Ministry of the Environment
of the Czech Republic

UPDATED NATIONAL IMPLEMENTATION PLAN

OF THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS IN THE CZECH REPUBLIC

FOR THE PERIOD 2024-2029

December 2023

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December 2023
Ministry of the Environment
Prague
Czech Republic

Citation: Karel Bláha et al. (2023): Updated National Implementation Plan of the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic for the period 2024-2029, Ministry of the Environment, Prague, December 2023, available online from:
https://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva,
http://www.recetox.muni.cz/nc/index.php?pg=cinnost--podpora-vykonu-statni-spravy,
https://www.databaze-strategie.cz/

Acknowledgements

A broad team of authors, comprising ministry staff, experts from academia, industry and NGOs, participated in the preparation of the update of the National Implementation Plan for the implementation of the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic for the period 2024-2029. In addition, the electronic version of the update was available to the public for comments and we are thankful for all the suggestions and feedback.
The authors also acknowledge the support they received from RECETOX of Masaryk University through the National Centre for Toxic Compounds and the RECETOX Research Infrastructure Units, namely from monitoring programmes for the incidence of persistent organic pollutants in the environment of the Czech Republic and the analyses and visualizations of these data. The activities of RECETOX in this area are supported by projects No. L01214 National Sustainability Programme (NSP) of the Ministry of Education, Youth and Sports and No. LM2015051 'RECETOX Research Infrastructure (RI RECETOX)' within the framework of the project Large Infrastructure for Research, Development and Innovation funded by the Ministry of Education, Youth and Sports of the Czech Republic.

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List of abbreviations

ADI	acceptable daily intake
AMAP	Arctic Monitoring and Assessment Programme
AOX	Halogenated organic compounds
AQIS	Air quality information system
AS	Academy of Sciences
BAT	Best Available Technology/Techniques
BEP	Best Available Practice
BFR	bromine flame retardants
BREF	Reference documents of the European Union on Best Available Technology
CAS	Chemical Abstracts Service
CEI	Czech Environmental Inspectorate
CENIA	Czech Environmental Information Agency
CHMI	Czech Hydrometeorological Institute
CHRC	Czech Health Research Council
CISTA	Central Institute for Supervising and Testing in Agriculture
CLRTAP	Convention on long-range transboundary air pollution
Conference	Conference of the Parties to the Stockholm Convention
COPx	Conference of the Parties No. x
CSMS	Contaminated Sites Monitoring System
DDT p, p'-DDT (4,4´-DDT)	1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane
DP	dechlorane plus
EC	European Community
EEA	European Environment Agency
EEB	European Environmental Bureau
EIA	Environmental Impact Assessment
ELV	end-of-life vehicles
EMEP	European Monitoring and Evaluation Programme
E-PRTR	European Pollutant Release and Transfer Register
EPS	Expanded polystyrene
EQS	environmental quality standard
EU	European Union
FAO	Food and Agriculture Organization
FB	Fire Brigade
FEP	Fluorinated ethylene propylene
GA CR	Grant Agency of the Czech Republic
GAPS	Global Atmospheric Passive Sampling
GEF	Global Environment Fund
GENASIS	Global Environmental Assessment and Information System
GEOSS	Global Earth Observation System of Systems
GMP	Global monitoring plan
HBB	Hexabromobiphenyl
HBCDD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCH	Hexachlorocyclohexane
ICPE	International Commission for the Protection of the Elbe
IED	Industrial Emissions Directive
IPEN	International POP Elimination Network (an international network of NGOs working to promote the Stockholm Convention on Persistent Organic Pollutants)
IPPC	Integrated Pollution Prevention and Control
IPR	Integrated Pollution Register
ISPOP	An integrated system for the implementation of reporting obligations
ISWM2	waste management information system
LOQ	limit of quantification
MEYS	Ministry of Education, Youth and Sports
MFA	Ministry of Foreign Affairs
MIT	Ministry of Industry and Trade
MoA	Ministry of Agriculture
MoD	Ministry of Defence
MoE	Ministry of the Environment
MoF	Ministry of Finance

MoH	Ministry of Health
MoLSA	Ministry of Labour and Social Affairs
MONET_CZ	Monitoring network of persistent organic pollutants in the air of the Czech Republic by passive sampling method
MoT	Ministry of Transport
MQL	Method Quantitation Limit
MRD	Ministry for Regional Development
MU Brno	Masaryk University Brno
National Centre	National Centre for Toxic Compounds
NATO	North Atlantic Treaty Organization
NGO	Non-governmental non-profit organisation
NIP	National Implementation Plan for the Stockholm Convention
NIPH	National Institute of Public Health
NP E	National Programme Environment
OCP	organochlorine pesticides
OP E	Operational Programme Environment
PAH	polycyclic aromatic hydrocarbons
PARC	Partnership for the Assessment of Risks from Chemicals
PBDE	polybrominated diphenyl ethers
PCB	polychlorinated biphenyls
PCDD	polychlorinated dibenzodioxins
PCDD/F	polychlorinated dibenzo-p-dioxins and dibenzofurans
PCDF	polychlorinated dibenzofurans
PCN	polychlorinated naphthalenes
PeCB	Pentachlorobenzene
PFAS	perfluorinated and polyfluorinated alkyl substances
PFC	polyfluorocarbons
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFOS-F	Perfluorooctane sulfonyl fluoride
PHC	Population and Housing Census
Plan	National Implementation Plan for the Stockholm Convention
PM	particulate matter
POP	persistent organic pollutants
POPRC	Persistent Organic Pollutants Review Committee
PTFE	Polytetrafluoroethylene
PVC	Polyvinylchloride
PVDF	Polyvinylidene fluoride
RDC	Research and Development Council
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals (European Parliament and Council Regulation (EC) No. 1907/2006 of 18 December 2006 concerning the registration, evaluation, authorization and restriction of chemicals, establishing the 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 a 2000/21/EC)
RECETOX	Research Centre for Environmental Chemistry and Ecotoxicology
RESAP	Register of Emissions and Air Pollution
SC	Stockholm Convention on Persistent Organic Pollutants
SCCP	Short-chain chlorinated paraffins
SCIP	a database of information on substances of concern in articles as such or in composite objects (articles) established under the Waste Framework Directive
SCRC	Stockholm Convention Regional Centre
SCWO	Super-critical Water Oxidation
SEP	state-owned enterprises Povodí
SESEZ	System of registration of old environmental burdens
SISP04	Individual food consumption in the Czech Republic - a national study
UIT CZECH REPUBLIC	Union of Industry and Transport of the Czech Republic
SVA	State Veterinary Administration
SVHC	substances of very high concern
TAC	Triacetyl Cellulose
TACR	Technology Agency of the Czech Republic

TDI	tolerable daily intake
TEQ	Toxic Equivalent
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organisation
US EPA	United States Environmental Protection Agency
VISOH2	Public extension of ISWM2 (Waste Management Information System)
VŠB-VEC Ostrava	Energy Research Centre, VŠB - Technical University of Ostrava
W2EF	Waste-to-energy facility
WEEE	waste electrical and electronic equipment
WFD	Water Framework Directive
WHO	World Health Organization
WMP	Waste management plan
WWTP	wastewater treatment plant
XPS	Extruded polystyrene

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1. INTRODUCTION

The National Implementation Plan for the implementation of the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic (hereinafter referred to as the '**Plan**' or '**NIP**') is the main national strategic document that is regularly and compulsorily updated in relation to the fulfilment of the obligations set out in Article 7 of the Stockholm Convention on Persistent Organic Pollutants (hereinafter referred to as the '**Convention**').
The Plan and its subsequent periodic updates are designed to assess the situation at the national level for selected chemicals at any given time. It is used to evaluate the performance of existing action plans of the Czech Republic, to modify them or to set other priority short-term and long-term tasks arising from the introduction of new measures and procedures or in case they are needed to obtain the necessary information or knowledge about the occurrence, use and disposal of persistent organic pollutants (hereinafter referred to as '**POPs**') listed or newly listed in the Annexes of the Convention by the Conference of the Parties to this Convention (hereinafter referred to as '**COP**'). The aim of all the activities listed in the Plan is, as quickly as possible, to eliminate or reduce the negative impacts of POPs on human health and the environment in the Czech Republic and thus contribute to faster global achievement of the objectives of the Convention.
The content of the Plan provides information on the current scope of the Convention, including basic information on individual POPs and describes the current status of addressing POPs in the Czech Republic. Following the state of implementation of the objectives of the Convention in the Czech Republic, the Plan modifies the existing activities, excludes the completed activities, and presents action plans for substances which have been newly listed in the Convention. Each Plan also takes into account the discussion and outcomes prepared by the Review Committee for the evaluation of Persistent Organic Pollutants (scientific subsidiary body of the Convention, hereinafter referred to as '**the POPRC**'). The NIP structure is, to the greatest extent possible, based on the manuals and guidelines prepared and updated by the Secretariat of the Stockholm Convention in cooperation with international experts.
The draft of the Plan is prepared by the Ministry of the Environment (hereinafter referred to as '**MoE**'). under the direction of the national focal point of the Stockholm Convention with the support of experts from the National Centre for Toxic Compounds and the Interministerial Council of the National Centre for Toxic Compounds. The proposal was also out for public consultation in autumn 2023.
The final version of the Plan is acknowledged by the Government of the Czech Republic. The English versions of the Plan, including updates, are presented at the next meeting of the Conference of the Parties and published on the Convention's website (http://chm.POP.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx).
The Czech versions are available on the websites of the Ministry of Environment, the National Centre for Toxic Compounds and on the portal of strategic documents of the Czech Republic (https://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva, http://www.recetox.muni.cz/nc/index.php?pg=cinnost--podpora-vykonu-statni-spravy, https://www.databaze-strategie.cz/).

This document is the third version of the original 2006 Plan (hereinafter referred to as '**NIP, 2006**'). The first update dates back to 2012 (hereinafter referred to as '**NIP, 2012**') and the second to 2018 (hereinafter referred to as '**NIP, 2018**'). All versions can be found on the above-mentioned websites.
Much of the information contained in previous versions, such as the properties of specific compounds, remains unchanged and is not repeated in this version, only referenced in the text. Information from previous versions is retained or condensed to maintain the context and clarity of the text.
This is also the first time the Plan has been subject to public consultation. Comments received during the consultation covered, for example, POPs in EIA (Environmental Impact Assessment) processes, the granting of integrated permits, technologies for POPs destruction and the further use of waste from incinerators. Some new tasks were subsequently incorporated into the NIP in response. Some comments addressed more complex issues that go beyond the purpose and focus of this Plan. The comments were then sent to the relevant departments of the MoE.

1.1. Update of the National Implementation Plan

Updates to the NIP evaluate the implementation of previous POPs-related activities in the Czech Republic and present action plans for substances that have been newly included in the Stockholm Convention since the last update. The document refers to them as **'new' substances**. This document reflects the inclusion of new substances in the Convention for the period 2017 to 2023. Three substances were included at **COP 8 (in 2017)**: **decabromodiphenyl ether** (commercial mixture, c-

decaBDE, CAS number 1163-19-5) and **short-chain chlorinated paraffins** (e.g. with the following CAS numbers 85535-84-8; 68920-70-7; 71011-12-6; 85536-22-7; 85681-73-8; 108171-26-2) were included in Annex A with specific exemptions, and **hexachlorobutadiene** (CAS number 87-68-3), which was already listed in Annex A, was also included in Annex C at COP 8.
At **COP 9 (in 2019)**, decisions were taken to add the pesticide **dicofol** (CAS numbers 115-32-2, 10606-46-9, without specific exemptions), and **perfluorooctanoic acid** (PFOA, CAS number335-67-1)**, its salts and PFOA-related compounds** (with specific exemptions) to Annex A of the Convention. **COP 10 (in 2022)** also included **perfluorohexanesulfonic acid** (PFHxS, CAS number 355-46-4)**, its salts and PFHxS-related compounds** in Annex A of the Convention, without exemptions. **COP 11 (in 2023)** included **UV 328** (CAS number 25973-55-1), **dechlorane plus** (CAS number 13560-89-9, syn-135821-03-3 and anti-isomer 135821 74-8) and **methoxychlor** (CAS number 72-43-5) in Annex A. Methoxychlor is without exemptions, the other two are with specific exemptions for production and use.
The **first/original NIP** of 2006 covered the period 2006-2010, its **first update (NIP, 2012)** covered the period 2012-2017 and the **second NIP update (NIP, 2018)** was for the years **2018-2023**. **NIP, 2018** was acknowledged by the Government in Resolution No. 553 of 24 July 2017. This Resolution 553 also required the submission of information to the Government on the implementation of this updated Plan by 31 October 2021. The Government discussed the implementation on 25 October 2021 and by Government Resolution No. 935 imposed the obligation to submit the next update of the National Implementation Plan for the Czech Republic **by 30 November 2023.**
The **development of the third update of the Plan** was again entrusted to an inter-ministerial group - the Council of the National Centre for Toxic Compounds (hereinafter referred to as referred to as the '**Council**', the original Council of the National Centre for Persistent Organic Pollutants) with the support of the National Centre for Toxic Compounds (hereinafter referred to as referred to as the '**National Centre**', the original National Centre for Persistent Organic Pollutants). The Council discussed proposals for new activities and draft action plans for existing and new substances in 2023.

1.2. The Stockholm Convention on POPs

The Stockholm Convention on Persistent Organic Pollutants aims to protect human health and the environment from the harmful impacts of the listed substances. Persistent organic pollutants are among the most dangerous chemicals due to their toxicity and a combination of properties including the ability to persist in the environment for long periods of time, to be transported over long distances and to accumulate in living organisms. The treaty was negotiated in May 2001 under the auspices of the United Nations Environment Programme (**UNEP**) and entered into force globally and for the Czech Republic on 17 May 2004 (No. 40/2006 Coll.). It currently has 186 parties, including the European Union.
Substances covered by the measures of the Convention are listed in its **Annexes A, B or C** (the same substances may also be listed in two Annexes, i.e. A and C, or B and C). When the Convention entered into force in 2004, there were 12 substances in the Annexes. However, the list has been expanded on the basis of decisions taken by the Conference of the Parties. The Convention covers measures for the entire life cycle of substances, from their production/formation, release and presence in the environment, to the management of stocks and waste containing them.
The extent of restrictions on production, use, import and export is determined by the classification of the substance in Annex A or B; i.e., banned or limited. However, both Annexes allow for exemptions to the prohibitions on production and use if decided by the Conference of the Parties and registered by the Party concerned. The exemptions take the form of either specific exemptions, which are time-limited, or acceptable purposes (these are only possible for Annex B substances), which are not time-limited, but Parties are required to implement measures that will lead to the reduction/elimination of their use. Annex C includes chemicals that are unwanted by-products, e.g. of chemical production or combustion, and Parties must take measures to reduce these unintentional releases to the environment with a view to their continued minimisation and, where possible, their ultimate elimination. The inclusion of new substances in the Annexes to the Convention, including the approval of any exemptions, is decided by the Conference of the Parties on the basis of recommendations from the Convention's scientific subsidiary body, the POPRC**.**
The list of the original 12 substances of the Convention continues to expand depending on decisions taken by the COP. **Table 1** shows the status of included substances as of the date of submission of this update, including the substances listed at the 11th Conference, which took place from 1-12 May 2023. More detailed information on the substances included up to COP 7 (in 2015), including, is provided in previous versions of the Plans (NIP, 2006, 2012 and 2018).
For certain substances included in **Annexes A** or **B** to the Convention, Parties are allowed to continue their use or production to the extent of defined exemptions that have **specific exemption** designations **and acceptable purposes** under the Convention, as specified in the relevant decisions, if the Party

registers the exemption/purpose with the Secretariat of the Stockholm Convention. Sometimes a general exemption is approved without the need for registration.
Specific exemptions for listed chemicals are usually registered for a period of five years (may be extended under certain conditions); acceptable purposes are not time-limited unless the Conference of the Parties decides otherwise.
The period of need for all exemptions shall be periodically reviewed and may be terminated at the discretion of the Conference. A summary of available specific exemptions and acceptable purposes is provided in **Table 2**, which is taken from previous versions of the NIP and supplemented with new substances that have been added to the Convention since the previous update of the Plan. In Tables 1 and 2, the rows with 'new' substances are distinguished. Further details of the exemptions are given for the relevant compounds in Chapter *2.3. Evaluation of POPs included in Annexes A and B.*

Parts II to XII of Annex A and **Parts II to V of Annex B** of the Convention, which are also referred to in Table 2, contain additional specifications or additional measures for the substance for which they are listed.

Annex A, **Part II** refers to PCBs and states the obligation of the Parties in particular:
- to take measures to eliminate the use of PCBs in equipment (e.g. transformers, capacitors or other containers containing liquid stocks) **by 2025**
- to promote measures to reduce the hazards and risks from the use of polychlorinated biphenyls
- to take measures as soon as possible, but no later **than 2028**, to manage waste liquids and equipment contaminated with PCBs containing more than 0,005 % of PCBs in an environmentally sound manner
- to prepare a report on progress in the elimination of polychlorinated biphenyls every five years and provide it to the Conference.

Table 1: Substances listed in the Annexes to the Stockholm Convention, their first coverage in the NIP versions

	Date of inclusion in the Convention entry into force in general/ / entry into force for the EU and its Member States if different from the general number of chemicals	Annex A substances to be removed from use and production and banned from export and import	Annex B substances the production, use, import, export of which are restricted	Annex C substances which are subject to measures against their unintentional production
NIP, 2006	22. 05.2001 17.05.2004 **12 substances** ('dirty dozen')	aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene, polychlorinated biphenyls (PCBs)	1,2-dichloro-diphenyltrichloroethane (DDT)	hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs)
COP 4 NIP, 2012	04.-08.05.2009 26.08.2010 21 substances	α-hexachlorocyclohexane (α-HCH), β-hexachlorocyclohexane (β-HCH), chlordecone, hexabromobiphenyl (HBB), hexabromodiphenyl ether and heptabromodiphenyl ether (hexa-, heptaBDE), lindane (γ-HCH), pentachlorobenzene (PeCB), tetrabromodiphenyl ether and pentabromodiphenyl ether (tetra-, pentaBDE)	perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) (so-called PFOS-based compounds)	pentachlorobenzene (PeCB)
COP 5 NIP,	25.-29.04.2011 27.10.2012 22 substances	technical endosulfan and its isomers		

2012				
COP 6 NIP, 2018	28.04.-10.05.2013 26.11.2014/26.04. 2016 23 substances	hexabromocyclododecane (HBCDD)		
COP 7 NIP, 2018	04.-15.05.2015 15.12.2016/15.12. 2016 26 substances	pentachlorophenol, its salts and esters, polychlorinated naphthalenes (PCN), hexachlorobutadiene (HCBD, for Annex A)		polychlorinated naphthalenes (PCNs)
COP 8 NIP, 2024	24.04.- 05.05 2017 18.12.2018 28 substances	decabromodiphenyl ether (commercial mixture, c-decaBDE) and short-chain chlorinated paraffins, hexachlorobutadiene (HCBD, for Annex C)		hexachlorobutadiene (HCBD)
COP 9 NIP, 2024	29.04.- 10.05 2019 03.12.2020 30 substances	dicofol, perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds		
COP 10 NIP, 2024	06.-17.06. 2022 (physical part) 16.11.2023 31 substances	perfluorohexanesulfonic acid (PFHxS), its salts and PFHxS related compounds		
COP 11 NIP 2024	1-12. 05. 2023 34 substances Entry of change into force autumn 2024	UV 328, dechlorane plus, methoxychlor		

Table 2: Possible exemptions to the ban on production or use of substances listed in Annex A or B, as of 2023

