the period 2008-2011.

National legislation	Contents with respect to POPs	Measures proposed in NAP 2008	Current status
Act on Emissions of Boiler Plants (BGBl. I No. 150/2004); Clean Air Ordinance on Boiler Plants (BGBl. No. 19/1989 as amended by BGBl. II No. 2005/55); as amended by Emission Measurement Ordinance (Fed.Law Gaz. II No.153/2011)	ELVs for dust, CO, Corg, NO_x	Adaptation to BAT necessary	Adaptation done through Act on Emissions of Boiler Plants as applicable
Industrial Code 1994 and specific ordinances according to Article 82 para 1, for example Ordinance on sinter plants (Fed. Law. Gaz. II No. 1997/163)	ELV for various air pollutants, eg dust, PCDD/F	Continuous evaluation with regard to BAT	Routine Evaluation
Ordinance on combustion plants (BGBl. II No. 331/1997)	ELVs for dust, CO, Corg, NO_x	Adaptation to BAT necessary (stricter ELVs for dust)	Measure was implemented by amendment (BGBl. II No. 312/2011)
Waste incineration ordinance (Fed. Law. Gaz. II No. 2002/389)	ELVs for dust, CO, Corg, NO_x, heavy metals, PCDD/F	stricter ELVs for dust for co-incineration plants	Revised ordinance Fed.LawGaz. II No. 2010/476, but no stricter ELV for dust
Austrian Water Act and specific Ordinances:	ELVs for AOX and POX in the sector specific ordinances		
Ordinance on the limitation of waste water emissions from flue gas treatment (BGBl. II No. 271/2003)	ELVs for PCDD/F	Continuous evaluation with regard to BAT	none
Ordinance on the limitation of waste water emissions from processing of coal (BGBl. II No. 346/1997)	ELVs for PAHs	Continuous evaluation with regard to BAT	none
Ordinance on the limitation of waste water emissions from the production of plant protecting agents and crop sprayings (BGBl. No. 668/1996)	ELVs for AOX and specific POPs	Continuous evaluation with regard to BAT	none

National legislation	Contents with respect to POPs	Measures proposed in NAP 2008	Current status
Ordinance on the determination of the target state for surface waters (BGBl. II No. 96/2006)	Environmental quality standard for HCB	For PAHs community environmental quality standards were determined (in 2008)	ordinance was amended in 2010 according to directive 2008/105/EC (BGBl. II No. 461/2010)
Other relevant legal provisions			
Ordinance on landfills (BGBl. II No. 39/2008)	Limit values for the content of PAH in wastes		Amended with BGBl. II No. 185/2009 und II 178/2010
Compost ordinance (BGBl. II No. 292/2001)	Limit values for the content of POPs in composts	Continuous evaluation of the limit values necessary	none
Ordinances on sewage sludge and compost of the Federal Provinces	Limit values for POP	Continuous evaluation of the limit values necessary	None, some Austrian provinces limit POPs in sewage sludge
Soil Protection Laws of the Federal Provinces: Burgenländisches Bodenschutzgesetz (LGBl. Nr. 87/1990) Niederösterreichisches Bodenschutzgesetz (LGBl. Nr. 6160-0) Oberösterreichisches Bodenschutzgesetz (LGBl. Nr. 63/1997) Bodenschutzgesetz Salzburg (LGBl Nr. 80/2001) Steiermärkisches landwirtschaftliches Bodenschutzgesetz (LGBl. Nr. 66/1987)		Elaboration of target values for organic pollutants (including polybrominated diphenylethers, perfluorinated tensides and pesticides) with the aim to reduce pollution of soils	Not realised
Ambient Air Quality Act (IG-L)	§ 21 IG-L: Legal basis for an ordinance	Evaluation whether generally binding ELVs for crematoria in an ordinance according to § 21 IG-L are necessary	Not implemented, no general binding rule for crematoria
Laws of the Federal Provinces concerning residential combustion sources		Agreement pursuant to Art. 15a Federal Constitution Law concerning the placing on the market and the inspection of combustion installations, rapid transposition of the requirements of this agreement into the law of the federal provinces	Agreement was signed in 2011
Act on Air Pollution Prevention (BGBl. I No. 137/2002, as amended (BGBl. I No. 50/2012))	Prohibition of burning of biogenic materials, many exemptions possible	Evaluation with respect to the exemptions	Prohibition integrated in Act on Air Pollution Prevention
Permitting process	*Contents with respect to POPs*	*Comments/Specific Steps*	
Landfill sites	Fire protection requirements	Implementation of effective fire protection requirements for landfills and intermediate storage sites for waste	No new information

Bearing in mind that the sectorresidential combustion is responsible for 70% of the PCDD/F emissions into air the Federal Ministry of Agriculture and Forestry, Environment and Water management in cooperation with the Federal Guild of Chimney sweepers, the tile stove alliance, the Austrian Medical Chamber and the association of doctors for a healthy environment published a booklet entitled “Richtig heizen” (“Proper Heating”) in 2010. The booklet contains information on the effects of emissions from household stoves on human health and the environment

as well as advice on how low emissions heating can be achieved. It has been distributed to the public via chimney sweepers and medical doctors. Furthermore an internet-site has been created (**www.richtigheizen.at**), where the proper use of the household stoves as well as legal considerations are described.