Chemical substance	Activity	Specific exemption/acceptable purpose
Aldrin CAS no.: 309-00-2	production	none
	use	none
Chlordane CAS no.: 57-74-9	production	none
	use	none
Dieldrin CAS no.: 60-57-1	production	none
	use	none
Endrin CAS no.: 72-20-8	production	none
	use	none
Heptachlor CAS no.: 76-44-8	production	none
	use	none
Hexachlorobenzene CAS no.: 118-74-1	production	none
	use	none For intermediate products in a closed system, the option of using Note iii of Part I of Annex A is still available
Mirex CAS no.: 2385-85-5	production	none
	use	none
Toxaphene CAS no.: 8001-35-2	production	none
	use	none
Polychlorinated biphenyls (PCBs) CAS no.: various	production	none
	use	specific exemption: products used in accordance with the provisions of Part II of this Annex (A)
DDT 1,1,1-trichloro-2,2 bis(4-chlorophenyl)ethane CAS no.: 50-29-3	production	acceptable purpose: use for disease vector control in accordance with Part II of this Annex (B)
	use	acceptable purpose: disease vector control in accordance with Part II of this Annex (B)
Alpha hexachlorocyclohexane CAS no.: 319-84-6	production	none
	use	none
Beta hexachlorocyclohexane CAS no.: 319-85-7	production	none
	use	none

Chemical substance	Activity	Specific exemption/acceptable purpose
Chlordecone CAS no.: 143-50-0	production	none
	use	none
Hexabromobiphenyl CAS no.: 36355-01-8	production	none
	use	none
Hexabromodiphenyl ether and heptabromodiphenyl ether (the exact identification of the compounds is given in Part III of Annex A, labelled 'Definitions')	production	none
	use	specific exemption: products in accordance with the provisions of Part IV of this Annex (A)
Lindane CAS no.: 58-89-9	production	none
	use	specific exemption: human health pharmaceutical for the control of head lice and scabies as second line treatment
Tetrabromodiphenyl ether and pentabromodiphenyl ether (the exact identification of the compounds is given in Part III of Annex A, labelled 'Definitions')	production	none
	use	specific exemption: products in accordance with the provisions of Part V of this Annex (A)
Pentachlorobenzene no. CAS :608-93-5	production	none
	use	none
Perfluorooctanesulfonic acid, its salts and perfluorooctanesulfonyl fluoride CAS no.: 1763-23-1, 307-35-7 and others	production	acceptable purpose: In accordance with part III of this Annex, production of other chemicals to be used solely for the use below. Production for uses listed below. Specific exemption: None
	use	acceptable purpose: In accordance with part III of this Annex for the following acceptable purpose, or as an intermediate in the production of chemicals with the following acceptable purpose: - Insect baits with sulfluramid (CAS No. 4151-50-2) as an active ingredient for control of leaf-cutting ants from Atta spp. and Acromyrmex spp. for agricultural use only specific exemption: - Metal plating (hard-metal plating) only in closed-loop systems - Fire-fighting foam for liquid fuel vapour suppression and liquid fuel fires (Class B fires) in installed systems, including both mobile and fixed systems, in accordance with paragraph 10 of part III of this Annex
Technical endosulfan and its isomers CAS no.: 959-98-8, 33213-65-9, 115-29-7, 1031-07-8	production	specific exemption: permitted for the parties listed in the register
	use	specific exemption: a group of crop-specific pests listed in accordance with the provisions of Part VI of this Annex (A)
Hexabromocyclododecane (the exact identification of the compound is presented in Part III of Annex A, marked 'Definitions')	production	specific exemption: as permitted for the Parties listed in the Register in accordance with the provisions of Part VII of this Annex (A)
	use	specific exemption: expanded polystyrene and extruded polystyrene in buildings in accordance with the provisions of Part VII of this Annex (A)
Hexachlorobutadiene CAS no.: 87-68-3	production	none
	use	none
Pentachlorophenol and its salts and esters CAS no.: 87-86-5, 131-52-2, 27735-64-4, 3772-94-9, 1825-21-4	production	specific exemption: as permitted for the Parties listed in the Register in accordance with the provisions of Part VIII of this Annex (A)
	use	specific exemption: pentachlorophenol for poles and crossbeams in accordance with the provisions of Part VIII of this Annex (A)
Polychlorinated naphthalenes, including dichlorinated naphthalenes,	production	specific exemption: intermediates in the production of polyfluorinated

Chemical substance	Activity	Specific exemption/acceptable purpose
trichlorinated naphthalenes, tetrachlorinated naphthalenes, pentachlorinated naphthalenes, hexachlorinated naphthalenes, heptachlorinated naphthalenes and octachloronaphthalene CAS no.: various		naphthalenes, including octafluoronaphthalene
	use	specific exemption: production of polyfluorinated naphthalenes, including octafluoronaphthalene
Decabromodiphenyl ether (commercial mixture, c-decaBDE), CAS no.: 1163-19-5	production	specific exemption: As allowed for the Parties listed in the Register
	use	specific exemption: In accordance with Part IX of this Annex: - Parts for use in vehicles specified in paragraph 2 of Part IX of this Annex - Aircraft for which type approval has been applied for before December 2018 and has been received before December 2022 and spare parts for those aircraft - Textile products that require anti-flammable characteristics, excluding clothing and toys - Additives in plastic housings and parts used for heating home appliances, irons, fans, immersion heaters that contain or are in direct contact with electrical parts or are required to comply with fire retardancy standards, at concentrations lower than 10 per cent by weight of the part - Polyurethane foam for building insulation
Short-chain chlorinated paraffins (alkanes, C10-13, chlorine): straight-chain chlorinated hydrocarbons with chain lengths from C10 to C13 and a chlorine content exceeding 48 % by weight, for example: substances with the following CAS no.: 85535-84-8; 68920-70-7; 71011-12-6; 85536-22-7; 85681-73-8; 108171-26-2.	production	specific exemption: As allowed for the Parties listed in the Register
	use	specific exemption: - Additives in the production of transmission belts in the natural and synthetic rubber industry - Spare parts of rubber conveyor belts in the mining and forestry industries - Leather industry, in particular fatliquoring in leather - Lubricant additives, in particular for engines of automobiles, electric generators and wind power facilities, and for drilling in oil and gas exploration and petroleum refining to produce diesel oil - Tubes for outdoor decoration bulbs - Waterproofing and fire-retardant paints - Adhesives - Metal processing - Secondary plasticizers in flexible polyvinyl chloride, except in toys and children's products
Dicofol CAS no: 115-32-2, 10606-46-9	production	specific exemption: none
	use	specific exemption: none
Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds Indicative list of substances covered by the list of PFOA, its salts and PFOA-related compounds (UNEP/POP/POPRC.17/INF/14/Rev.1)	production	specific exemption: - Fire-fighting foam: None - For other production, as allowed for the Parties listed in the Register in accordance with the provisions of part X of this Annex
	use	specific exemption: In accordance with the provisions of part X of this Annex: - Photolithography or etch processes in semiconductor manufacturing - Photographic coatings applied to films - Textiles for oil and water repellency for the protection of workers from dangerous liquids that comprise risks to their health and safety - Invasive and implantable medical devices - Fire-fighting foam for liquid fuel vapour suppression and liquid fuel fires (Class B fires) in installed systems, including both mobile and fixed systems, in accordance with paragraph 2 of part X of this Annex - Use of perfluorooctyl iodide for the production of

Chemical substance	Activity	Specific exemption/acceptable purpose
		perfluorooctyl bromide for the purpose of producing pharmaceutical products, in accordance with the provisions of paragraph 3 of part X of this Annex - Manufacture of polytetrafluoroethylene (PTFE) and polyvinylidene fluoride (PVDF) for the production of: o High-performance, corrosion-resistant gas filter membranes, water filter membranes and membranes for medical textiles o Industrial waste heat exchanger equipment o Industrial sealants capable of preventing leakage of volatile organic compounds and PM2.5 particulates - Manufacture of polyfluoroethylene propylene (FEP) for the production of high-voltage electrical wire and cables for power transmission - Manufacture of fluoroelastomers for the production of O-rings, v-belts and plastic accessories for car interiors
Perfluorohexanesulfonic acid (PFHxS), its salts and PFHxS related compounds Draft indicative list of substances included in the list of PFHxS, its salts and PFHxS-related compounds (UNEP/POP/POPRC.15/INF/9)	production	specific exemption: none
	use	specific exemption: none
Methoxychlor any possible isomer of dimethoxydiphenyltrichloroethane or any combination thereof, e.g.: CAS No: 72-43-5;30667-99-3;76733-77-2;255065-25-9;255065-26-0;59424-81-6;1348358-72-4.	production	specific exemption: none
	use	specific exemption: none
UV 328 CAS number: 25973-55-1	production	specific exemption: As allowed for the Parties listed in the Register in accordance with the provisions of part XII of this Annex
	use	specific exemption: In accordance with part XII of this Annex: - Parts of motor vehicles (covering all land-based vehicles, such as cars, motorcycles, agricultural and construction vehicles and industrial trucks), such as bumper systems, radiator grills, spoilers, car garnish, roof modules, soft/hard tops, trunk lids and rear window wipers - Industrial coating applications for motor vehicles, engineering machines, rail transportation vehicles, and heavy-duty coatings for large steel structures - Mechanical separators in blood collection tubes - Triacetyl cellulose (TAC) film in polarizers - Photographic paper - Replacement parts for articles in applications in accordance with the provisions of paragraphs 2 and 3 of part XII of this Annex
Dechlorane plus CAS no.: 13560-89-9; 135821-03-3; 135821-74-8	production	specific exemption: none
	use	specific exemption: In accordance with part XI of this Annex: - Aerospace - Space and defence applications - Medical imaging and radiotherapy devices and installations - Replacement parts for, and repair of, articles in applications in accordance with the provisions of paragraphs 2 and 3 of part XI of this Annex

Part III refers to polybrominated diphenyl ethers and specifies which diphenylethers the Convention covers and provides definitions for these substances. **Part IV** and **Part V** are also dedicated to diphenylethers and determine the conditions for use for specific exemptions for these substances.
Part VI on endosulfan specifies exemptions and provides a list of plants, and the bound pests against which it is possible to produce and use endosulfan.
Part VII is dedicated to hexabromocyclododecane and states the obligation of each Party, which registered a specific exemption for the production and use of hexabromocyclododecane for expanded polystyrene and extruded polystyrene in buildings, to take the necessary measures to ensure that the expanded polystyrene and extruded polystyrene containing hexabromocyclododecane can be easily identified throughout the life-cycle by labels or by other means.
Part VIII on pentachlorophenol similarly indicates that each Party that registered a specific exemption for the production and use of pentachlorophenol for poles and crossbeams take the necessary measures to ensure that the poles and crossbeams containing pentachlorophenol can be easily identified throughout the life-cycle by labels or by other means. Items treated with pentachlorophenol should not be reused for purposes other than those that have an exemption.
Part IX is dedicated to decabromodiphenyl ether and specifies the components for which this substance is permitted.
Part X further specifies the restrictions for PFOA-based compounds mainly in relation to fire-fighting foams.
Part XI is dedicated to further specification of the exemption for spare parts containing dechloran plus.
Part XII is dedicated to further specification of the exemption for spare parts containing UV 328.

Annex B (Restrictions), **Part II** imposes a series of additional measures for DDT such as:
- the establishment of the DDT register
- the use of DDT for disease vector control in accordance with World Health Organization recommendations and guidelines
- providing information on the use of DDT every three years
- the development of safe alternative chemical and non-chemical products.

Part III contains complementary measures against PFOS-based compounds imposed Parties registering specific exemptions/acceptable purposes to progressively restrict the production and use of PFOS, and indicates the obligation to report on the progress in restriction.
Similarly, **Annex C** (Unintentional Production) lists additional parts. **Parts II and III** list the categories of sources from which POPs listed in this Annex are/may be released, **Part IV** provides general definitions and **Part V** provides general guidance to Parties on the implementation of Best Available Techniques and Best Environmental Practices (BAT/BEP); basic tools for preventing and limiting releases of substances in this Annex - for more details on Annex C substances see chapter *2.4 Assessment of substances in Annex C*.

2. ASSESSMENT OF POPS IN THE CZECH REPUBLIC

An integral part of the national implementation plans should also be general information about the state for which they are created. This information remains the same for the Czech Republic, so it is possible to use the original wording of Chapter *2.1 State characteristics* – of the first NIP *(*2006). The institutional and policy framework of the Czech Republic has also not changed and more details can be found in the text of Chapter *2.2. Institutional, policy and legislative framework* in the NIP 2012 (more specifically parts 2.2.1 to 2.2.3). However, changes over time have been recorded by legislation and the following chapter summarises the most important current regulations in the Czech Republic in relation to POPs as of August 2023.

More detailed information on EU-level legislation can be found in the EU Implementation Plan and its updates, also published on the website of the Convention: http://chm.POP.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx.

2.1. Key legal regulations related to POPs - as of August 2023

For the Czech Republic, the basic legislation in the POPs area is Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (revised version) (hereinafter referred to as '**Regulation (EU) 2019/1021**'), which is directly applicable in the national legal order and is superior to the original national provisions in this area. This Regulation replaced 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, as referred to in previous

versions of the NIP. The Regulation transposes the commitments of two international treaties, the Stockholm Convention on Persistent Organic Pollutants and the Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution (CLRTAP, 1998). The two Conventions address the issue of POPs in relation to the environment, but the scope, lists and method of inclusion of substances in each instrument are not fully identical. The Stockholm Convention is a global treaty concluded under the United Nations Environment Programme (UNEP) and covers selected POPs in all components of the environment. The CLRTAP Convention only applies to the region covered by the UNECE and the Protocol on POPs only focuses on air. The similarity between the Protocol on POPs and the Stockholm Convention is due to the fact that the Protocol, which was created earlier, was taken as a basis for the global Stockholm Convention. By 2023, a number of amendments to Regulation (EU) 2019/1021 were adopted to reflect the inclusion of new substances in both the Stockholm Convention and the Protocol on POPs. Regulation (EU) 2019/1021, including the latest amendments and consolidated versions, is available via EUR-Lex in all EU languages.

Two acts - Act **No. 350/2011 Coll.**, on Chemicals and Chemical Mixtures and on Amendments to Certain Acts (Chemical Act), as amended, and **Act No. 541/2020 Coll.**, on Waste, adapt the Czech legal system to the above-mentioned Regulation (EU) 2019/1021. As the Regulation is a directly applicable regulation, the adaptation consists mainly in the set levels of penalties for breaches thereof. In addition, Act No. 541/2020 Coll. implements the EU Directive on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT).

The **Chemical Act** is the basic instrument for chemicals in the Czech Republic. Regulation (EU) 2019/1021, directly relates to Section 34 (Offences by legal persons and natural persons engaged in business), namely paragraphs 4(b), 23 and 24(b) and (e). There is a possibility of penalties of up to CZK 3,000,000 for the violation of the Regulation in relation to the production, marketing and use of POPs substances and up to CZK 500,000 for failure to report POP stocks. Inspections under this Act are carried out by the Czech Environmental Inspectorate, regional public health offices, customs offices, the State Labour Inspectorate and the Central Institute for Supervising and Testing in Agriculture.

In **Act No. 541/2020 Coll.**, **on Waste**, Sections 81, 82, 83 define the obligations for the management of PCB waste and Section 84 defines POP waste. Penalty provisions for waste with POPs are contained in Section 121(3)(j)-(q) and the penalties in Section 121(5)(b)-(d) range from CZK 1,000,000 to CZK 25,000,000. The exercise of public administration in the field of waste management is established by Section 134(1)(d), control of the management of waste with POPs is in the hands of the Czech Environmental Inspectorate.

The overarching EU regulation for chemicals management is the regulation **REACH**[1]. The second key regulation is the **CLP Regulation**[2]. Substances identified as persistent, bio-accumulative and toxic (**PBT properties**) or very persistent and very bio-accumulative **(vPvB properties**) in the REACH assessment are restricted/banned under REACH and many substances so assessed were later included in the Stockholm Convention or are candidate substances, i.e. proposed for inclusion in the Convention.

The key change to the CLP Regulation in this context was **Commission Delegated Regulation (EU) 2023/707** of 19 December 2022 amending Regulation (EC) No 1272/2008 as regards hazard classes and criteria for the classification, labelling and packaging of substances and mixtures, which introduces new hazard classes and criteria for the classification, labelling and packaging of substances and mixtures, including 4.3. Persistent, bio accumulative and toxic or very persistent and very bio-accumulative properties and 4.4 Persistent, mobile and toxic or highly persistent and highly mobile properties.

In the thematic groups below, other legislation that has the greatest impact on the issue of POPs is listed.

Legislation aimed at pesticides and fertilizers

Act No. 326/2004 Coll., on Phytosanitary Care and Amendments to Some Related Acts, as amended. Implementing regulations to this act regarding plant protection products have been issued:

[1] Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals, establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93, Commission Regulation (EC) No 1488/94, Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, as amended

[2] Regulation (EC) No 1272/2008 of the European Parliament and of the Council on the classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006, as amended

Decree No 327/2012 Coll., on the protection of bees, wildlife, aquatic organisms and other non-target organisms when using plant protection products
Decree No 32132/2018 Coll., on preparations and auxiliary plant protection products
Decree No. 206/2012 Coll., on professional qualification in the phytosanitary care sector
Act No. 156/1998 Coll., on Fertilisers, Soil Auxiliary Substances, Auxiliary Plant Preparations and Substrates and on Agrochemical Soil Testing (Fertiliser Act), as amended
The following implementing regulations on fertilisers and sediments have been issued for the Act:
Decree No. 309/2021 Coll., on sampling and analysis of fertiliser samples
Decree No. 474/2000 Coll., on laying down requirements for fertilisers
Decree No. 257/2009 Coll., on the use of sediments on agricultural land

Legislation on the prevention of major accidents
Act No. 224/2015 Coll. of 12 August 2015 on the Prevention of Major Accidents Caused by Selected Hazardous Chemical Substances or Chemical Mixtures and Amending Act No. 634/2004 Coll., on Administrative Fees, as amended (Act on the Prevention of Major Accidents).
Implementing regulations to the Act:
Decree No. 227/2015 Coll., on particulars of safety documentation and extent of the information provided by processors of the report
Decree No. 228/2015 Coll., which designates the scope of the processing of public information, notifications on a major accident and final report of the incidence and consequences of a major accident
Decree No. 229/2015 Coll., on how to prepare the draft of the annual plan of inspections and formalities regarding the content of the information on the outcome of the inspection and the control report
Decree No. 225/2015 Coll., on determining the extent of security measures of physical protection of the building included in group A or group B
Decree No. 226/2015 Coll., on the principles for defining the zones of emergency planning and procedures for the definition and content requisites for the external emergency plan and its structure

Legislation in the field of air protection with the impact on emissions and monitoring of POPs
Act No. 201/2012 Coll., on Air Protection
Decree No. 415/2012 Coll., on the permissible level of pollution and its detection and implementation of certain other provisions of the Air Protection Act
Decree No. 330/2012 Coll., on the method of assessing and evaluating pollution levels, the extent of informing the public about pollution levels and smog situations

Legislation aimed at agricultural land
Act No. 334/1992 Coll., on the Protection of the Agricultural Land Fund, as amended
Decree No. 153/2016 Coll. laying down details of the protection of quality of agricultural land and amending Decree No. 13/1994 Coll., setting forth the details on the protection of agricultural land. The limit values are determined and already used as indicators for soil assessment. According to the aforementioned law, there are two levels: preventive levels of hazardous substances in agricultural soil (mg.kg^{-1} DM) (for ΣPAU, ΣPCB, ΣDDT, HCB, HCH (Σ α+β+γ), PCDD/F, C 10 - C 40 hydrocarbons) which represent the upper limits of the levels of risk substances and the indicative levels of risk substances (for benzo(a)pyrene, Σ PAH, Σ PCB, Σ DDT, HCB, HCH (Σ α+β+γ), PCDD/F), above which there is a risk to the health of food or feed, a direct risk to human or animal health from contact with soil and a negative effect on the productive function of agricultural soils (mg.kg^{-1} DM).
Decree No. 257/2009 Coll., on the use of sediments on agricultural land
Decree No. 48/2011 Coll., on the determination of protection classes
The Fertilisers Act, listed under *Legislation aimed at Pesticides and Fertilisers* (see above), also has a direct link.
Decree No. 275/1998 Coll., on agrochemical testing of agricultural soils and determination of soil properties of forest land, as amended

Legislation aimed at water
Act No. 254/2001 Coll., on Waters and on Amendments to Certain Acts (Water Act), as amended, and its implementing regulations
Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas, as amended. Annex 6 provides a list of priority substances and priority hazardous substances in which POPs are included (alachlor, brominated diphenyl ethers, chloroalkanes 10-13, endosulfan, HCB, HCBD, HCH, PeCBz, PCP, PAHs, PFOS,

dioxins and dioxin-like compounds, HBCDDs, heptachlor). If the environmental quality standards for these substances are exceeded, reduction measures must be implemented.
Government Regulation No. 57/2016 Coll., on the indicators and the level of acceptable pollution of waste water and on characteristics of the permit for discharge of wastewater into groundwater
Decree No.252/2004 Coll., on laying down the health requirements on drinkable and hot water and the frequency and extent of inspections of drinkable water, as amended
Decree No. 450/2005 Coll., on essential elements of the use of harmful substances and essential elements of the emergency plan, the method and scope of reporting accidents, their amelioration and elimination of their harmful effects, as amended
Decree No 5/2011 Coll., on the definition of hydrological districts and groundwater bodies, the method of assessing the status of groundwater and the details of groundwater status detection and assessment programmes, as amended
Decree No. 50/2023 Coll., on river basin plans and flood risk management plans
Decree No 98/2011 Coll., on the method of assessing the status of surface water bodies, the method of assessing the ecological potential of heavily impacted and artificial surface water bodies and the identification of programmes for the detection and assessment of the status of surface waters, as amended
Government Regulation No. 262/2012 Coll., on the determination of vulnerable areas and the action programme, as amended

Legislation aimed at waste management
Management of waste containing POPs is regulated by **Act No. 541/2020 Coll., on Waste**.
A number of implementing regulations have been adopted for the Waste Act (the following are selected regulations currently in force):
Acts:
- 542/2020 Coll. Act on End-of-life Products
- 477/2001 Coll. Act on Packaging and on Amendments to Certain Acts
- 243/2022 Coll. Act on the Reduction of the Impact of Certain Plastic Products on the Environment.

Regulation 111/2002 Coll. Government Regulation setting the amount of the deposit for selected types of returnable deposit packaging
Decree:
- 8/2021 Coll. Decree on the Waste Catalogue and the assessment of waste properties (Waste Catalogue)
- 16/2022 Coll. Decree on details of the management of certain end-of-life products
- 30/2021 Coll. Decree on the implementation of certain provisions of the Packaging Act
- 47/2023 Coll. Decree on the implementation of certain provisions of the Act on the Reduction of the Impact of Certain Plastic Products on the Environment
- 169/2023 Coll. Decree laying down the conditions under which solid fuel from waste ceases to be waste
- 273/2021 Coll. Decree on the details of waste management
- 245/2021 Coll. Decree on the details of the disposal of end-of-life vehicles

Legislation aimed at food
Act No. 110/1997 Coll., on Food and Tobacco Products, as amended
Government Regulation No 98/2005 Coll., establishing a rapid alert system for the emergence of a risk to human health from food and feed
Decree No 253/2018 Coll., on requirements for extraction solvents used in food production
Decree No 58/2018 Coll., on food supplements and food composition
Decree No. 298/2012 Coll., repealing Decree No. 235/2010 Coll., laying down requirements for purity and the identification of additives, as amended
Decree No. 277/2010 Coll., repealing Decree No. 273/2000 Coll. of the Ministry of Health, laying down the maximum permissible residues of veterinary medicinal products and biologically active substances used in animal production in foodstuffs and food raw materials, as amended
Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC
Commission Regulation (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in foodstuffs and repealing Regulation (EC) No 1881/2006

Legislation aimed at environmental liability

Act No. 167/2008 Coll., on the Prevention and Remediation of Environmental Damage and on Amendments to Certain Acts, as amended

Government Regulation No. 295/2011 Coll., on environmental damage risk assessment and detailed conditions of the financial security

Decree No. 17/2009 Coll., on the detection and remediation of ecological damage to land

Horizontal legislation

Act No. 76/2002 Coll., on Integrated Pollution Prevention and Control, on the Integrated Pollution Register and on Amendments to Certain Acts (Integrated Prevention Act), as amended

Act No. 25/2008 Coll., as amended, on the Integrated Pollution Register and the Integrated System for Compliance with Environmental Reporting Obligations and on Amendments to Certain Acts, as amended

Government Regulation No. 145/2008 Coll., establishing a list of pollutants and threshold values and data required for reporting to the Integrated Pollution Register, as amended

Decree No. 288/2013 Coll., on the implementation of certain provisions of the Integrated Prevention Act

Act No. 100/2001 Coll., on Environmental Impact Assessment and on Amendments to Certain Related Acts (Environmental Impact Assessment Act), as amended

Act No. 258/2000 Coll., on the Protection of Public Health and on Amendments to Certain Related Acts, as amended

Government Regulation No. 361/2007 Coll., laying down the conditions for occupational health protection

Decree No 432/2003 Coll., laying down the conditions for categorising work, limit values for biological exposure test indicators, conditions for the collection of biological material for biological exposure tests and the requirements for reporting work with asbestos and biological agents

Decree No. 6/2003 Coll., establishing hygienic limits of chemical, physical and biological indicators for the indoor environment of living rooms of certain buildings

Decree No. 428/2004 Coll., on obtaining professional competence to handle hazardous chemicals and chemical preparations classified as highly toxic

Act No. 120/2002 Coll., on the Conditions for Placing Biocidal Products and Active Substances on the Market and Amending Certain Related Regulations

Act No. 324/2016 Coll., on Biocidal Products and Active Substances and Amending Certain Related Acts (Biocides Act)

2.2. The status of implementation of POPs measures in the Czech Republic

The obligations that the Parties must fulfil with respect to POPs are derived from the text of the Convention and from decisions taken by the COP. The measures are general, identical for all the POPs classified and include compliance with rules for the management of their stocks, waste, monitoring and prevention of releases into the environment or monitoring of POPs in prescribed environmental components.

Further measures in relation to the manufacture, use, import and export of specific substances depend on the Annex in which the substances are listed (Annexes A, B, C and, as mentioned above, it is possible to list a substance in two Annexes i.e. A and C or B and C). Simply put, Annex A substances are banned, Annex B substances are subject to restrictions. The manufacture, use, export and import of Annex A and B substances are prohibited/restricted. For substances listed in Annex C, i.e. substances not directly produced but released into the environment by human activities such as combustion, the main objective of the measures taken is to minimise or eliminate such releases.

An overview of all the POPs included in Annexes A, B or C of the Stockholm Convention by 2024 is shown in **Table 3**, which is again an update of the table in previous versions of the NIP and summarises the situation regarding their production, use and generation in the Czech Republic. Rows with substances newly added to the table since the last update are again highlighted.

2.3. Assessment of POPs listed in Annexes A and B

Within this chapter, substances are discussed mainly from the perspective of fulfilling the obligations of prohibition/restriction of their production and use resulting from their inclusion in the listed Annexes, or

specific problems that are being addressed in the Czech Republic in connection with the substance. POPs included in Annexes A and B are prohibited from production and use except to the extent permitted by specific exemptions and acceptable purposes. The issues of contaminated sites, waste, and monitoring are mentioned here with general conclusions; these topics are discussed in more detail in separate chapters.
The registration of exemptions is EU-wide and is sent to the Secretariat by the European Commission, based on EU legislation. As of August 2023, the EU has registered exemptions for decaBDE and PFOA-based compounds.
Exemptions are defined for Member States in Regulation (EU) 2019/1021, which transposes the obligations of the Convention. Although the extent of the registered exemptions does not exceed that defined by the Convention, the exemptions in the Regulation are not always fully identical to those in the Convention and are sometimes more restrictive and use the terminology of EU legislation. Discussions on the need for exemptions is ongoing in the context of the meetings of the competent authorities of the Member States on this Regulation and the actual changes to the Regulation have been made since 2018 by means of so-called delegated acts. In the Czech Republic, the negotiating position on exemptions is approved inter-ministerially.

The registration of a specific exemption or acceptable purpose implies an obligation for a Party to seek and adopt national measures to reduce or eliminate the need for such exemptions. A *Party may at any time notify the Secretariat of the Convention in writing of the cessation of the need to use the exemption, and the Secretariat shall then remove that Party from the relevant register*.

Substances included in the Convention up to and including 2015 have already been covered by the inventory and follow-up tasks of previous versions of the NIP and are discussed in this update with respect to the current status and implementation of previous tasks and targeted for persistent problems. The assessment and baseline inventory of substances included in the Convention in 2017, 2019, 2022 and 2023 (i.e. after the publication of the previous version of the NIP) are presented in a separate chapter *2.5. Basic inventory and assessment of newly classified substances in the Czech Republic*.
In the Czech Republic, POPs that were included in the Convention by 2015 are no longer produced or used in production. However, products manufactured and placed on the market before the ban can still be used. Typical examples are products containing so-called brominated flame retardants. The substances can also still be used as standards for research purposes.

Table 3: Production, use and unintentional production/formation of POPs in the Czech Republic

Substance	Purpose of use/origin	Production	Use	Note
Aldrin	pesticide	no	no or minimal (banned in 1980)	Registration 1962-1963
1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane (DDT) and its metabolites	pesticide	yes	yes, until 1974, when it was officially banned. Complete termination of use not until 1978-1983.	Registration 1958-1973 (various preparations)
Dieldrin	pesticide	no	yes, until 1969 (officially banned)	Registration 1960-1968
Endrin	pesticide	no	yes, until 1984 (officially banned)	Registration 1960-1983
Heptachlor	pesticide	no	yes, until 1986 (officially banned)	Registration 1970-1985
Hexachlorobenzene	pesticide, industrial chemical, by-product	yes, until 1968, Spolana	yes, until 1977 (officially banned)	HCB is an unintentional by-product of the production of chlorinated hydrocarbons
Chlordane	pesticide	no	no	
Lindane/ Hexachlorocyclohexanes	pesticide, by-product	yes (until 1977)	yes, at least until 1975 (officially banned since 2010)	Registration 1952-1970, from 1956 only lindane used and only in

Substance	Purpose of use/origin	Production	Use	Note
				forestry
Mirex	pesticide	no	no	
Toxaphene	pesticide	no	yes, until 1986 (officially banned in 1984)	Registration 1958-1983
Polychlorinated biphenyls	industrial chemical, by-product	yes, in 1959-1984	yes	for more details see chap. 2.3.2 of this document
Polychlorinated dibenzo-p-dioxins and dibenzofurans	by-product	-	-	Only unintentional production - combustion processes
Perfluorooctane sulfonic acid, its salts and perfluorooctane, sulfonyl fluoride (PFOS comp.)	industrial chemical	no	yes	for more details see chap. 2.3.2 of this document
Hexabromodiphenyl ether and heptabromodiphenyl ether	industrial chemical	no	yes	for more details see chap. 2.3.2 of this document
Tetrabromodiphenyl ether and pentabromodiphenyl ether	industrial chemical	no	yes	for more details see chap. 2.3.2 of this document
Chlordecone	pesticide	no	no	
Hexabromobiphenyl	industrial chemical	no	no	
Pentachlorobenzene	pesticide, industrial chemical, by-product	no	yes	is formed as a necessary and unintentional by-product of the production of chlorinated hydrocarbons
Technical endosulfan and its salts	pesticide	no	yes	In the past, it was used on a limited basis as an insecticide and to protect wood
Hexabromocyclododecane	industrial chemical	no	yes	
Pentachlorophenol its salts and esters	pesticide	yes	yes, probably until the 90s of the 20th century	
Polychlorinated naphthalenes	industrial chemical, by-product	no	no or minimally	current formation in unintentional production
Hexachlorobutadiene	industrial chemical, by-product (included in Annex C in 2017)	no	no or minimally	current formation in unintentional production
Short-chain chlorinated paraffins	industrial chemical	no	yes	for more details see chap. 2.5. Basic inventory and assessment of newly listed substances
Decabromodiphenyl ether	industrial chemical	no	yes	
Perfluorooctanoic acid (CAS No 335-67-1, PFOA), its salts and PFOA-related compounds	industrial chemical	no	yes	
Dicofol (CAS No 115-32-2)	pesticide	no	yes (banned since 2010)	
Perfluorohexanesulfonic acid (PFHxS, CAS No 355-46-4), its salts and PFHxS-related compounds	industrial chemical	no	no	
Methoxychlor	pesticide	no	no	
UV 328	industrial	no	yes	

Substance	Purpose of use/origin	Production	Use	Note
	chemical			
Dechloran plus	industrial chemical	no	yes	

2.3.1. Assessment of pesticides in Annex A

The chapter deals with pesticides classified in 2004, 2009, 2011, 2015 - aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), pentachlorobenzene (PeCB), chlordane, chlordecone, mirex, toxaphene, three isomers of HCH and endosulfan. HCB and PeCB are also included as industrial chemicals in Annex C and information on them is included in the following chapters *2.3.2. Assessment of industrial chemicals in Annex A* and *2.4. Assessment of substances in Annex C*. Information on dicofol and methoxychlor is given in Chapter *2.5. Basic inventory and assessment of newly classified substances*.

The term obsolete organochlorine pesticides (OCP) is used for pesticides used in the past and, as shown in summary table 3 of this document, many of the pesticides included in the Convention were not used at all in the Czech Republic or their production and use ended many years ago. Similarly, unconsumed stocks or waste of these substances were already disposed of under the programmes carried out by the Ministry of Agriculture (MoA) in the early 1990s, when most (but not all) of the stocks were incinerated. The MoA completed the identification and area remediation of sites contaminated with obsolete pesticides on 1 January 2011. In the Czech Republic, it is assumed that the storage or waste of these substances no longer occurs in large volumes; if it does occur, it is in a smaller quantity and its disposal is carried out individually, at the owner's expense. Pentachlorophenol is a certain exception; it was used as a biocide for wood protection, was produced in the Czech Republic in the past and applied quite intensively, so it can still be found in wood products that were treated with this biocide. However, even here it is assumed that, due to the end of life of most of these products, they have either already been incinerated or landfilled. More detailed information on this issue is provided in the previous version of the NIP, 2018.
As a consequence of the long-term use of some of the pesticides listed in the Convention on the territory of the Czech Republic in the past, their persistent occurrence is monitored mainly in the framework of water and agricultural legislation. Dietary exposure is still monitored and assessed for certain pesticides.
Chlordane, endosulfan, heptachlor, hexachlorobenzene, and HCH isomers are on the list of pesticide residues, or combinations thereof, analysed in food of animal origin. In addition, endosulfan (sum of alpha- and betaisomers and endosulfan sulphate expressed as endosulfan) is on the list of pesticide residues, or combinations thereof, analysed in products of plant origin. The lists are part of the Multi-annual Pesticide Residue Monitoring Plan 2023-2025 issued by the Ministry of Health under Regulation (EC) No 396/2005[3].
However, when these pesticides are detected, they are at very low concentrations. Some pesticides are also detected in imported products.
Further information on the monitoring of OCPs in the environment of the Czech Republic is given in Chapter *2.10. Technical infrastructure for POPs assessment*. For more detailed information on the substances and on the issue of obsolete pesticides in the Czech Republic, it is possible to use the first NIP, 2006 *(2.3.1 Assessment of Chemicals under Annex A Part I (POP pesticides): historical, current and planned production, use, import and export. Existing Policy and Legislative Framework), as well as Annex 2* (NIP, 2006) for further details and also *Annex 1 P.1.8- P. 1.11* in NIP, 2012.

Conclusions
The use of pesticides listed in the Convention has been banned in the Czech Republic for a relatively long time and their stocks and waste have already been disposed of in an environmentally sound manner under a number of programmes that have been carried out for this purpose in the past. However, problems with these pesticides and the sites contaminated with them persist. The issue is discussed in more detail in a separate text in Chapter *2.7. Identification of contaminated sites*, which also deals with solutions for waste or illegal OCP landfills, which are already being dealt with in the Czech Republic on a case-by-case basis, and existing financial instruments for removal are listed at the end of the chapter. The monitoring of pesticides, including those included in the Convention, is relatively well set up in the Czech Republic and an overview of the relevant programmes of individual

[3] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC Text with EEA relevance

ministries has been summarised in the document '**Setting up POP monitoring and processing and use of POP data in the Czech Republic** (current version from 2019)' available on the website of the Ministry of the Environment. More detailed information on monitoring is provided in Section *2.10.1. Monitoring*. The results of public health monitoring confirm the persistence of the surface contamination of food with OCPs at low concentrations, which, according to current knowledge, do not pose a significant health risk when assessed as individual chemicals rather than in mixtures. Therefore, the checking of OCP content in food should still be maintained for imported and randomly also for domestic food (especially of animal origin).

2.3.2. Assessment of industrial chemicals in Annex A

The chapter deals with industrial chemicals listed in the years 2004, 2009 and 2011 - hexabromobiphenyl (HBB), polychlorinated biphenyls (PCBs), brominated diphenyl ethers (tetra- to heptaBDE), hexachlorobenzene (HCB) and pentachlorobenzene (PeCB). HCB and PeCB are simultaneously also pesticides (see previous chapter). PCBs, HCB and PeCBs are also included in Annex C of the Convention. Further information on measures against Annex C substances is given in Chapter *2.4. Assessment of substances in Annex C*.

Hexabromobiphenyl (HBB), pentachlorobenzene (PeCB), hexachlorobenzene (HCB)

Of these three compounds, only HCB was previously intentionally produced and used in the Czech Republic, the other two were not. No information is available on their potential presence in used products, but it is not expected given that they were part of products that are likely to have reached the end of their useful life.

Conclusions

HCB and PeCB continue to be produced in the Czech Republic as unintentional by-products of chlorinated compounds production. Some occurrence of the compound HBB may also be observed in waste, but is expected to be minimal. More detailed information in chapter *2.4. Assessment of substances in Annex C and 2.6. Stockpiles and wastes with POPs.*

Hexabromocyclododecane (HBCDD)

HBCDD was not produced in the Czech Republic, but was used quite a lot. It is assumed that polystyrene with HBCDD may have been imported into the Czech Republic since 1989. In 1995, Kaučuk Kralupy started to produce polystyrene with HBCDD; production using HBCDD ended in 2015. More detailed information is provided in the previous version of the NIP, 2018. There is now a complete ban on the production and use of HBCDDs, except for products that were in use prior to the ban.

Conclusions

The problem associated with HBCDDs is mainly at the waste stage, when plastics containing the substance become waste, and it is therefore necessary to prevent the substance from entering new products through recycling plastics and preventing releases into the environment. Further information on the issue of brominated flame retardants in waste streams is given in chapter *2.6.* Stockpiles and wastes with POPs*, the section Waste containing/contaminated with POPs*.

Polychlorinated biphenyls (PCBs)

The Czech Republic has a rich history of PCB use and production; the compounds were banned only in 1984. PCBs were used in so-called closed (transformers, capacitors) and open (coatings, sealants, about 21% of all use) applications. Detailed information on the history of the production, use and properties of the substances can be found in chapter *2.3.2 Assessment of chemical substances in Annex A, Part II Chemicals (PCBs)* in the original NIP (2006).

Annex A, Part II sets out the general procedure for eliminating the use of PCB equipment; the use of all PCB equipment must be phased out by 2025 at the latest, liquid PCB waste and equipment contaminated with PCBs in concentrations above 0,005 % must be disposed of in an environmentally sound manner by 2028

In the Czech Republic, equipment with PCBs that had a PCB volume greater than 5 litres had to be registered. Owners of such equipment, if the PCB concentration in the equipment was greater than 500 ppm, were obliged to decontaminate the equipment or hand it over for disposal by 31 December 2010 at the latest.

For all remaining equipment, the following obligations apply:

a) Transfer all equipment and waste containing PCBs to a waste management facility by the end of 2025 and decontaminate waste containing PCBs by that time.
b) Dispose of waste containing PCBs held by waste management facilities by the end of 2028.