Furthermore, the rapid implementation of the following measures is of utter importance:

- Establish compliance with the requirements of an agreement between the federal provinces pursuant to Article 15a of the Federal Constitution Law concerning the setting of consolidated quality standards to support the establishment and refurbishment of residential buildings for the purpose of the reduction of greenhouse gases.
- Effective financial funding for the replacement of coal fired small scale firing installations
- Periodic reviews and improvements of the criteria for the funding of biomass plants (including biomass plants operated in the agricultural sector) with respect to operating conditions, energy efficiency (including district heating systems), quality of fuels and emission limit values for dust

  → emission limit values for dust were changed in 2007 and 2009.
- Further information with respect to the prevention of co-incineration of waste in small scale firing installations
- Further information with respect to the final disposal of ashes/soot from small scale firing installations
- Implementation of appropriate measures to ensure that the target value for benz(a)pyrene in the ambient air (1 ng/m^3) will be complied with. This target value will be converted into a limit value as of 31.12.2012.

  → different measures in the provinces.

For the following sources the availability of data is still very limited or missing. Therefore, to assess whether releases of POPs are relevant and to improve and complete the Austria Inventories on POPs, the following specific steps to improve data quality are desirable/necessary. However, the implementation of these measures is often subject to available budget resources.

- emission behaviour of small scale combustion installations (esp. in case of firing straw and cereals)

  → still partly unknown in the case of POPs, but a project is envisaged which will investigate certain emission parameters of small scale combustion installations (residential combustion, “EnEm Tech project”)
- measurement of emissions of motor vehicles and update of emission factors to improve the quality of forecasts

  → The Handbook Emission Factors for Road Transport (HBEFA) provides emission factors for all current vehicle categories (PC, LDV, HGV, urban buses, coaches and motor cycles), each divided into different categories, for a wide variety of traffic situations. Emission factors for all regulated and the most important non-regulated pollutants as well as fuel consumption and CO_2 are included.The last version HBEFA 2.1 dates back to 2004 and was updated in 2010 (HBEFA 3.1). All emission factors have been recalculated (based on a broader set of emission data, on new measurements of motor vehicle emissions; new emission factor models have been applied). For calibrating the

model, a broad set of emission measurements up to Euro 4 has been used. Emission factors for the new standards of Euro 5 and 6 are mainly based on assumptions in view of future legislation.

- improvement of data quality with respect to releases of POPs from landfills and abandoned industrial sites and known contaminated sites (e.g. PAH content oflandfill gases)
- assessment of the contamination and treatment of waste and residues in non ferrous metals and secondary steel production as well as in sinter plants

  → no new assessment
- determination of POP-concentrations in waste streams from small scale combustion installations in the sectors residential combustion, services and agriculture which have a high probability of being released into the environment (e.g. bottom ash and fly ash)
- determination of POP-concentrations in waste streams from fossil fuel fired utility and industrial boilers (including co-incineration of waste) which are recovered in other production processes or which have a high probability to be released into the environment (e.g. fly ash from co-incineration plants)
- determination of POP-concentrations in waste streams from biomass fired combustion installations which are recovered in other production processes or which have a high probability to be released into the environment (e.g. bottom ash)
- determination of concentrations of PCDD/F and relevant precursors especially in bleached (Kraft-)pulp (imported and domestic production), paper (packaging paper, paper board, paper made from recovered fibres), colours and inks, deinking sludge

  → In 2011 the Environment Agency Austria accomplished a survey assessing possible PCDD/F input into cardboard boxes via contaminated printing inks. The results of this limited study did not show any indication of PCDD/F contamination of currently used printing inks.
- quantification of POPs in filter dusts from the clinker process (Austrian cement kilns)

  → quantification after consultation talks with Environment Agency Austria, Federal Economic Chamber/cement industry and other stakeholders; support of the revision of the Dioxin Toolkit relating to „mineral products“
- quantification of POPs emissions (esp. PCDD/F and PCB) of Platformer 3 of the OMV refinery in Schwechat

  → quantification of POPs emissions of Platformer 3 still unknown.