The Waste Act sets out the basic obligations for the management of PCB waste and everyone is obliged to hand over PCBs, PCB waste or PCB-containing equipment for disposal or decontaminate PCB-containing equipment immediately after they become aware of the fact that they are the owner or operator of equipment containing PCBs or that PCBs, PCB waste or equipment containing PCBs are located on the land or in a building of which they are the owner.
If the equipment is lightly contaminated, it must be handed over for removal or decontaminated by 31 December 2025 at the latest; if it is equipment containing polychlorinated biphenyls with a filling volume of less than 5 litres, except for lightly contaminated equipment, it shall be handed over for removal or decontamination by the date specified in the relevant phasing-out plans for polychlorinated biphenyls or in the lists of equipment containing polychlorinated biphenyls not subject to continuous registration, but no later than 31 December 2022.
Equipment containing PCBs that has been transferred to a waste facility shall be disposed of within 1 year of such transfer. Disposal of PCBs shall only be possible in facilities designated for this purpose and shall be carried out by the methods listed in Annex 6 of the Waste Act under disposal codes D8, D9, D10, D12 and D15.
The owner or operator of decontaminated equipment and lightly contaminated equipment shall label that equipment. The owner and operator of lightly contaminated equipment shall maintain it until it is decommissioned in such a manner that the PCBs contained therein comply with the relevant technical standards, that the equipment is in good working order and that no release of its contents occurs.

The Ministry laid down by decree the conditions for the decontamination of equipment containing polychlorinated biphenyls and the method of labelling equipment containing polychlorinated biphenyls.

All the equipment currently in operation in the Czech Republic is fully compliant with the legislation, i.e. the PCB content is no higher than 500 ppm. All locations of such facilities (or companies) are precisely known and all such facilities are decontaminated on an ongoing basis according to a decontamination plan.
The Czech Republic is removing the equipment within its capacity. Currently, one facility in the Czech Republic is capable of incinerating PCB waste. The annual capacity of the facility is 25,000 tonnes, for all hazardous waste, incl. PCB. The import of PCB equipment intended for disposal is prohibited in the Czech Republic.
As of March 29, 2023, there are 185 pieces of large equipment in the Czech Republic containing over 5 litres of PCBs with a total weight of 64.0818 tonnes. Furthermore, there is equipment containing PCBs that is privately owned by ČEZ Distribuce, a.s. (11 101 units) and E.ON. Česká republika s.r.o. (3 230 units).
With regard to contaminated sites, as of March 2023, 693 contaminated or potentially contaminated PCB sites are registered in the CSMS database in the Czech Republic. The reason for the increase from 2017, when there were 397 sites, is the implementation of the National Inventory of Contaminated Sites project in 2018-2021. In fact, this does not mean that the number of contaminated sites in the Czech Republic has increased dramatically, but that they have now been mapped in more detail. Further information on the issue of contaminated sites is provided in Chapter *2.7. Identification of contaminated sites*.
Another problem associated with PCBs is their former use in open applications (coatings, sealants), used both indoors and outdoors. However, biomonitoring data in the Czech Republic do not indicate excessive exposure to PCBs from open applications and, moreover, show that elevated levels of PCBs in the Czech population are decreasing significantly over time. Further monitoring of PCBs in open applications in the Czech Republic is therefore not considered necessary as there is no evidence of open applications that pose a significant risk to the general public. A greater risk from open applications is in the release of PCBs into the environment.
However, new unintentional sources of PCBs from new paints and kitchen equipment (glued board furniture, detected as congener PCB11) may be of greater importance in the indoor environment.
The limitation of PCB release from scrap processing is addressed in the relevant BREF (Best Available Techniques (BAT) Reference Document for Iron and Steel Production, according to Directive 2010/75/EU on industrial emissions[4]).

[4] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

Prevention and protection against the introduction of PCBs (not only) into the Elbe River is addressed in a document approved in 2016 by the International Commission for the Protection of the Elbe entitled 'Prevention and protection against the introduction of PCBs and other pollutants from old coatings into watercourses in the international Elbe basin'
(MKOL-2016_Prevence_PCB_080916.pdf (ikse-mkol.org).

Conclusions

The Czech Republic is fulfilling its obligations. Regarding EU legislation, it pertains to the Council Directive 96/59/EC[5], which has been implemented into the Waste Act. According to the Waste Act, a database of facilities containing PCBs has been created and is maintained by CENIA, which receives and processes reports in this area. Equipment subject to registration is discarded, other equipment is allowed to be used until the end of its useful life. In accordance with the Convention and Regulation (EU) 2019/1021, all equipment with a filling size above 0.05 litres and a PCB concentration in the filling greater than 50 ppm must be decommissioned by the end of 2025. The number of these equipment in the Czech Republic is monitored and is slightly decreasing.

However, due to the historical production and former widespread use of PCBs in the Czech Republic, it is necessary to pay continuous attention to PCB-related issues. To date, there has not been an increased incidence of PCBs due to past applications in public buildings, but the potential for environmental contamination from disposal remains. The contamination of the human population in the Czech Republic is one of the highest in Europe, despite a significantly decreasing trend. The current PCB contamination of food in the Czech Republic is comparable to other European countries and does not represent a clearly elevated source of PCBs for the Czech population. In general, food of animal origin is among the most important sources of human exposure. Reducing the consumption of animal fats can contribute significantly to reducing the exposure dose. Therefore, in relation to population exposure to PCBs, it is recommended to continue to strictly inspect foods, especially those high in animal fats, and to promote the reduction of animal fat consumption in the population.

In view of the elevated levels of PCBs demonstrated in biomonitoring, it is recommended to continue to monitor POP levels in breast milk on a regular basis, annually, in a relevant population sample.

Tetra-, penta-, hexa-, heptabromodiphenyl ether and decabromodiphenyl ether

Tetra-, penta-, hexa- and hepta- and decabromodiphenyl ethers (PBDEs) were not included in the Convention together, tetra- and pentaBDE by decision SC-4/17 and hexa- and heptaBDE by decision 4/18 in 2009, and both groups of substances with the same specific exemption for all, which allows the recycling of products containing these substances up to 2030. For the Czech Republic as well as for the whole Union, the registration of the exemption has been terminated, its termination was notified to the Secretariat in 2019 and the general ban on the production, use, import and export of the compounds is now in force. The previous version of the NIP, 2018 discusses the issues associated with this exemption in more detail. DecaBDE was only included later in 2017 by decision SC-8/10 and is thus a 'new' substance for this NIP update and is also given special attention in Chapter *2.5. Basic inventory and assessment of newly classified substances*. For the purposes of the definitions of limit values for products and waste, the substances are considered as one common group of PBDEs in the Union.

Plastics in electrical and electronic equipment are also covered by Directive 2011/65/EU[6], which sets a maximum value of 0.1% by weight for the concentration of all PBDEs tolerated in homogeneous materials in Annex II.

Conclusions

Tetra-heptaBDEs are no longer found in products used in the Czech Republic. This is probably related to the end of life of the products in which they were used. DecaBDE is one of the most frequently detected of this group, more about this substance is mentioned in chapter *2.5. Basic inventory and assessment of newly classified substances*.

The content of PBDEs in waste, the management of such waste, and the prevention of their entry into new products through recycling remains a persistent problem.

In the Czech Republic, the reuse of recycled plastics containing or potentially containing PBDEs is not taking place, mainly because there is no demand for such material, precisely because it may contain these substances (plastics from electrical and electronic equipment and polyurethane foams from car wrecks). However, increased scrutiny is still needed with regard to the permitted levels of PBDEs for

[5] Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCBs/PCTs)

[6] Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

both exported products and waste and imported products, particularly those intended to come into contact with food, water and children's products.
More information on the issue of waste is provided in a separate chapter *2.6.* Stockpiles and wastes with POPs*,* the section *Waste containing/contaminated with POPs*.

2.3.3. Assessment of pesticides in Annex B

One pesticide, DDT, has been listed in Annex B since the beginning of the Convention, and DDT thus belongs to the group of the original 12 POPs of the Convention ('dirty dozen'). Annex B, Part II sets out the measures to be implemented by the Parties in relation to this substance.

The Czech Republic is one of the countries where **DDT** was used in the past. However, it has been banned for a number of years. Furthermore, only countries listed in the DDT register available on the Convention website may use or produce this substance. For more information on the issue of DDT and the history of its use in the Czech Republic, please refer to chapter *2.3.3. Assessment of chemical substances in Annex B (DDT)* of the original Plan from 2006.
DDT is on the list of pesticide residues, or combinations thereof, analysed in food of animal origin in the Multi-annual Pesticide Residue Monitoring Plan 2023-2025 issued by the Ministry of Health on the basis of Regulation (EC) No 396/2005.

Conclusions
In the Czech Republic, measures against DDT fall under the issue of other obsolete chlorinated pesticides and the conclusions adopted for DDT are the same as those for Annex A pesticides (listed in Chapter *2.3.1. Assessment of pesticides in Annex A*), with tasks to address identified contaminated sites, continue monitoring in prescribed matrices, and maintain inspection of DDT in food and feed, including imported commodities.

2.3.4. Assessment of industrial chemicals in Annex B

Annex B lists one industrial chemical or group of chemicals: PFOS, its salts and PFOSF. Compounds were included in the Convention in 2009 with specific exemptions (some of which have already expired) and acceptable purposes. A summary of the exemptions is given in Table 2.

Currently, any production of **PFOS** compounds**, its salts and PFOSF** in the EU, incl. the Czech Republic, is prohibited. The last permitted use in the EU in chrome plating will be terminated/banned in 2024, this exemption is already not used in the Czech Republic. Further information on the properties, environmental occurrence and origin of these compounds is given in chapter *2.3.6. Assessment of chemicals substances listed in Annex B, Part III (PFOS, its salts and PFOS)* (NIP, 2012). Information on previously used exemptions is provided in chapter *2.3.4. Assessment of industrial chemicals in Annex B* (NIP, 2018).

Conclusions
Due to their hydrophilic nature, PFOS compounds require increased attention in relation to water, soil and sediment, environmental spills, contaminated sites and waste management, including sludge. The problems associated with them, as with most POPs in general, are their separation from the waste stream, proper disposal, identification of their presence in the products used, and their monitoring and biomonitoring. These are topics also discussed in Chapters *2.6. Stockpiles and wastes with POPs, 2.7. Identification of contaminated sites, 2.10. Technical infrastructure*.
Products containing PFOS have a relatively long lifetime. Monitoring for PFOS in compounds, preparations and products such as carpets, outdoor clothing, and leather products is appropriate. Due to the 'non-degradability' of PFOS, the potential presence of these compounds in sludge applied to agricultural land is a major risk.
PFOS substances are no longer used in the Czech Republic, but there is a lack of more precise information on the extent of their former use and their occurrence in used products and subsequently in waste. Direct stockpiles or waste of these substances are not anticipated in the Czech Republic. There is still insufficient information about contaminated sites in the Czech Republic and they appear as a result of the search for the source of the substances in water. Potentially contaminated sites include sites where PFOS compounds have been and are used (from metal treatment, textile, paper and plastics plants), possible contamination from the use of fire-fighting foams in which they have been contained, and municipal waste landfills. Priority should be given to preventing further environmental contamination by improper handling of textile wastes that have been treated with PFOS-based compounds.

2.4. Assessment of substances in Annex C

Annex C lists the substances hexachlorobenzene (HCB), pentachlorobenzene (PeCB), polychlorinated biphenyls (PCBs), hexachlorobutadiene (HCBD), polychlorinated diben-p-dioxins and dibenzofurans (PCDDs/PCDFs) and polychlorinated naphthalenes (PCNs).

The reduction or elimination of releases of substances listed in Annex C, substances that are not intentionally produced by humans but are nevertheless produced by their activities and released into the environment, is one of the main objectives of the Convention. According to Article 5 of the Convention, Parties are required to inventory the sources of these substances and report, as part of their reporting obligation, an estimate of the quantities released from the source categories listed in Annex C, Parts II and III. Parties are also required to develop action plans to prevent or minimise releases of Annex C substances. The strategies are subject to review every five years.
Parts II and III of Annex C list the source categories (industrial facilities) from which POPs are assumed to be released. Newly built category II facilities are obliged to be built in BAT/BEP mode, while category III facilities are encouraged to be built according to new technologies. For existing category II and III sources, Parties are to encourage the implementation of BAT/BEP.
The use and implementation of processes that lead to the reduction of unintentional releases of POPs is carried out in the Czech Republic in accordance with Directive 2010/75/EU[7], which is the EU legal framework for the reduction of harmful industrial emissions (released directly, through wastewater, waste production), in particular through better use of Best Available Techniques (BAT).
Air emissions are monitored by legislation in the field of air protection regardless of the threshold values from the sources listed in Annex 2 of Act No. 201/2012 Coll.[8] The main regulatory instruments for reducing POP emissions into the air are specific emission limits set out in the implementing regulation of the Act (Decree No. 415/2012 Coll.[9]) or by the Regional Office in the air pollution source operating permit, as well as emission caps and source operating conditions, which are also set out by the operator in the source operating permit. With a few exceptions, emission limits are not directly prescribed for these compounds, nor are other specific source operating conditions usually aimed at directly limiting these substances.
Of the POPs, emissions of PCDFs and PCDDs, PAHs (POPs not covered by the Convention, in the range of 4 congeners) and PCBs are calculated for emission inventories reported under CLRTAP commitments. Information on one-off emission measurements (in cases where required by Act No 201/2012 Coll.) is part of the reporting of the aggregated operational records within the ISPOP system[10]. The measured data are used to prepare emission inventories where appropriate.
Improvement of the emission inventory of emissions from stationary and mobile sources in the area of PAHs, PCDD/F is ongoing. The new emission factors found within the projects of VŠB-VEC in Ostrava http://portal.chmi.cz/files/portal/docs/uoco/oez/embil/VypocetEF.pdf were used. The development of the PCB and HCB emission inventory is carried out for the main sectors and using internationally valid emission factors.
The requirements for emission inventories of PeCBs and PCNs have not been implemented so far, among others, because their preparation is not required by the POPs Protocol to the CLRTAP Convention and the methodology is not developed within the framework of available LRTAP/EEA documents (especially the 'Emission Inventory Guidebook').
Emissions of air pollutants from waste incineration plants, as one of the main sources of POPs, are monitored within the scope of the requirements set out in Annex 4 of the Ministry of Environment Decree No. 415/2012 Coll.[11] Of the POPs, emissions are only measured for polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzodioxins (PCDDs). Data on PCDD/PCDF emissions are submitted by incineration plant operators as part of the aggregated operational records to the air quality information system (AQIS), which includes the register of emissions and stationary sources (REZZO) pursuant to Section 7, paragraph 1 of Act No. 201/2012 Coll. Information on the operation of waste incineration and co-incineration plants is thus publicly available:
http://portal.chmi.cz/files/portal/docs/uoco/oez/emise/spalovny/evidence/index.html

[7] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[8] Act No. 201/2012 Coll. on Air Protection as amended
[9] Decree No 415/2012 Coll. of 21 November 2012 on the permissible level of pollution and its determination and on the implementation of certain other provisions of the Air Protection Act
[10] Integrated system for the implementation of reporting obligations, https://www.ispop.cz/magnoliaPublic/cenia-project/uvod.html
[11] Decree on the permissible level of pollution and its determination and on the implementation of some other provisions of the Air Protection Act

http://portal.chmi.cz/files/portal/docs/uoco/web_generator/incinerators/index_CZ.html
http://portal.chmi.cz/files/portal/docs/uoco/oez/emise/spalovny/index.html (Czech version only).
Information on POPs emissions reported under the aggregated operational inventory is published for individual plants here:
http://portal.chmi.cz/files/portal/docs/uoco/web_generator/plants/index_CZ.html.

The CEI inspects the operation of waste incineration plants and plants approved for the co-incineration of waste (collectively referred to as waste thermal treatment plants in national legislation) and compliance with all binding conditions several times a year within the scope of the requirements set by legislation. The reports on the results of inspections are provided to the overview of sources of thermal treatment of waste, which is publicly accessible and is maintained by the CHMI on behalf of the Ministry of the Environment. The combustion process and thus the level of destruction of thermally stable high-molecular-weight organic substances, including POPs, is continuously monitored in the waste thermal treatment plant (the concentration of carbon monoxide, total organic carbon, particulate matter, nitrogen oxides and sulphur dioxide, hydrogen chloride and hydrogen fluoride, as well as the oxygen concentration and combustion temperature are continuously monitored in the exhaust gases). Of the persistent organic pollutants, PCDD/F emissions are detected in air emissions twice per calendar year by one-off measurements. If the waste is co-incinerated in a cement clinker plant, the measurement also monitors the emissions of PAHs (benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene and benzo(k)fluoranthene) as substances that do not have an emission limit.
The regulation of emissions of particulate pollutants (PP) and their associated substances through emission limits set for sources burning solid, liquid and some gaseous fuels, thermal treatment of waste and other sources where fuels are usually burned (metallurgical production, mineral processing, etc.) also contributes to the reduction of POP emissions into the air. All major groups of air pollution sources falling under the Integrated Pollution Prevention and Control (IPPC) regime are obliged to apply BAT technologies and the associated low pollutant output concentrations. The update of the BREF[12] is also being used, where e.g. metallurgical plants can include, in addition to quality filtration, subsequent cleaning of the waste gas with the addition of a reagent for PCDD/F binding to reduce PPs and POPs.
Releases of Annex C POPs are also monitored under the Integrated Pollution Register (IPR). Releases of PCDD/Fs to air from waste incineration processes, production and processing of ferrous and non-ferrous metals, heat and power generation and transport are reported to the IPR. PCB releases are also reported from waste incineration and the production and processing of ferrous and non-ferrous metals. The HCB compound was deliberately produced in the Czech Republic until 1968. Currently, its origin in the Czech Republic is mainly from unintentional production and it is produced as a by-product of the production of chlorinated hydrocarbons and the electrolytic production of chlorine itself in chemical plants.
The IPR is continuously updated, including in relation to the Stockholm Convention[13]. It has been possible to include under the IPR the monitoring and possible reporting of PCNs (related to naphthalenes), hexa-BDEs and hepta-BDEs, salts and esters of pentachlorophenol, benzo(a)pyrene (related to PAHs) - which was previously reported voluntarily, and finally selected substances from the PFAS group[14]. For the time being, their monitoring and possible reporting in releases to water and with a threshold of 0.05 kg/year has been selected. The first reporting year will be 2024.
For the time being, the IPR is closely linked to the European Pollutant Release and Transfer Register (E-PRTR) established under Regulation (EC) No 166/2006[15]. The European Regulation sets thresholds for selected substances. When a certain amount of releases (to air, water and soil) and

[12] BREFs are the reference documents used by competent authorities when issuing integrated permits under Integrated Pollution Prevention and Control (IPPC).
[13] Government Regulation No. 326/2020 Coll., amending Government Regulation No. 145/2008 Coll., establishing a list of pollutants and threshold values and data required for reporting to the Integrated Pollution Register, as amended by Government Regulation No. 450/2011 Coll. and Government Regulation No. 137/2023 Coll., amending Government Regulation No. 145/2008 Coll., establishing a list of pollutants and threshold values and data required for reporting to the Integrated Pollution Register, as amended
[14] Specifically, these items are: perfluorobutanoic acid (PFBA), perfluoropentanoic acid (PFPA), perfluorohexanoic acid (PFHxA), perfluoroheptanoic acid (PFHpA), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluoroundecanoic acid (PFUnDA), perfluorododecanoic acid (PFDoDA), perfluorotridecanoic acid (PFTrDA), perfluorobutanesulfonic acid (PFBS), perfluoropentanesulfonic acid (PFPS), perfluorohexanesulfonic acid (PFHxS), perfluoroheptanesulfonic acid (PFHpS), perfluorooctanesulfonic acid (PFOS), perfluorononesulfonic acid (PFNS), perfluorodecanesulfonic acid (PFDS), perfluoroundecanesulfonic acid (PFUnS), perfluorododecanesulfonic acid (PFDoS) and perfluorotridecanesulfonic acid (PFTrS)
[15] Regulation (EC) No 166/2006 of the European Parliament and of the Council establishing a European Pollutant Release and Transfer Register

transfers (in wastewater and waste quantities and, in the case of IPR at national level, substances in waste) per year is exceeded, the industrial operator is subject to reporting obligations. The disadvantage of the IPR in relation to information on POPs releases is that it does not cover 'sub-threshold' releases and not all sources of POPs, e.g. releases from domestic solid fuel combustion, which are also considered to be a significant source of POPs, are covered.
The life of this European regulation is gradually coming to an end as the draft revised Industrial Emissions Directive was discussed at European level in the course of 2022 and 2023 in connection with the revision of the IED. The list of substances itself is slightly affected - dicofol, perfluorooctanoic acid and its salts and perfluorohexane-1-sulfonic acid and its salts were added (in all cases, all releases and transfers are covered and the threshold is 1 kg/year).
In general terms, it can be stated that the IPR is a very important tool at the national level for monitoring the releases/transfers of pollutants, especially from important industrial plants that have a major impact on environmental pollution.
A completely new data processing system (StaR BI) should be used in the future to better identify other possible sources of POPs from Annex C (if they are also subject to reporting to the IPR). However, its current state is not in a form that would allow it to do so. At the European level, the EU Register of Industrial Sites is already in operation, although from the Czech perspective, even this is not conceived in a completely ideal and user-friendly way. For waste containing POPs, the new Waste Management Information System - ISWM2 will serve as an important source of primary data and information. Aggregated data for the Czech Republic will be available in a suitable form in the public part of THE PISWM2.
One of the basic prerequisites for quality information is the integration of individual data sources. Without this, it will never be possible to perform cross-checking processes against different data sources in a fully optimal way. This work remains ongoing, but essential parts, such as the new ISPOP, are already fully operational. In the case of StaR BI, only the sub-parts can be mentioned, such as the user interface for publishing data reported to the IPR. Thus, in this respect, the handling and linking of the partial datasets is still not in an optimal form. The fulfilment of all the obligations of the MoE in terms of data provision, processing, reporting, linking, etc. will continue to be quite complicated.
Information on relevant BAT in the context of waste disposal is included in the BAT Reference Document (BREF) Waste Management[16]. The application of BAT described in the BREFs leads to the prevention and, where this is not possible, to the reduction of emissions, including POP emissions.
BAT/BEP guidelines are also being developed at the global level to assist Parties in implementing their obligations under the Stockholm Convention in this area (Article 5) and are available on the website. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which develops and updates technical guidelines for the environmentally sound management of POPs waste, also addresses the issue of POPs waste management in cooperation with the Stockholm Convention.
The **reduction of releases of Annex C substances to water** (except PCNs) is ensured by the Water Framework Directive[17], if the environmental quality standard for these substances is exceeded, the Czech Republic must take measures to reduce the release below the limit.
The determination and reduction of POP emissions **from diffuse sources** and their control is more complex. The main such sources include domestic boilers, which are the most common source of benzo(a)pyrene, but also of other POPs released by, for example, burning plastics or chemically treated wood. According to the Air Protection Act, these sources have been controlled in the Czech Republic since 2017 through regular mandatory inspections of their technical condition and operation. The reduction of POP emissions in these households is mainly due to the modernisation of solid fuel boilers. As of 1 September 2022, the ban on the use of solid fuel boilers below class 3 according to ČSN EN 303-5 came into effect. The **effectiveness of the ban on the use of boilers below Class 3** located in households, family houses and apartment buildings has been postponed by 2 years to **1 September 2024**. If the legal conditions are met, boilers and heaters in households can be inspected by the inspection authorities on site. Replacement of solid fuel boilers, the operation of which is or will be banned, was supported by the so-called boiler subsidies financed from the OP E 2014-2020, from the funds of the NIPH (both the National Recovery Programme and the

[16] Waste incineration 5.1. Disposal or recovery of hazardous waste with a capacity greater than 10 t/day and involving at least one of the following activities; and 5.2. Disposal or recovery of waste in facilities for the thermal treatment of waste and Treatment of waste 5.1. and 5.3. a) Disposal of other waste with a capacity greater than 50 t per day and involving at least one of the following activities, except urban waste water treatment; b) Recovery or recovery combined with the disposal of non-hazardous waste, with a capacity greater than 75 t per day and involving at least one of the following activities, except urban waste water treatment

[17] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy

Modernisation Fund), while the installation of other heat sources (heat pumps, gas boilers) and modern solid fuel boilers meeting the requirements of ecodesign was supported.
For the determination of emissions from biomass combustion in households, the PHC data[18] are used, which are maintained within the AQIS, which includes a register of emissions and stationary sources pursuant to Section 7, paragraph 1 of Act No. 201/2012 Coll., (REZZO), maintained for the Ministry of the Environment by the CHMI.
In order to refine the inventory of transport emissions, the Ministry of Transport commissioned the project 'Determination of Persistent Organic Pollutants' to the Transport Research Centre in support of the National Implementation Plan. As a result of the project, a methodology for the determination of POPs from mobile sources and measurement of POP emission factors from mobile sources is proposed in order to refine the emission inventory especially for non-road transport ('off road' - military, agriculture, forestry, etc.). For polycyclic aromatic hydrocarbons (PAHs), the focus has been on monitoring for additional substances in this group beyond those normally recommended by the US EPA. These are so-called EUPAHs, i.e. PAHs recommended for monitoring by the EU, and possibly other PAHs. The results are intended to refine the emission inventories for the reporting obligations of the Czech Republic.
The new obligation under Regulation (EU) 2019/1021, and subsequently the Waste Act, to keep records of POPs waste, sent as part of the annual reporting on waste production and management, will also contribute to the refinement of the inventory in the Czech Republic.

Hexachlorobenzene (HCB)
According to data provided by the Czech Republic within EMEP, the highest HCB emissions to air between 2013 and 2020 were attributable to heat and power generation (in the low tens of mg/kg/year). Over this period, however, there has been a downward trend in emissions of around 37 %. Other sources of air emissions (as defined in the reporting framework) are at concentrations below 1 mg/kg, often with no detectable trend; a slight increase in this period is observed for waste incineration. In the Czech Republic, hexachlorobenzene is produced in large quantities by unintentional production, in the order of several hundred tonnes per year. In 2010, a plan was approved for a long-term strategy for the producing company to phase out and subsequently eliminate unintentional production of this substance. The new technology, which will rapidly reduce HCB production, is currently under construction, according to the announcement of Spolek pro chemickou a hutní výrobu, a.s., with commissioning planned for the fourth quarter of 2023. With the commissioning of the new production, they expect to reduce the generation of waste containing HCB (and other POPs) in 2025 to approximately half the level of previous years (meant as an absolute value, the specific output of the existing production will be significantly lower). Technological measures have already been introduced in the past in the existing production, which have reduced the HCB production by about 100 t/year, and which are continuously applied/maintained. Following the results and experience with the operation of the new technology (and the actual impact on HCB production), further options to reduce HCB production or waste containing HCB will be investigated and revised once production is stabilised/optimised. This is foreseen for the period 2025 to 2026. Subsequently, technological changes/measures will be implemented to further reduce the HCB production or, if necessary, to stop the transfer of HCB for external disposal (incineration).

Hexachlorobutadiene (HCBD)
Air emissions of HCBD are not monitored under EMEP. This substance is, however, included in the E-PRTR and subsequently in the IPR, and thus industrial operators are obliged to report releases. Previously, it was monitored within the IPR and in waste transfers, but this was abolished by Government Decree No.450/2011 Coll. In the Czech Republic, the substance is also produced as a by-product of the production of chlorinated hydrocarbons, which is then disposed of in a hazardous waste incinerator. HCBD is listed as a priority hazardous substance in Annex X of the Water Framework Directive and the Czech Republic must take measures to phase out discharges, emissions and releases of this substance. Following the Water Directive, HCBD is classified as a priority pollutant in Decree No. 414/2013 Coll. Regular monitoring in the waters is ongoing.

Polychlorinated diben-p-dioxins and dibenzofurans (PCDDs/PCDFs)
Within the IPR, PCDD/Fs are mainly reported as transfers of substances in waste and releases to air. According to the data reported to the IPR, the annual amount of waste transferred between 2014 and 2021 was several times higher than the amount of air emissions. Between 2013 and 2021, the reported total concentration of releases into air is more or less constant (around 0.005 kg TEQ/year). The reporting of the transfer of substances in waste in recent years also does not show a significant trend and ranges from 0.1 to 0.2 kg TEQ/year.

[18] Population and Housing Census

Total emissions of PCDD/Fs reported under EMEP ranged between 26-41 g TEQ/year from 2013-2020, with no emissions exceeding 30 g TEQ/year in the last five years. The production of heat and electricity and the production of ferrous and non-ferrous metals are among the largest sources of PCDD/F emissions in the Czech Republic. There has been a fairly significant decline in metal production, with concentrations around 10 g TEQ/year in recent years. Annual emissions from heat production are also around this value.
The largest producers of PCDD/Fs in waste are metallurgy and waste incineration, as shown in **Table 4**. The issue of dioxins in ash from waste incineration plants was also addressed in two studies by IPEN and Arnika (Petrlík, J. et al., 2017; Katima, J. et al., 2018).

Table 4: Summary of information on dioxins transferred in waste (g TEQ/year) based on data from THE IPR (http://www.irz.cz)

Year	2014	2015	2016	2017	2018	2019	2020	2021	Average
Incineration of municipal waste	14.77	7.42	8.39	28.99	13.87	18.08	8.11	8.74	13.63
Incineration of hazardous waste	10.67	23.70	17.40	18.98	31.89	39.43	45.16	9.13	22.01
Metallurgy	25.80	48.60	37.00	199.25	171.43	129.78	106.00	70.70	83.37
Total	51.24	79.72	62.79	247.22	217.19	187.29	159.27	88.57	119.01

Polychlorinated naphthalenes (PCNs)
These substances are not monitored under EMEP. They are monitored under the IPR from 2021. There, the obligation to report PCNs is linked to the reporting of naphthalenes, so if the reporter in question has to report naphthalenes, they are obliged to report also the amount of PCNs. Specifically, they are monitored in releases to air, water and soil and in transfers in waste.

Polychlorinated biphenyls (PCBs)
In the context of IPR monitoring, the vast majority of PCBs are reported in waste streams. The range of reported quantities for individual years is quite large. Between 2013 and 2021, it ranged from 15 kg per year to almost 6 tonnes per year.
Reporting of PCB releases to air via the IPR is minimal. Only one plant reported concentrations below 0.15 mg/kg each year during the period. Releases to water were reported twice to water by the wastewater treatment plant and twice to soil by the wastewater company, at similar concentrations, over the period. In the reporting of air emissions under the POPs Protocol to CLRTAP, annual releases of PCBs were below 1 mg/kg/year, with the highest concentrations attributable to heat and power generation.

Pentachlorobenzene (PeCB)
Within the IPR, PeCB is monitored in releases to air, water and soil. The threshold is set at 1 kg/year for all equally. However, no releases of the substance have been reported to the IPR so far. In the Czech Republic, the substance is also produced as a by-product of the production of chlorinated hydrocarbons.

Conclusions
The air protection agenda includes monitoring of POPs emissions as required by the POPs Protocol to the CLRTAP Convention and Directive (EU) 2016/2284 of the European Parliament and of the Council[19]. The evolution of emissions over the period 1990-2020 is shown in the chart.
Thus, no methodology has been developed for POPs for which an emission inventory is not required by the POPs Protocol to the CLRTAP. Its preparation would be disproportionately financially demanding for the Czech Republic and it does not seem to be practical. This applies to PeCB, PCN and HCBD.
For basic information on releases of harmful substances into the environment, the IPR register is also used, to which designated operators are required to provide information on the releases of substances. It is necessary to ensure that all operators affected by the POPs reporting obligation comply with this obligation and to continuously assess the possibility of updating/implementing BAT that will lead to a reduction in releases. Support for the introduction of BAT/BEP, support for research in the field of innovation is a regular part of the assignment of programmes of the Ministry of Industry

[19] Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016 on the reduction of national emissions of certain air pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC

and Trade. There are also some inconsistencies in the data reported to the IPR and continuous efforts are needed to ensure the completeness and quality of the data submitted.
In 2019 and 2020, incinerators were inspected for compliance with the obligation to report releases (air) and transfers (waste) of POPs to the IPR. The Inspectorate carried out 3 inspections In 2019 and 4 inspections in 2020, pursuant to Act No. 100/2001 Coll. on Environmental Impact Assessment.
Regular inspections of incinerators are carried out in accordance with the requirements of the legislation. Selected POPs are monitored and so far, it has not been assessed as necessary to monitor emissions of other POPs both in air and in waste products.
The Czech Republic is also under a new obligation under EU Regulation (EU) 2019/1021 to ensure the control and traceability of waste containing POPs listed in Annex IV of the Regulation. In the national legislation, the issue is covered by the Waste Act, where this waste is defined according to Section 94(4) and Section 95(3) of this Act. The reporting of data on persistent organic pollutants shall be sent according to sheet 6 of Annex 13 to Decree 273/2021[20] as part of the annual reporting.
The inventory of WWTPs will be possible if the release of these substances into the environment is reported by the polluter, e.g. through the IPR, or must be part of the permit to discharge wastewater into surface waters. Changes in reporting to the IPR are expected in connection with the ongoing revision of the IED Directive and the subsequent proposal for a new regulation on the industrial emissions portal, which will replace Regulation (EC) No 166/2006 on E-PRTR in the future.
Within the Czech Republic, an **IPR Working Group** has been established to exchange information and to evaluate the inclusion of new substances in the IPR, coordinated by the Ministry of the Environment. The group, which includes relevant stakeholders including the MIT, industry representatives and NGOs, is considering the possibility of monitoring, extending monitoring or adjusting thresholds for persistent organic pollutants. A Best Available Techniques Information Exchange System is available for the exchange of information on BAT, https://www.mpo.cz/ippc/system-pro-vymenu-informaci/--143236 under the Integrated Prevention Act.

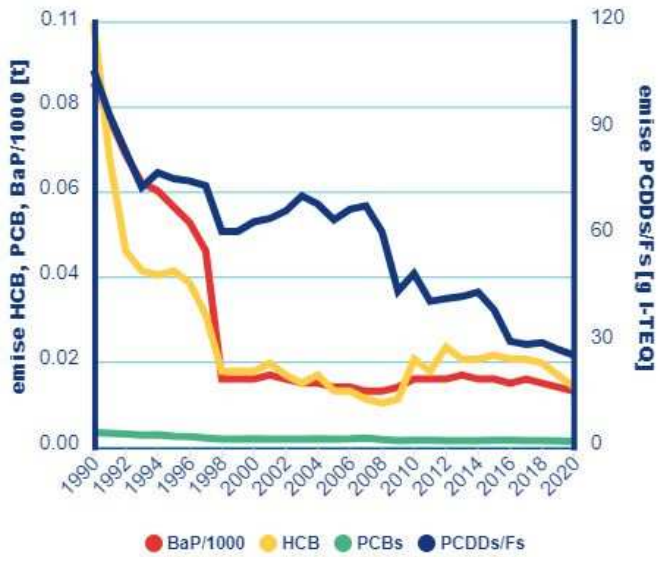


Chart: Evolution of total POP emissions, 1990-2020 taken from: Air pollution in the Czech Republic in 2021 (chmi.cz)

2.5. Basic inventory and assessment of newly listed substances

The chapter summarises the information to date on substances that were added to the Convention after the previous update, i.e. substances added between 2017 and 2023. In this document they are referred to as 'new' substances. These are substances newly included in action plans and strategies for the implementation of the Convention's commitments. In view of the new substances, this update of the Plan collects and evaluates all available information on production, use, stockpiles, imports and exports and the impact on the environment and human health in the Czech Republic.

[20] Decree No. 273/2021 Coll. on details of waste management

Dicofol

Dicofol (CAS No: 115-32-2, 10606-46-9) was included in Annex A, Part I by Decision SC-9/11 in 2019 without specific exemptions for production and use.

Use

Dicofol is an organochlorine pesticide, the use of which has been banned in many countries, including the EU, for many years. India remains the world's main producer and consumer of dicofol. As an intermediate product of a closed system, this production generates banned DDT (India therefore has a manufacturing exemption).

The pesticide dicofol was generally used as a replacement for DDT to control mites and other pests for various crops such as fruits, vegetables, ornamental plants, cotton and tea. In the Czech Republic it was used mainly in hop growing and in orchards.

Legislation

Regulation (EU) 2019/1021 prohibits dicofol in accordance with the Convention, by including this entry in Part A of Annex I to the Regulation without any exemptions from its manufacture and use. The Regulation does not specify a limit value for unintentional traces and it thus corresponds to the limit of quantification. The Regulation also sets limit values for waste, the so-called low and high POPs: The values are a determinant for the management of waste containing this substance.

Authorisation for the use of dicofol as a plant protection product expired in the EU in 2010. Its use as a biocidal product has also been banned in the EU. Dicofol is designated as a priority hazardous substance in EU water legislation and environmental quality standards are set for it. Maximum residue limits are also set for dicofol in food and feed of plant and animal origin and States are obliged to carry out control sampling. Dicofol (sum of the p, p' and o, p'isomers) is thus on the list of pesticide residues, or combinations thereof, analysed in products of plant origin, which is part of the Multi-annual Pesticide Residue Monitoring Plan 2023-2025 issued by the Ministry of Health on the basis of Regulation (EC) No 396/2005[21].

Origin and occurrence in the environment

Since the use of this pesticide was banned in the Czech Republic many years ago, its possible occurrence is associated with earlier applications. Dicofol is one of the quality indicators monitored in surface waters and solid matrices (sediments and floatables). In 2021, none of the surface water samples evaluated (86 profiles, 658 samples in total) exceeded the environmental quality standard (EQS) according to Government Regulation No. 401/2015 Coll.; the presence of dicofol in solid matrices (sediments and floatables) was not demonstrated, in all samples it was below the limit of determination (5 µg/kg). It was not possible to assess the trend due to very low concentrations (CHMI 2022). A similar situation has been observed in previous years.

Summary of the situation in the Czech Republic

This is a pesticide whose use has been banned in the Czech Republic for many years. However, occurrence is still possible in connection with its former use or storage and cannot be excluded. Occurrence in imported crops can also be a problem.

It is monitored in waters, sediments and floatables as well as in food of plant origin. Regular monitoring in all matrices prescribed by the Convention is not set up.

Methoxychlor

Methoxychlor (CAS No: 72-43-5) was included in Annex A, Part I in 2023 without specific exemptions for production and use.

Use

Methoxychlor is an organochlorine pesticide that is used as an insecticide effective against a wide range of agricultural and household pests. Its use is not allowed in the EU. In the Czech Republic (and before that in Czechoslovakia), according to available information, no plant protection products based on methoxychlor were registered after 1973 (records available from that year), i.e. no such products were authorised in the Czech Republic after 1973, nor was its use permitted even under ‘emergency uses’. There are no conclusive records earlier than after 1973.

[21] Regulation (EC) No 396/2005 of the European Parliament and of the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending Council Directive 91/414/EEC

Legislation
Use as a plant protection product and as an active substance in biocidal products was phased out/banned in the EU by 2003 and 2006 under the relevant legislation. Its inclusion in the Convention means that it is regulated in the EU by Regulation (EU) 2019/1021 and its production, marketing and use will be prohibited by this Regulation. The regulation will also set unintentional quantity values and limit values for waste, the so-called low and high POPs content, which determine how waste containing this substance is managed.
Methoxychlor is on the list of pesticide residues, or combinations thereof, to be analysed in food of animal origin, which is part of the Multi-annual Pesticide Residue Monitoring Plan 2023-2025 issued by the Ministry of Health on the basis of Regulation (EC) No 396/2005.

Origin and occurrence in the environment
Since the use of this pesticide was banned in the Czech Republic many years ago, its occurrence is associated with earlier application. Exposure of the Czech population to methoxychlor has been monitored since 1994. The exposure dose estimate for the Czech population was <0.1% of the ADI based on the analysis of 220 composite samples of 189 food types in the form of 3432 individual samples. Methoxychlor residues were recorded in 56 composite samples of mainly plant origin (period 2020/2021) (NIPH 2022a). By 2021, methoxychlor was no longer detected in any of the drinking water samples (n = 1066) in all monitored areas (NIPH 2022b).

Summary of the situation in the Czech Republic
This is a pesticide whose use has been banned in the Czech Republic for many years. Its occurrence is monitored in waters, sediments and floatables as well as in food of animal origin. Similar to other obsolete pesticides, its presence in food is still detected. However, the trend of the burden in the Czech population is stably low with a fluctuating course and methoxychlor is not significant in terms of the health risk of the population. However, the NIPH recommends that food control should continue (NIPH 2022a). Occurrence in imported crops can also be a problem. Monitoring in the mandatory matrices imposed by the Convention is not yet carried out in the Czech Republic.