Data availability on POP emissions into the environment

The following table lists specific measures designed to improve the quality of available data regarding POPs emissions into the environment:

Specific steps	Timetable
Improvement of data quality with respect to releases of HCB and PCB into air (e.g. by planning and carrying out measurement programmes for sources with high priority, such as residential combustion sources, industrial processes).	Review of available (literature) data, identification of (suspected) relevant sources
Establishment of monitoring programmes in the neighbourhood of POP relevant emitters	Identification of relevant sites for sampling Sampling and measurements (winter/summer)
Continuation of monitoring programmes using Norway spruce needles close to POP sources	Continued sampling

Data availability on POP concentrations in the environment

The following table lists specific measures designed to improve quality of available data regarding POPs concentrations in the environment:

Specific steps	Timetable
Continuation of ambient air and deposition monitoring for POPs at Alpine summits (Sonnblick)	Continued sampling and analysis
Ambient air and deposition monitoring for POPs in the Austrian-Czech border region	Sampling in 2011/12 and analysis
Development of transfer factors to improve knowledge of interrelations between POP concentrations in the environment and bioavailable concentrations.	Establishment of a scientific panel to elaborate a study design
Development and adaptation of passive sampling methods to improve the comparability of available data	Method/Instrument selection and development, pilot study Evaluation of the pilot study and selection of an appropriate method
Implementation of a national monitoring programme to investigate the distribution of deposited POPs	2008 – selection of sampling sites From 2009 onwards – implementation

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ABBREVIATIONS

AVV……..Abfallverbrennungsverordnung (BGBl. II Nr. 476/2010)

CORINAIR.....Core Inventory Air

CORINE .....Coordination d´information Environmentale

CRF .....Common Reporting Format

DKDB .....DampfkesseldatenbankAustrian annual steam boiler inventory

EEA .....European Environment Agency

EIONET .....European Environment Information and Observation NETwork

EMEP .....Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe

EPER.....European Pollutant Emission Register

GLOBEMI .....Globale Modellbildung für Emissions- und Verbrauchsszenarien im Verkehrssektor(Global Modelling for Emission- and Fuel consumption Scenarios of the Transport Sector) see [HAUSBERGER 1998]

GPG .....Good Practice Guidance (of the IPCC)

HCB.....Hexachlorobenzene

HM.....Heavy Metals

IEA.....International Energy Agency

IEF.....Implied emission factor

IIR.....Informative Inventory Report

IPCC.....Intergovernmental Panel on Climate Change

NACE .....Nomenclature des activites economiques de la Communaute Europeenne

NEC.....National Emissions Ceiling (Directive 2001/81/EC of The European Parliament And Of The Council of 23 October 2001 on national emission ceilings for certain atmospheric pollutants – NEC Directive)

NFR .....Nomenclature for Reporting (Format of Reporting under the UNECE/CLRTAP Convention)

NIR .....National Inventory Report (Submission under the United Nations Framework Convention on Climate Change)

NISA .....National Inventory System Austria

OECD .....Organisation for Economic Co-operation and Development

OLI.....Österreichische Luftschadstoff InventurAustrian Air Emission Inventory

PAH .....Polycyclic Aromatic Hydrocarbons

PCDD/F .....Polychlorinated Dibenzodioxins and Dibenzofurans

PM .....Particular Matter

POP .....Persistent Organic Pollutants

PRTR.....Pollution Release and Transfer Register

SNAP.....Selected Nomenclature on Air Pollutants

UNECE/CLRTAP.United Nations Economic Commission for Europe.Convention on Long-range Transboundary Air Pollution

UNFCCC .....United Nations Framework Convention on Climate Change

WFD .....Waste Framework Directive 2000/60/EC

ENVIRONMENT AGENCY AUSTRIA umweltbundesamt

Umweltbundesamt GmbH
Spittelauer Lände 5
1090 Vienna/Austria

Tel.: +43-(0)1-313 04
Fax: +43-(0)1-313 04/5400

office@umweltbundesamt.at
www.umweltbundesamt.at

This report is the first review of the National Action Plan (NAP) pursuant to Article 5 of the Stockholm Convention on persistent organic pollutants (POPs). For the review emission data from relevant source categories in different environmental media have been updated and compared to the data in the NAP 2008. An assessment of the efficacy of national legal regulations was made as well as an analysis if Best Available Techniques (BAT) in combination with Best Environmental Practices (BEP) have been applied. The report also contains recommendations and measures in order to reduce emissions of POPs in the future.
In general, the findings of the NAP 2008 remain valid for the next years: Measures to reduce emissions from residential combustion sources should be continued. Monitoring programmes should be continued.

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