Short-chain chlorinated paraffins (SCCPs)
Short-chain chlorinated paraffins (alkanes, C10-13, chlorine)$^{+}$: straight-chain chlorinated hydrocarbons with a chain length of C10 to C13 and a chlorine content greater than 48 % by weight were included in Annex A, Part I by Decision SC-8/11 in 2017 with specific exemptions for production and use. The wording of the exemptions is given in Table 2. A new note (vii) was added to Annex A simultaneously with this entry.

Use
SCCPs are widely used in a number of industrial applications, as components of high-pressure products (lubricants, greases), industrial cutting oils, flame retardants or as additives in the manufacture of rubber, coatings and sealants or for the coating of leather and some textiles. These substances are often formed during the production of other chlorinated paraffins and are then found in their mixtures. The use, production, import and export of short-chain chlorinated paraffins in the EU has been restricted since 2004 and was completely banned on 4 December 2015 under Regulation (EU) 2019/1021 (previous version (EC) No 850/2004).

Legislation
Regulation (EU) 2019/1021 implements the inclusion of SCCPs in the Convention in EU legislation by including this entry in Part A of Annex I to the Regulation. The Regulation sets limits for the SCCP content in substances, preparations (below 1 % by weight) and products (below 0.15 % by weight). There are no longer any exemptions for its production and use, except for the general exemption of the possibility of using products that were used before the ban. The Regulation also sets limit values for waste, so-called low and high POPs content, which determine how waste containing SCCPs is managed.

Origin and occurrence in the environment
In 2021, for the water quality indicator chloralkanes (C10 - C13), the limit of quantification was exceeded for only 2 values out of a total of 707 selected analysis areas (water, sediment and floatable

samples). Only one of these values exceeded the limit value for groundwater according to Decree No. 5/2011 Coll.[22] (limit value 0.4 µg/l, measured value 0.5 µg/l) (CHMI 2022).

SCCPs were detected in all analysed samples (LOQ 5 ng/g) of socks (n = 14) and T-shirts (n = 14) purchased in brick-and-mortar stores in Prague and e-shops with countries of origin Vietnam, India, Pakistan, Turkey, China, Bangladesh, Italy, or undetermined, at concentrations ranging from 17.1 to 4040 ng/g (mean 933 ng/g, median 209 ng/g). Socks contained more SCCPs (average 1690 ng/g) than T-shirts (average 182 ng/g), probably due to the use of different materials. Concentrations were also significantly different in cotton and synthetic materials (higher concentrations in synthetics) (Tomasko, Parizek, and Pulkrabova, 2023).

SCCPs were found in edible oils (n = 27, four types: rapeseed, olive, sunflower and coconut) purchased on the Czech market in 2015-2017 with countries of origin in the EU, Tunisia, Sri Lanka and the Philippines, and in fresh and frozen fish purchased on the Czech market in 2017: salmon (Salmo salar, n = 12) originating from farms in Scotland, Norway, Chile, Iceland and wild salmon (Oncorhynchus gorbuscha) from FAO Fisheries Region No. 67. The average concentration of SCCPs in vegetable oils was 36 ng/g (7 out of 27 samples were above the quantification limit), Cl_6 and Cl_7 congeners predominated, and fats and oils from non-EU countries were the most contaminated. In fish, SCCPs were detected in 11 out of 13 samples, with an average concentration of 28 ng/ng of lipids dominated by the Cl_9 and Cl_{10} congeners (Tomasko, Stupak, Hajslova, et al., 2021).

SCCPs were measured in dietary supplements containing omega-3 fatty acids originating from fish oil (n = 85) purchased on the European market in spring 2010 (n = 39), autumn 2020 (n = 35) and spring 2021 (n = 11). SCCP concentrations were above the limit of quantification in 51 out of 85 samples, median 0.12 µg/g fat, range <0.01 - 56.48 µg/g fat, the congeners were dominated by C_{11}, Cl_6 and Cl_7 (Tomasko et al., 2022).

Tomasko et al., 2022 also determined SCCP levels in 27 blood serum samples of urban male police officers, median age 38 years, from Prague (n = 8), Ostrava (n = 9) and České Budějovice (n = 10), which were obtained in 2019 as part of the Healthy Aging in Industrial Environment (HAIE) study. SCCP concentrations above the LOQ were detected in 78% of samples (n = 21) and ranged from <150 to 2600 ng/g of lipid (median 370 ng/g of lipid). The highest median serum SCCP concentration was found in participants from Ostrava, with C_{10} congeners predominating (Tomasko, Stupak, Parizkova et al., 2021).

Summary of the situation in the Czech Republic
SCCPs (or other chlorinated paraffins) were not and are not produced in the Czech Republic. Used products containing SCCPs and waste with SCCPs are the current main source of these substances in the Czech Republic. Regular monitoring in the prescribed matrices of the Convention is not yet taking place. Information on prevalence in the Czech Republic is available from several studies.

Decabromodiphenyl ether (decaBDE)
Decabromodiphenyl ether (BDE-209) present in commercial decabromodiphenyl ether (CAS number 1163-19-5) was included in Annex A, Part I, by Decision SC-8/10 in 2017 with specific exemptions for production and use. Specific exemptions are generally limited to a period of five years, unless otherwise specified in the decision. The wording of the exemptions is given in Table 2. Simultaneously with this entry, a new Part IX was added to Annex A to specify the exemptions in more detail.

Use
DecaBDE is a brominated flame retardant. It has been used and is used in many industries, in plastics, textiles, adhesives, sealants, coatings and inks. In the Union, it was widely used in plastics and in textiles used in home furnishing applications. Currently, it is still possible to produce and use it in the EU under registered exemptions. Given the lifetime of the treated items, DecaBDE can be expected to continue to affect waste streams for several years.

Legislation
Regulation (EU) 2019/1021 implements the inclusion of decaBDE in the Convention in EU legislation by including this entry in Part A of Annex I thereof. It is listed in the regulation with a limit for unintentional trace amounts and with exemptions for its manufacture and use. Exemptions reflect those approved under the Convention and registered by the EU with the Convention Secretariat. With

[22] Decree No 5/2011 Coll. on the definition of hydrogeological districts and groundwater bodies, the method of assessing the status of groundwater and the details of groundwater status detection and assessment programmes

regard to the Regulation, exemptions from the production and use of this substance are allowed in the Czech Republic/EU for: - parts for use in older vehicles, exemptions will expire at the end of the useful life of the older vehicles or in 2036, whichever comes first; - exemptions for aircraft (for which type approval was applied for before December 2018 and received before December 2022), will expire at the end of the aircraft's useful life; and - exemptions for additives for plastic enclosures and parts used to heat household appliances, irons, fans, immersion heaters, which will expire on December 18, 2023. As with other classified substances, the Regulation sets unintentional quantity values and waste limit values, the so-called low and high POPs content, which determine how the waste is managed. The values are set for the sum of PBDEs.

In the EU, the production and marketing of this compound were initially banned from 2 March 2019, based on the REACH regulation (entry 67 in Annex XVII). This entry was removed from REACH following the implementation of the amendment to the Convention in Regulation (EU) 2019/1021 and restrictions on the production and use of DecaBDE are governed by Regulation (EU) 2019/1021.

Origin and occurrence in the environment
DecaBDE levels during air monitoring using passive PUF samplers (with polyurethane foam) at EMEP background sites (Churanov, Sumava; Košetice; Prague, Libuš; Svratouch) in 2011-2019 were at concentrations of <LOQ - 4670 pg/sample, the median of all measurements was 368.9 pg/sample. The time trend was not significant. In 2019, decaBDE concentrations ranged from 278.5 to 457 pg/sample, with a median of 332.5 pg/sample (data from the portal GENASIS: Home, Borůvková et al., 2015).

Data from monitoring of atmospheric PBDEs measured with a high-volume air sampler with a PM_{10} particulate separator, with weekly sampling frequency at the Košetice observatory (EMEP background site) in 2011-2019 showed decaBDE concentrations (in air and particles) from 0.05 to 5.01 pg/m^3, with occurrence mainly in particles, and a significant decrease in atmospheric decaBDE concentrations between 2011-2014 at the monitored site (Degrendele et al., 2018).

In 2012, CISTA started screening for selected PBDE congeners in agricultural soils and other environmental matrices (sediments, WWTP). As no PBDEs were found above the limit of quantification in soil samples, PBDEs are no longer determined in soil samples as of 2016. Since 2012, 9 PBDE congeners have been determined in WWTP sludge. However, DecaBDE is not determined (Poláková et al., 2022).

Sediment levels at the Košetice background site ranged from <LOQ to 372 pg/g in 2018 and 2019, median 172 pg/g (n = 13) (data from the portal GENASIS: Home, Borůvková et al., 2015).

(Hloušková et al., 2013) report decaBDE concentrations in 31 sediment samples from various sites in the Czech Republic, including the most polluted rivers (Elbe, Vltava, Bílina, Lužická Nisa, Morava and Dyje) from 2010. DecaBDE was the third most frequently detected (53%) PBDE congener (after BDE47 and BDE99) and the congener with the highest concentrations (0.620-477 µg/kg, median 6.10 µg/kg) (Hloušková et al., 2013).

The range of decaBDE concentrations in topsoil at the background EMEP site in Košetice was 67.4-448 pg/g in 2020, median 131 pg/g (n = 7). Slightly higher concentrations were observed in 2020 in the organic horizon (O horizon), ranging from 477-1290 pg/g, median 1110 pg/g (n = 4) (data from the portal GENASIS: Home Borůvková et al., 2015).

Plant concentrations were determined for decaBDE in 2018 and 2019 at the background site in Košetice. In 1-, 2-, and 3-year-old pine needles, concentrations ranged from 60.5 to 252 pg/g, median 98.7 pg/g (n = 12); in 1- and 2-year-old spruce needles, concentrations ranged from 56.7 to 184 pg/g, median 114.5 pg/g (n = 14); and in mosses (n = 14), concentrations ranged from 167 to 3140 pg/g, median 455.5 pg/g (GENASIS: Home, Borůvková et al., 2015).

DecaBDE was the congener with the highest (air, dust) and second highest (window coating) indoor concentrations in 20 households in Brno in 2013 with a median indoor air concentration of 9.4pg/m^3 (n = 3), range <LOD - 15pg/m^3; a median concentration of 139 ng/g (n = 30), range 16-788 ng/g in dust; and a median concentration of 0.40ng/m^2 (n = 21), range <LOD - 3.1 ng/m^2 in window film/coating (Venier et al., 2016).

The study (Jílková et al., 2018) confirmed that in a residential dwelling, the contribution of decaBDEs to the amount of PBDEs in indoor dust decreases with increasing distance from the television (as a possible source of decaBDEs).

The WHO monitors 40 BFRs, including PBDEs, in breast milk. In 2021, 14 BFRs were found in the samples monitored. In none of them did the proportion of positive samples (content above the limit of quantification) exceed 50% of the total number of breast milk samples and they were therefore not quantified (HAA 2022a).

DecaBDE was detected in 12% of 231 breast milk samples from 2019 and 2021 collected from mothers in Karviná and České Budějovice (median age 30 years) with a median concentration of 0.75 ng/g of lipid, relatively lower than reported by other European studies (Parizek et al., 2023).

(Sochorová et al., 2017) reports the concentration of decaBDE in blood serum from biomonitoring in 2015. From 300 serum samples of participants with an average age of 40.8 from Prague, Ostrava, Liberec and Žďár nad Sázavou, decaBDE was detected in 7% of samples, with concentrations ranging from <LOQ (0.1 ng/ml) to 14.4 ng/ml (<LOQ-2693 ng/g of lipid). PBDEs, especially decaBDE, were the BFRs with the highest serum levels.

(Polachova et al., 2021) determined 89 POPs, including decaBDE, in the blood serum of municipal police officers (n = 274, 21-63 years) from Ostrava, Prague and České Budějovice collected in spring (n = 142) and autumn (n = 132) of 2019. DecaBDE was the second most frequently detected BFR after BDE 47 (detected in 44% of samples (spring) and 21% of samples (autumn)), at concentrations ranging from <1.5-459 ng/g of lipid (spring) and <1.5-618 ng/g of lipid (autumn). DecaBDE concentrations were lower than in the 2015 serum samples and 9 times lower compared to concentrations in the French and Danish populations reported in other studies.

PBDEs were determined in 107 subcutaneous fat samples from volunteers (19-76 years, mean 43.2 years) taken during plastic surgery procedures. DecaBDE levels were below the LOQ in all samples (Logerová et al., 2019).

DecaBDE and other PBDEs have been monitored in products by NGOs (Møller et al, 2021). In addition to PBDE concentrations, brominated dioxin (PBDD/F) concentrations and dioxin activity levels monitored by bioassays have been shown to be of concern (Behnisch et al., 2023).

Summary of the situation in the Czech Republic
DecaBDE is a substance that is not produced in the Czech Republic and was not produced in the past; it is found in a number of products where it has been used as a flame retardant. Similarly, it is still possible to place on the market and use products under exemptions, which mainly include spare parts. A number of studies have been devoted to monitoring and biomonitoring of the substance in the Czech Republic. DecaBDE is one of the most commonly detected PBDEs.
DecaBDE, like other brominated flame retardants, enters the environment during the period of use and mainly in the waste phase of the products. Proper management of such waste is therefore key to preventing release into the environment and avoiding its occurrence in recycled material. The waste issue of brominated retardants is discussed in more detail in Chapter *2.6. Stockpiles and wastes with POPs*. The occurrence of decaBDE in the environment and human matrices is also detailed in Chapter *2.10. Technical infrastructure for POPs assessment*.

Perfluorooctanoic acid
Perfluorooctanoic acid (CAS number 335-67-1, PFOA), its salts and PFOA-related compounds were included in Annex A of the Convention, Part I, with specific exemptions for their production and use, by Decision SC-9/12 in 2019. Specific exemptions are generally limited to a period of five years, unless otherwise specified in the decision. The wording of the exemptions is given in Table 2. Along with the inclusion of the substance, a new Part X was added to the Annex, which further clarifies the conditions for exemptions.

Use
PFOA substances are and have been used in a very wide range of applications as water, oil and stain repellents, firefighting foams and also as an intermediate in the production of fluoropolymers, with the resulting likely significant waste and potential for emissions issues.

Legislation
Regulation (EU) 2019/1021 implements the inclusion of PFOA in the Convention in EU legislation by including this entry in Part A of Annex I to the Regulation. It is listed in the Regulation with a limit value for unintentional trace amounts and with exemptions for its production and use required in the EU. Exemptions reflect those approved under the Convention and registered by the EU with the Convention Secretariat. The need for the exemptions registered by the EU is continuously assessed in regular expert meetings and in the light of technical and scientific progress. Some exemptions already expired on 4 July 2023. The use of perfluorooctyl iodide for the production of perfluorooctyl bromide for the manufacture of pharmaceutical products shall be subject to review and assessment by 31 December 2026, every four years thereinafter referred to as, and until 31 December 2036. The Regulation also sets limit values for waste, the so-called low and high POPs content, which determine how waste containing these substances is managed.

Origin and occurrence in the environment
In 2021, laboratory analyses were performed on 14 samples of sludge from the WWTP and PFOA levels were determined in the range of <0.10 - 2.79 $\mu g.kg^{-1}$ of dry matter, median 0.6 $\mu g.kg^{-1}$ of dry matter. 13 sludges had values above the LOD (Poláková et al., 2022). During groundwater monitoring in 2021, the presence of PFOA was demonstrated in 5 monitored groundwater objects in 3 different sub-basins of the Upper and Middle Elbe, Berounka and Morava rivers and tributaries of the Vah (CHMI 2022).

(Semerád et al., 2020) analysed sludge from 43 WWTPs in the Czech Republic for the presence of 32 PFASs and demonstrated high contamination of sludge with PFASs, including PFOA and PFHxS, which may pose a risk of contamination of food and the environment in the potential application of sludge in agriculture. Significantly higher PFAS concentrations were found in samples from large WWTPs (population equivalent > 50 000). In approximately 20% of the samples, the representation of PFASs was shifted in favour of shorter-chain PFASs (e.g., PFBA, PFPeA, PFHxA, PFHpA, PFBS, and PFHxS), consistent with the trend of 'regrettable' substitution.

The results of the PERFOOD study, which analysed dietary PFAS in four EU countries, including the Czech Republic, show that the population exposure to PFAS through the ingestion of vegetables and potatoes is low. Analysis of vegetables sampled in 2010 and 2011 detected PFOA in only 7% of the samples (Herzke et al., 2013). PFOA was detected in 38% of samples at concentrations <LOQ - 149 pg/g (median 7 pg/g) by analysis in cereals, sweets (sugar and honey), salt and fruit (n = 72). PFHxS was not detected in any sample (D'Hollander et al., 2015).

According to the SVA report with the results of residues and contaminants investigation (so-called foreign substances) in live livestock, raw materials and food of animal origin and in feed, PFOA was detected in 0 out of 4 (0/4) samples of cow milk, 0/3 samples of sheep milk, 0/2 samples of carp muscle, ½ samples of other fish muscle (average 0.05 ug/kg) and 1/4 samples of wild pig muscle (average 0.187 µg/kg) in 2022 (Vlasáková et al, 2023).

PFOA was measured in 11 of 16 household dust samples in the Czech Republic at concentrations in the range < MQL - 26.7 ng/g, median 2 ng/g (Karásková et al., 2016).

In the human biomonitoring of the NIPH, the frequency of PFOA in breast milk samples was 100%. PFOA concentrations have been on a downward trend since 2006, when the median PFOA content in breast milk was 0.07 ng/ml, with a median of 0.02 ng/ml in 2021 (WHO 2022a).

PFOA was detected in 77% (LOQ = 0.006ng/ml) of 231 breast milk samples from 2019 and 2021 collected from mothers (median age 30 years) in České Budějovice (n = 70) and Karviná (n = 161), with a median concentration of 0,022 ng/ml and a range of the 5th-95th percentile of 0.004-0.011 ng/ml in České Budějovice and a median concentration of 0.01 ng/ml and a range of the 5th-95th percentile of 0.004-0.08 ng/ml in Karviná (Parizek et al., 2023).

In 2018 and 2019, an analysis of selected substances including PFAS in the blood serum of blood donors (2018, n = 395) and the EHES project (2019, n = 242) from Prague, Ostrava, Liberec and Žďár nad Sázavou was performed. PFOA was detected in all samples from both groups, at concentrations ranging from 0.04 to 3.916 ng/ml, with a median of 0.687 ng/ml in the EHES study (2019) and 0.150 to 9.888 ng/ml with a median of 1.475 in the blood donors (2018). Comparing the PFOA content with the limit values set by the Commission for Biomonitoring of the German Federal Environment Agency UBA, the safe limit level for PFOA in adults from both sets was found to exceed level I (below which there is no risk of health effects according to current knowledge) in 18 % of individuals (WHO 2021).

(Polachova et al., 2021) determined 89 POPs, including PFOA, in the blood serum of urban police officers (n = 274, 21-63 years) from Ostrava, Prague and České Budějovice collected in spring (n = 142) and autumn (n = 132) of 2019. PFOA was detected in all samples, at concentrations ranging from 0.081-2.60 ng/ml, median 0.934 ng/ml (spring), and 0.075-2.90 ng/ml, median 1 ng/ml (autumn), lower compared to other European countries.

PFOA was detected in all serum samples of the 309 participants from the CELSPAC study: YA (Young Adults) sampled in 2019, with a median concentration of 1.11 ng/ml (Rudzanova et al., 2023).

Serum concentrations of PFOA in the sample population of the KARDIOVIZE study (479 participants, median age 53) ranged from 0.26 to 6.72 ng/ml, median 1.63 ng/ml, and levels of PFOA and other PFAS were associated with cardiometabolic markers in the study population (Maranhao Neto et al., 2022).

In the CELSPAC - FIREexpo study, which deals with the evaluation of occupational exposure and its effect on the health of firefighters, blood serum samples were collected from three groups: i) recruits before, during and after training (n = 58), professional firefighters (n = 52) and a control group (n = 55). Significantly higher levels of PFOA were observed in both the novice and professional firefighter groups compared to the control group. Specifically, the median blood serum PFOA levels were 1.18 and 1.12 ng/ml before and after the 11-week training period in the novices, 1.21 ng/ml in the professionals, and 0.9 ng/ml in the control group. In 7.6% of the serum samples, the PFOA level exceeded the level I limit set by the Biomonitoring Commission of the German Federal Environment Agency UBA (Řiháčková et al., 2023). The study also showed an association of PFAS exposure with elevated bilirubin levels and an alteration of serum lipids in the participants (Pálešová et al., 2023).

Summary of the situation in the Czech Republic
PFOA is a substance that is not produced in the Czech Republic, but is found in many products where it has been used. Similarly, products can still be placed on the market and used under exemptions. The occurrence of the substance is monitored in the environment of the Czech Republic and PFOA is one of the items that is subject to reporting to the IPR under the PFAS group of selected substances. Information on the presence of PFOA in products is not generally known in the Czech Republic. Leachate from landfills containing PFOA released into soil and water can create sites contaminated with this substance. Such contaminated sites should be identified and, according to assessment, cleaned up using appropriate decontamination techniques.
Problems with PFOA arise in the waste phase and with the contamination of sites. The waste issue of perfluorinated substances is further discussed in chapter *2.6. Stockpiles and wastes with POPs*. Further information on monitoring is provided in Chapter *2.10. Technical infrastructure for POPs assessment*.

Perfluorohexanesulfonic acid
Perfluorohexanesulfonic acid (PFHxS, CAS number 355-46-4), its salts and PFHxS related compounds were included in Annex A, Part I of the Convention without specific exemptions by Decision SC-10/13 in 2022.

Use
Due to their properties, these substances are used or were used in fire-fighting foams, in plating, to protect textiles, leather products from contamination and water, in cleaning agents, impregnation, semiconductor and electronics production. The substances are also formed as unintentional by-products of electrochemical fluorination. They were manufactured in China.

Legislation
Regulation (EU) 2019/1021 implements the inclusion of PFHxS in the Convention into EU legislation by including this item in Part A of Annex I thereof without any exemptions for their production or use. The Regulation also sets unintentional quantity values and limit values for waste, the so-called low and high POPs content, which determines how waste containing these substances is managed.

Origin and occurrence in the environment
PFHxS was measured in 15 of 16 household dust samples in the Czech Republic at concentrations in the range of MQL-9.3 ng/g, median 2 ng/g (Karásková et al., 2016).

In 2018 and 2019, analysis of selected substances including PFAS in blood serum of blood donors (2018, n = 395) and EHES project (2019, n = 242) from Prague, Ostrava, Liberec and Žďár nad Sázavou was performed. PFHxS was present in all EHES study samples, and in 99.5 blood donor

samples, ranging from 0.027 - 1.49 ng/ml, with a median of 0.393 ng/ml in the EHES study (2019) and 0.014 - 3.018 ng/ml with a median of 0.314 ng/ml in blood donors (2018) (NIPH 2021).

(Polachova et al., 2021) determined 89 POPs, including PFHxS, in the blood serum of municipal police officers (n = 274, 21-63 years) from Ostrava, Prague and České Budějovice collected in spring (n = 142) and autumn (n = 132) of 2019. PFHxS was detected in all samples, at concentrations ranging from 0.043-1.73 ng/ml, median 0.436 ng/ml (spring), and 0.044-1.79 ng/ml, median 0.459 ng/ml (autumn), lower compared to other European countries.

PFHxS was present in 5% of breast milk samples analysed in human biomonitoring in 2021 (NIPH 2022a).

PFHxS was also detected in all serum samples of 309 participants from the CELSPAC study: YA (Young Adults) sampled in 2019, with a median concentration of 0.32 ng/ml (Rudzanova et al., 2023).

In the CELSPAC - FIREexpo study (see section on PFOA), the median serum PFHxS levels in novices were 0.46 and 0.44 ng/ml before and after 11 weeks of training, 0.49 ng/ml in professionals and 0.43 ng/ml in the control group (Řiháčková et al., 2023).

Summary of the situation in the Czech Republic
The substance was neither produced nor intentionally used in the Czech Republic, its occurrence is assumed to be unintentional, e.g. it is detected in fluorinated fire extinguishing foams. Thus, the main problems and challenges to be addressed are the identification of its possible occurrence in products and its identification and separation from the waste stream.
Information on the presence of PFHxS in products is not known in the Czech Republic. Technologies for destruction and irreversible transformation in waste have already been evaluated in the framework of the Stockholm-Basel Convention cooperation. Leachate from landfills containing PFHxS released into soil and water can create sites contaminated with this substance. Such contaminated sites should be identified and, According to assessment, cleaned up using appropriate decontamination techniques. The occurrence of the substance in the Czech environment is monitored within the IPR; PFHxS is one of the items that is subject to reporting within the PFAS group of selected substances.

Currently, PFASs (per- and polyfluoroalkylated substances), which include the three groups of substances included in the Convention, PFOS, PFOA and PFHxS, are in the spotlight due to their negative properties and persistence, which cause them not to degrade under natural environmental conditions and they are therefore referred to as forever chemicals. Of this group, PFHxS substances are among the most frequently detected in human blood. At EU level, a restriction on the use of all PFAS substances in firefighting foams is under preparation, as well as a general ban on the production and use of the whole group, with the intention that they will only be allowed for uses that are necessary and where there are no more suitable alternatives yet. The aim of the general ban is to avoid unwanted substitution of already banned fluorinated compounds by other fluorinated substances from this group, which often have the same negative impact.
The forthcoming overall restriction in firefighting foams has already highlighted a number of practical issues that need to be addressed and will need to be addressed in relation to the restriction of the whole group, setting up analytical methods, finding suitable fluorine-free alternatives, e.g. the need to decontaminate existing equipment in which fluorinated foams have been contained to avoid contamination of newly used foams, the need for proper removal/disposal of fluorinated foams or equipment in which fluorinated foams have been used. Last but not least, places contaminated with these foams pose a big problem. The solutions and measures are associated with relatively high financial costs and the overall unavailability of appropriate technologies.

Dechlorane plus
Dechlorane Plus (CAS number 13560-89-9) including its syn-isomer (CAS number 135821-03-3) and anti-isomer (CAS number 135821-74-8) was included in Annex A, Part I of the Convention in 2023. The general entry into force of this amendment is expected in autumn 2024, one year after the notification by the Depositary of the Convention. The substance has been included with specific exemptions for use, i.e. for a period of five years, except for the exemption for spare parts, for which the end-of-life date is 2041 or 2044. If requested, the Conference may decide to extend the five-year exemptions. The wording of the exemptions is given in Table 2. Simultaneously with the inclusion of the substance, a new Part XI was added to the Annex to further specify the exemptions.

Use
Dechloran plus (DP) is a highly chlorinated flame retardant with major applications in electrical cables and wires used in the automotive industry. These applications account for 70-90% of total global

usage. Another use of DP is as a lubricant additive. The technical mixture is sold as a substitute for commercial decabromodiphenyl ether (c-decaBDE), a substance already included in the Convention. China remains the sole producer of the substance, but has announced that it will ban production by 1 January 2024. Another manufacturer was the US, which, according to unverified information, ceased production in 2016. The global annual production volume is a very rough estimate in the range of 300-1000 tonnes per year, with the EU accounting for 100-300 tonnes. Currently, DP is one of the most frequently detected chlorinated retardants in the environment. The main sources of emissions are production, waste management and recycling, with less emitted during product use - the largest exposure is in urban environments.

Legislation
In the EU, the substance has been evaluated under REACH and this evaluation has resulted in a proposal for restriction, which will be the basic input for the negotiation of exemptions under Regulation (EU) 2019/1021, where, as DP has been included in the Stockholm Convention, the restriction of this substance will be transposed. In the EU, the substance has been assessed as a Substance of Very High Concern (SVHC) and was added to the Candidate List in January 2018. It then went through the aforementioned evaluation process for the purpose of its limitation.
According to the evaluation information, alternative substitutes for dechloran plus are available, but none are universal for all applications and the need for exemptions for its continued use in the EU persists. Regulation (EU) 2019/1021 will also set an unintentional quantity value and limit values for waste, the so-called low and high POPs content, which will determine how waste containing this substance is managed.
Until the inclusion in the Convention is reflected in Regulation (EU) 2019/1021, the substance (except for certain restrictions such as SVHC substances) is already subject to the ban on use as for all halogenated chlorinated retardants in electronic displays, which entered into force in the EU in 2021. The ban, adopted as part of the Ecodesign Directive[23], applies to all electronic displays, including televisions, monitors and digital signage displays, with a size equal to or greater than 100 cm^2 or 15.5 $inches^2$.

Origin and occurrence in the environment
The levels of anti-DP and syn-DP are monitored in the air using a passive PUF sampler at 4 background EMEP sites in the Czech Republic (Churanov, Šumava; Košetice; Prague, Libuš; Svratouch). Of the isomers, anti-DP predominates, and the time trend is insignificant for both isomers. In 2019, the anti-DP concentrations at the monitored sites ranged from 30.1 to 110 pg/sample, median 73.525 pg/sample, and the syn-DP concentrations ranged from 9.015 to 58.8 pg/sample, median 36.4 pg/sample (data from GENASIS: Home, Borůvková et al., 2015).

Syn- and anti-DP concentrations were measured in two water samples from the Svratka and Svitava rivers in Brno in 2016. Concentrations in the Svitava River were 1,370 pg/l and 0,792 pg/l for anti- and syn-DP, in the Svratka River 6,710 pg/l and 3,520 pg/l for anti- and syn-DP (data from the portal GENASIS: Home, Borůvková et al., 2015).

Syn- and anti-DP are monitored in the sediment at 7 locations at the background site in Košetice. It is not possible to determine a time trend from the available data from 2018-2020. In 2020, anti-DP concentrations at the study sites ranged from 12.6 to 65 pg/g, median 37.1 pg/g, and syn-DP concentrations ranged from 5.91 to 147 pg/g, median 11.7 pg/g (n=6). Anti-DP was predominant in most samples, with the exception of samples from Vyklantice, nové jezírko, where syn-DP was predominant in 2019 and 2020 (data from the portal GENASIS: Home, Borůvková et al., 2015).

Syn- and anti-DP are also monitored in soil (A horizon, O horizon and soil surface) at the background site in Košetice. Data from 2018-2020 show that anti-DP is the predominant of the two isomers and the highest concentrations were observed in the O (organic) horizon. In 2020, topsoil anti-DP concentrations at the monitored sites ranged from 56.7 to 608 pg/g, median 153 pg/g, and syn-DP concentrations ranged from 15.6 to 110 pg/g, median 66.4 pg/g (n=7), while in the O horizon, measured anti-DP concentrations ranged from 522 to 1030 pg/g, median 906 pg/g, and syn-DP from 161 to 255 pg/g, median 246.5 pg/g (n=4) (data from the portal GENASIS: Home, Borůvková et al., 2015).

According to 2018 and 2019 data from syn-DP and anti-DP monitoring at the background site in Košetice, anti-DP dominates the biota. In 2019, anti-DP levels ranged from 24.6 to 144 pg/g, median

[23] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (revised version)

74.15 pg/g in needles of 3-year-old pines (n = 4), and 46.8 to 444 pg/g, median 68.6 pg/g in moss (n = 7). While syn-DP concentrations ranged from 16.8 to 46.9 pg/g, median 31.35 pg/g in needles of 3-year-old pines (n = 4), and 23.1 to 42.9 pg/g, median 31.2 pg/g in moss (n = 7) (data from GENASIS: Home, Borůvková et al., 2015).

In indoor environmental monitoring (air, dust, window film) in 20 households in Brno in 2013, DP was detected in one of the three air samples (anti-DP only with a concentration of 65 pg/m^3), in 33% of the 21 window film samples with a median concentration of 1.4 ng/m^2, and in 50% of the 30 dust samples with a median concentration of 20 ng/g (Venier et al., 2016).

In the human biomonitoring of the NIPH, the frequency of anti-DP in breast milk samples was 21% in 2021.

Anti-DP was detected in 13% of 231 breast milk samples from 2019 and 2021 collected from mothers in Karviná and České Budějovice (median age 30 years) with an average concentration of 0.14 ng/g lipid, approximately 5 times lower than in Canada (Parizek et al., 2023).

(Polachova et al., 2021) determined 89 POPs, including anti-DP, in the blood serum of municipal police officers (n = 274, 21-63 years) from Ostrava, Prague and České Budějovice collected in spring (n = 142) and autumn (n = 132) of 2019. Anti-DP was detected in 22% (spring) and 33% (autumn) of the samples.

Summary of the situation in the Czech Republic
The substance is not produced in the Czech Republic/EU, it is imported as a separate substance or in products. Its annual consumption in the EU is estimated at between 90-230 tonnes per year, with the automotive industry considered to be the main user of dechlorane. Based on the confirmed uses of DP in the EU, i.e. in plastics in the automotive industry and in electrical and electronic equipment, the waste streams most likely to be affected by the inclusion of DP in the Convention are ELVs and WEEE. More specific information directly related to the situation in the Czech Republic is not known.
The main problems and tasks to be solved will thus be the identification of their possible stocks, their occurrence in products and their identification and separation from the waste stream and the introduction of regular monitoring of this substance. So far, substances have not even been the subject of attention under the topic of contaminated sites. The occurrence of the substance in the Czech Republic is monitored in certain matrices. Its releases are not tracked within the IPR. They are assumed to be from wastewater discharges. The dismantling and recycling of waste and landfills are often mentioned as potential sources. In the EU, information on the presence of DPs (and other substances of concern) in products on the market is submitted to the SCIP database for concentrations above 0.1% by weight (w/w). Technologies for destruction and irreversible transformation in waste will still be assessed under the Basel Convention. Leachate from landfills containing DP released into soil and water can create DP-contaminated sites. Such contaminated sites should be identified and, according to assessment, cleaned up using appropriate decontamination techniques.

UV stabilizer and plastic additive UV-328
The substance UV-328 (CAS number 25973-55-1) was listed in Annex A of the Convention in 2023. The general entry into force of this amendment is expected in autumn 2024, one year after the notification by the Depositary of the Convention. The substance has been classified with specific exemptions for manufacture and use, i.e. for a period of five years, except for the exemption for spare parts, for which the end of product life or 2041 and 2044, respectively, generally apply. If requested, the Conference may decide to extend the five-year exemptions. The wording of the exemptions is given in Table 2. Along with the inclusion of the substance, a new Part XII has been added to the Annex to further specify the exemptions.

Use
It is a phenolic benzotriazole which, due to its ability to absorb UV radiation without degrading, is used in materials (plastics) to prevent their degradation or discolouration caused by UV radiation. The main use is in the automotive industry, such as automotive paints, coatings, sealants, adhesives, plastics and rubbers to protect materials from degradation caused by UV radiation or discolouration, as well as various automotive fluids such as coolants, hydraulic fluids and engine oil lubricants. It can also be used as an additive and printing inks in plastics and rubbers for outdoor furniture, building materials and food packaging (in the non-food contact layer) and wood products. Other uses include applications in leather and textiles and cosmetics. Typical use concentrations range from 0.1 to 3 % by weight.

Safer alternatives for the most important applications of UV-328 are available, but some may be just as harmful. This applies in particular to the substitution of other phenolic benzotriazoles that have already been added to the REACH Annex XIV list in the EU or are being assessed for classification as persistent, bioaccumulative and toxic (PBT) chemicals. Other potential alternatives such as benzophenones also exhibit hazardous properties. Alternatives to UV-328 should be selected to avoid 'unfortunate' confusion.

Legislation
UV-328 has been identified as a Substance of Very High Concern (SVHC) in the EU due to its persistent, bioaccumulative, toxic and very persistent and very bioaccumulative (PBT/vPvB) properties under Regulation (EC) No 1907/2006 (REACH Regulation) and was included in the list of substances subject to authorisation (Annex XIV of the REACH Regulation) on 24 June 2020 with an expiry date of 27 November 2023. No applications have been submitted for authorisation of the use of this substance in the EU and the marketing and use of UV 328 is banned in the EU after 27 November 2023. Only certain uses are exempt from the REACH authorisation requirement, e.g. use as isolated intermediates or for scientific research and development activities. The inclusion of the substance in the Convention implies the transposition of the amendment into Regulation (EU) 2019/1021, including the necessary exemptions. The Regulation will also set unintentional quantity values and limit values for waste, the so-called low and high POPs content, which will determine how waste containing this substance is managed.

Origin and occurrence in the environment
The occurrence of the substance is not monitored in the Czech Republic. There are no known studies on its occurrence. Nor are its releases monitored. According to the dossier from the evaluation process of this substance, releases of UV-328 occur during all phases of the life cycle as a result of past and present production, transport and end use of the substance, as well as during use, disposal and end-of-life treatment of products containing UV-328. UV-328 is not chemically bound to materials, so the substance can be released from products and enter the environment. Microplastics containing UV-328 are then the main source of UV-328 in the marine environment. Technologies for the destruction and irreversible conversion of UV-328 in waste will still be assessed together with the Basel Convention. According to the available information, UV-328 decomposes at temperatures below 200 °C, so conventional waste incinerators should be able to adequately destroy this substance. However, if the waste containing UV-328 is not incinerated but landfilled, UV-328 may leach out of landfills. Where products containing this substance in concentrations above 0.1% by weight (w/w) are placed on the EU market, they are subject to registration. This obligation applies from 5 January 2021. SCIP is a database for information on substances of concern in products.
For waste, the focus should be on waste plastics in particular. Laundry, detergents, cosmetics, fragrances and air fresheners, and textiles are considered other sources of release. One source of direct release of UV-328 may be sewage sludge applied as fertilizer.
In addition, leachate from landfills containing UV-328 released into soil and water can create sites contaminated with UV-328. Such contaminated sites should be identified and, According to assessment, cleaned up using appropriate decontamination techniques.

Summary of the situation in the Czech Republic
The substance was not produced in the Czech Republic, according to the available information (SP CR) it was used for the UV stabilization of some PVC films with the requirement for long-term functionality under external conditions. It is also found in products imported into the EU. Information on its presence in specific products is collected from 2021, when the obligation to report such products to the EU SCIP database applies. Specific information directly related to the situation in the Czech Republic is not known. The main problems and tasks to be solved will be the identification of stocks, inventory of the substance in the products used and its identification and separation from the waste stream. The occurrence of the substance in the environment of the Czech Republic is not monitored, nor are there any known pilot studies that would address its occurrence in the Czech Republic. Similarly, this substance is not the subject of biomonitoring studies. No environmental contamination by the substance is being monitored, nor has any such site been otherwise identified to date.

2.6. Stockpiles and wastes with POP

Article 6 requires Parties to ensure that stocks containing POPs of Annexes A and B and waste contaminated with Annex A, B, C substances are managed in a manner that protects the environment and human health from their harmful effects. Parties must therefore identify potential stockpiles and provide information on the presence of POPs in products and waste. Waste containing a classified substance in a concentration

higher than the so-called low POP content is treated as POP waste. This waste must be eliminated from recycling by sorting and separation prior to treatment and then recommended technologies must be used to ensure that the POPs content is irreversibly destroyed or converted.

Stocks

The use of most of the substances listed in the Convention is banned in the EU and they are managed under the waste regime, as are the stocks containing them. Authorised uses of substances or stocks containing them are subject to notification in the Union. If the quantity or stocks containing such substances is more than 50 kg, the obligation to notify the nature and size of such stocks to the MoE applies under Regulation (EU) 2019/1021. Of the substances listed so far, PFOA compounds are the only reported stocks where stockpiles in the form of fire-fighting foams have been identified in the Czech Republic. There are still stocks of PCBs in used equipment in the Czech Republic, but their reporting is governed by a different regime under the Waste Act.

Products used

In the EU, companies that supply articles containing substances of very high concern (SVHCs) listed for possible inclusion in Annex XIV in concentrations greater than 0.1% by weight to the EU market must submit information on these articles to ECHA in the SCIP database from 5 January 2021. The SCIP database aims to raise awareness of hazardous chemicals in articles and products throughout their entire life cycle - including the waste stage. Products containing POPs whose use is prohibited may not be imported.

Conclusions

Accurate information on the presence of POPs in inventories is crucial for the proper management of POPs and subsequent waste. In the Czech Republic, entities are obliged to submit information on POPs stocks to the Ministry of the Environment via a form available on the website. There is also a general obligation to store such stocks in an environmentally sound manner. However, no precise information is available on the presence of PCBs in products in use which pre-date the ban, but mainly concern products with brominated flame retardants or perfluorinated substances, with the exception of PCBs in dielectric equipment, which are subject to special measures, including inventory obligations.
EU entities that use waste and place recovered substances, mixtures or articles on the market and those that produce by-products, are regularly inspected according to the methodological guideline 'Control of compliance with Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals' to verify whether the recovered substances and by-products comply with the Regulation.
The problem of recycling material containing hazardous substances has long been addressed, and not only for one group of substances. The introduction of technologies that can separate hazardous substances or parts thereof that contain them in the waste stream are the goal and a challenge.

Waste containing/contaminated with POPs

There is sufficient legislation in the Czech Republic to ensure that POPs waste is handled in an environmentally sound manner, thus fulfilling the provisions of the Stockholm Convention and the Basel Convention, under which guidelines for the management of POPs waste are developed. In the Czech Republic, Regulation (EU) 2019/1021 and the Waste Act are the basic legislation governing the management of waste containing or contaminated with POPs. In the Czech Republic, this concerns mainly industrial substances, as the majority of stocks and waste of chlorinated pesticides listed in the Convention were already eliminated in the Czech Republic in the first half of the 1990s, including the most recently included methoxychlor. The occurrence of waste of obsolete pesticides is thus no longer anticipated in the Czech Republic. In addition to these legislative documents, this issue is also addressed in strategic documents such as this NIP and the Waste Management Plan of the Czech Republic (WMP, current for 2015-2024 with a view to 2035 https://www.mzp.cz/cz/plan_odpadoveho_hospodarstvi_cr), which addresses the issue of POPs in waste in the chapters on PCBs and POPs.
Specifically, the aforementioned Regulation (EU) 2019/1021 obliges the Czech Republic to ensure the traceability of waste with POPs in the waste stream. Under this obligation, the management of waste containing POPs must be reported (Annex IV of the Regulation). The Regulation also sets limit values that are decisive for the management of POPs waste. These limit concentrations are in Annexes IV and V and are the low POP content (see Annex IV of the Regulation, 'low POP content'), where below this limit the waste is treated as POP-free, above this limit it must be treated in such a way that the POPs in the waste are irreversibly destroyed or transformed. The second limit value is set in Annex V and is the high POP content limit, which is the limit up to which waste containing POPs can be treated (limited to waste from Annex V Part 2, e.g. waste from thermal processes, lining, construction and

demolition waste/including excavated soil from contaminated sites/, waste from waste treatment plants, industrial waste water treatment plants and industrial drinking water and water production) by the most environmentally sound alternative treatment options listed in Annex V, Part 2.
The last amendment to the limit values of the Regulation (EU) 2019/1021 in the waste annexes, which revised some existing values and introduced values for newly included POPs, took place in 2022[24].

Amendments to Annex IV:
The new provisions of the Regulation concern the following substances:
- Pentachlorophenol, its salts and esters - 100 mg/kg
- Dicofol - 50 mg/kg
- PFOA - 1 mg/kg (PFOA and its salts); 40 mg/kg (sum of PFOA-related compounds)
- PFHxS - 1 mg/kg (PFHxS and its salts); 40 mg/kg (sum of PFHxS related compounds)
- SCCP - 1 500 mg/kg
- PBDEs - until 29 December 2025 - 500 mg/kg; from 30 December 2025 to 29 December 2027 350 mg/kg; from 30 December 2027 200 mg/kg
- PCDD/PCDF - 5 ug/kg
- HBCDD - 500 mg/kg; review and possible reduction to a maximum of 200 mg/kg by 30 December 2027 at the latest
Changes to Annex V:
Newly classified wastes in Part 2 of the Annex - Wastes according to the classification in Decision 2000/532/EC[25]:
- 10 01 03 ash from the combustion of peat and untreated wood
- 17 05 04 soil and stones other than those mentioned under item 17 05 03
- 20 municipal waste (household and similar trade waste, industrial waste and waste from offices) including components from separate collection
- 20 01 components from separate collection (except for number 15 01)
- 20 01 41 waste from chimney cleaning
New maximum concentration limits for substances listed in Annex IV:
- PCDDs/PCDFs and dioxin-like PCBs - 5 mg/kg
- Sum of PBDE concentrations - 10 000 mg/kg
- Pentachlorophenol, its salts and esters - 1,000 mg/kg
- Dicofol - 5,000 mg/kg
- PFOA and its salts - 50 mg/kg; PFOA-related compounds - 2 000 mg/kg
- PFHxS and its salts - 50 mg/kg; PFHxS related compounds - 2 000 mg/kg

BAT/BEP is applied to the disposal of POP waste in accordance with the BAT (Waste Incineration) conclusions issued. Incinerator-type facilities include technologies for the dry and wet scrubbing of pollutants that can currently be considered BAT.

Brominated flame retardants in the waste stream
The use of brominated POPs as flame retardants, in particular PBDEs and HBCDDs, has been widespread in the Union and has been and is mainly incorporated in the plastic parts of products. Products containing brominated POPs have entered, are entering, and will continue to enter the waste stream for decades. Some products have already become waste due to their end of life many years ago, while others may become a bigger problem in the future (polystyrene with HBCDD). The occurrence of this waste can therefore be expected also in landfills where such waste has been deposited and from where it could potentially be released and contaminate the surroundings, depending on how the landfills are secured against releases.
Polystyrene waste (EPS and XPS types) makes up and will make up the largest proportion of HBCDD waste. Although it is already entering the waste stream, a larger 'influx' can be expected as the useful life of already applied structural EPS or XPS boards containing the substance comes to an end. The service life of the boards is estimated at 50 years +/- 25 years. Previous inspections carried out in the Czech Republic focused on the content of brominated flame retardants in waste and recycled polystyrene have not detected the presence of POPs. The limit concentration of HBCDD in waste is set at 500 mg/kg of waste (so-called low POP content).

[24] Regulation (EU) 2022/2400 of the European Parliament and of the Council of 23 November 2022 amending Annexes IV and V to Regulation (EU) 2019/1021 on persistent organic pollutants
[25] Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes within the meaning of Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste within the meaning of Article 1(4) of Council Directive 91/689/EEC on hazardous waste (notified under document number K(2000) 1147)

In its methodological recommendation, the Waste Department of the Ministry of the Environment has determined to which listed hazardous waste incinerators in the Czech Republic construction waste EPS containing HBCDD should be transferred.
At present, the management of this waste is subject to a number of legislative measures, i.e. the methods of management and limit values determining such management are defined. The regulation also sets out obligations for processors of waste electrical equipment, inter alia, to preferentially remove all substances and components specified by the decree and to dismantle, concentrate, store, process or otherwise dispose of waste electrical equipment in accordance with the technical requirements and selected technical standards of the Office for Technical Standardization, Metrology and State Testing. It also establishes from 1 June 2023 the obligation to verify the fulfilment of the second obligation (implementation of individual steps in accordance with the standards) by a professionally competent person (Act No. 542/2020 Coll. on End-of-Life Products, technical requirements for the treatment of waste electrical equipment and a list of selected standards are set out in the implementing decree).
In summary, waste electrical equipment (e-waste) processors are subject to the obligation to remove, among other things, plastics containing PBDEs from e-waste as a matter of priority. As of 1 July 2023, pursuant to Section 69(2)(c) of Act No. 542/2020 Coll., on End-of-Life Products, e-waste processors are obliged to ensure verification of compliance with the obligation to dismantle, sort, store, process or otherwise manage waste electrical equipment in accordance with technical requirements and selected technical standards. Verification - certification must be carried out by a professionally qualified third party that holds an accreditation issued by the Czech Institute for Accreditation. At the moment, there is only one certification body in the Czech Republic, WEELEBEX. Currently, a total of 33 e-waste processors are certified in the Czech Republic. These processors are obliged to either separate such plastics (either via the dry - bromine-detecting lasers - or wet method based on weight, as bromine is relatively heavy) or to demonstrate that they will not be recycled (under customer contracts).

Waste from waste-to-energy plants and incinerators
In addition to the problems that incineration of waste with POPs can bring with it in the form of PBDD/F and PCDD/F emissions, another problem is the waste generated from incineration. Wastes from waste-to-energy plants and incinerators of waste and hazardous substances, i.e. fly ash, bottom ash, slag, etc., are potential sources of POPs. Waste from thermal processes with potential POP content can be disposed of in hazardous waste landfills provided that the wastes are pre-solidified or partially stabilised.
Following the requirements of Regulation (EU) 2019/1021, the parameters of ash from hazardous waste incineration plants are monitored during landfilling. Inspections of hazardous waste landfills are carried out annually. There is an implementing Decree No. 273/2021 Coll., on the details of waste management, which also sets out the technical requirements for POPs waste management.
Fly ash is also used as construction and reclamation material and such use is governed by Act No. 22/1997 Coll. on Technical Requirements for Products. In terms of environmental criteria, relatively strict leaching limits are set for the fly ash used in this manner, which can however be mitigated by comparison with the hydrogeological background. However, leaching limits are not primarily aimed at POPs but at heavy metals. Two studies by IPEN and Arnika have addressed the issue of fly ash from incinerators and have also covered the issue in the Czech Republic (Petrlík et al., 2017; Katima et al., 2018).

Fluorinated substances in the waste stream
The Convention itself lists only some of the so-called PFAS substances. Here, this includes the whole group of these chemicals. Wastes containing PFAS substances include firefighting foams that can no longer be used and textiles or household products that have been treated with the substances. They can thus also be expected in residues from waste incineration and in emissions. The very nature of these substances, and their often-extreme resistance and non-degradability, means that they need to be destroyed by combustion at extremely high temperatures. However, these high temperatures are not met by municipal waste incinerators, where textiles and plastic products treated with these substances often end up. According to some foreign studies, even high combustion temperatures or a high proportion of a particular waste type may not guarantee low concentrations of PFAS compounds in ash or emissions (Strandberg et al., 2021; Björklund et al., 2023). Non-combustion technology using Super-critical Water Oxidation (SCWO) has been suggested as one possible alternative (McDonough et al., 2022). Appropriate technologies for the decontamination of fire extinguishing equipment containing fluorinated substances are also currently under discussion.

Textile waste
In line with the objectives of the Textile Strategy set out in the Commission Communication of 30 March 2022 entitled 'An EU Strategy for Sustainable and Circular Textiles', textile products placed on

the Union market should, to a large extent, be made from recycled fibres that do not contain hazardous substances. In order to ensure that recycled textiles are free of hazardous chemicals such as PFOA from the outset, it is necessary to strengthen the limit values for PFOA, its salts and PFOA-related compounds in waste, as their presence could have an impact on the collection and treatment of textile waste. The Commission should therefore review the relevant concentration limit by the end of 2027 at the latest with a view to lowering it, if such a reduction is feasible in line with scientific and technical progress.

The issue of sludge

Sludge may be another potential source of POPs. In the Czech Republic, the limit values for certain POPs for application to agricultural land are set by Decree No. 273/2021 Coll. on the details of waste management only for 3 groups: AOX, PCBs and PAHs. The presence of other POPs is also detected in sludge. The evaluation of the extent of the input of these substances, including newly introduced ones, into the environment via sludge and the potential input to organisms from cultivated crops certainly deserves increased attention. Recently, there has also been talk of possible entry of perfluorinated POPs into the environment via this route. The incineration of sewage sludge results in the decomposition of POPs at sufficiently high temperatures, but the question remains, based on the studies mentioned above, whether this is also true for perfluorinated POPs.

POPs disposal capacities in the Czech Republic

Table 5 summarises the capacity of POPs and PCB waste management facilities. The capacities of the facilities are not set only for POPs or PCBs, but for all hazardous waste subject to a permit for admission to the facility.

Table 5: Capacity for PCB treatment in the Czech Republic (as of 2023, source ISOH - Register of facilities, MoE, CENIA)

List of facilities suitable for the treatment of PCB waste, the capacities indicated and the method of treatment.

Facility	Address	Treatment code*	Capacity (t)
ALFA SYSTEM s.r.o. CZS00924(thermal desorption and biodegradation)	premises of mine No. 16 - Příbram - Háje; 261 01 Příbram 1	R12, D9, D8, R3	annual: 900
Recovery Využití zdroje a.s CZT00097 (incinerator) and	Slovenská 2071/100; 709 00 Ostrava	D10	annual: 25000
ADC Services, s.r.o. CZL00331 (regeneration and shredding)	Podbřežice, 683 01	R12, D14, D13, R6, R2, R3, R7	annual: 600
Purum s.r.o. CZL00331 (biodegradation and decontamination)	Rynoltice 149, Liberec, 46355	R3, R12, D8, D9, D13	annual: 7000

* The treatment code determines the methods of disposal and recovery of waste according to Act No. 541/2020 Coll., on Waste.

Conclusions

While progress continues to be made in the development of techniques for identification and separation in waste streams, including guidance and updates from the Convention Secretariat, the problems posed by POPs in the waste stream are not resolved. Among other things, this is because direct separation technologies are very expensive. The focus should be in particular on reducing the input of POPs-containing waste into recycling.

Attention should be paid to incineration technologies in terms of POP content, also in view of the growing list of POPs, where the effect of combustion temperature on POP destruction and consequently on the waste coming out of incinerators is showing to be significant. The assessment of the extent of POP input through sludge application in the context of significant environmental risks and contamination of food chains deserves special attention.

The solution to the problem is thus linked to the support of research and development projects of new technologies and biotechnologies aimed at the gradual removal of waste and contaminated matrices and the overall focus on the development and consideration of BAT/BEP technologies that will lead to the minimization of POPs risks to health and the environment.

2.7. Identification of contaminated sites

According to Article 6(1)(e), the Parties are to identify sites contaminated with POPs and seek to remediate them in an environmentally sound manner.

Legislation
At the EU or Czech level, the issue of contaminated sites is dealt with in a number of legal provisions. However, there is no direct regulation in the Czech Republic that would cover this issue. All the legislation mentioned is guided by the 'the polluter pays" principle.
The key piece of legislation used to address the remediation of contaminated sites in the Czech Republic is the Water Act[26]. According to Section 42, paragraph 4, this Act imposes an obligation to take measures to remedy the defective condition (i.e. remove the source of contamination) if there is a serious threat or pollution of surface or groundwater.
Other related regulations fall within the area of waste management, in particular Decree No. 273/2021 Coll. on the details of waste management, which sets limit values for PCBs and PAHs in sludge applied to agricultural land.
In the area of soil protection, this is Act No. 41/2015 Coll.[27], especially its implementing regulation Decree No. 13/1994 Coll.[28] as amended, which regulates certain details of the protection of the agricultural soil fund.
In addition, there are a number of methodologies developed by the Ministry of Environment for dealing with contaminated sites for their identification, site surveys, risk assessment, removal or remediation (http://www.mzp.cz/cz/metodiky_ekologicke_zateze).

Conclusions
The issue of removing old environmental burdens or dealing with contaminated sites is not managed centrally according to uniform legislation and is the responsibility of the relevant ministries. The Ministry of the Environment acts as an expert guarantor of the process of removing old environmental burdens, which are financed through the mechanism of the so-called Ecological Contracts, OP E and NP E. At the same time, it cooperates with the administrators of other subsidy titles, e.g. on the regeneration of brownfields of other ministries. The removal of old ecological burdens caused by the Soviet army's stay is directly under the competence of the Ministry of the Environment, respectively the Department of Environmental Risks and Ecological Damage. The Operational Programme Environment (OP E) and the National Programme Environment (NP E) are important aids for regional and local administrations in this respect. Representatives of the Department are also on inter-ministerial committees dealing with the revitalisation of areas affected by mineral extraction. The Czech Republic has a publicly accessible database of contaminated sites called CSMS (Contaminated Sites Monitoring System, www.sekm.cz. The third version of the database is currently in operation). The database (under the former acronym SESEZ) was the output of a project of the Ministry of the Environment in 1996-98 within the framework of the Environmental Protection Programme. In 2004, the database was modified to make the outputs compatible with the information requirements of the European Environment Agency (EEA). The administrator of the database is the Ministry of the Environment, Department of Environmental Risks and Ecological Damage.
Sites with POPs (as groups of PCBs, PAHs and pesticides) were identified in one area-wide project in 2009-10, since then they have been added on an ongoing basis (outputs of the OP E, NP E projects) as they are identified. Similarly, projects have been undertaken to improve information and the overall quality of the database of contaminated sites. More detailed information on the development of the database and the addition of sites with POPs is provided in the previous version of the NIP, 2018. **Table 6** summarises the information to date (as at August 2023) provided by CSMS on POP sites. The reason for the increase in the number of sites for all three groups compared to the 2017 data presented in the previous version of the NIP is the implementation of the National Inventory of Contaminated Sites project in 2018-2021. In fact, this does not mean that the number of contaminated sites in the Czech Republic has increased dramatically, but that they have now been mapped in more detail.
The MoA completed the identification and area remediation of sites contaminated with obsolete pesticides on 1 January 2011.
The inventory of POPs was completed by the Ministry of Defence in January 2009; more specific information from this ministry is not available.

[26] Act No. 254/2001 Coll., on Water and on Amendments to Certain Acts (Water Act)
[27] Act of 10 February 2015 amending Act No. 334/1992 Coll., on the Protection of the Agricultural Land Fund, as amended, and Act No. 388/1991 Coll., on the State Environmental Fund of the Czech Republic, as amended
[28] Decree No. 13/1994 of the Ministry of the Environment regulating certain details of the protection of the agricultural land fund

Table 6: Setting priorities for locations with the occurrence of POPs (as of July 2023)

POP groups	Number of sites	Priority codes*				
		A1-A3	P3-P4	P2	P1	N0-N2
PCB	697	6 %	64 %	7 %	12 %	11 %
PAH	978	19 %	42 %	12 %	17 %	10 %
Pesticides	363	3 %	84 %	6 %	4 %	4 %

*according to the Methodological Instruction of the Ministry of the Environment on the Contaminated Sites Monitoring System including Priority Assessment
A1-A3: remedial action is necessary or desirable, P3-P4: contamination investigation is necessary, P2: further monitoring of contamination development over time is necessary, P1 institutional control of site use is necessary, N0-N2: no intervention is necessary

Conclusions
In terms of the occurrence of individual POPs or groups of POPs, more specific information on the occurrence of PCBs, PAHs and pesticides can be obtained from the existing CSMS database. Systematic identification of sites potentially contaminated mainly by industrial POPs added to the Convention after 2009 has not been carried out. The main POPs that can be most commonly expected at contaminated sites are newly, in addition to the 'old' POPs mentioned above (PCBs, PAHs, HCHs, PCDD/Fs), perfluorinated POPs and HCBD. Individual contaminated sites are usually not contaminated with just one compound. The CSMS database is continuously updated with information on recent changes in the status of contaminated sites and other locations. Currently, the amount of information on the sites is basically standardised (after the implementation of NIKM II). They differ basically in the degree of knowledge of the locality. The actual filling of the CSMS database is governed by the MoE's methodological instruction 'Methodological Instruction of the MoE for Working with the CSMS 3 System' from January 2021. The obligation to fill the CSMS database results from Decree 369/2004 Coll. on the design, implementation and evaluation of geological works, notification of geofactors at risk and the procedure for calculating reserves of exclusive deposits, for all surveys of anthropogenic pollution. At the same time, cases are registered here according to Act 167/2008 Coll. on the Prevention and Remediation of Environmental Damage. It is possible to add and subsequently register 'new' POPs to the database, e.g. PFAS group substances, by the Ministry of the Environment as the expert guarantor of the database. This is carried out by the MoE according to the current need, if contamination is proven at a site during exploratory work.

2.8. Awareness and education

Current level of information, awareness-raising and education of target groups, information exchange mechanism with target groups and Parties to the Convention

2.8.1. Mechanism for the exchange of information and awareness in the Czech Republic

The Czech Republic has had a mechanism for information exchange and coordination on POPs issues at the national level since 2005. The Council of the National Centre for Toxic Compounds (the Council) is an inter-ministerial advisory body to the Minister of the Environment. The Council, whose meetings on the status of implementation and relevant changes and priorities are held at the national level at least twice a year, includes representatives of the National Centre for Toxic Compounds (National Centre) and the relevant ministries (MoE, MoH, MoA, MIT, MoF, MEYS, MoT, MRD), the Chemical Industry Association and representatives of scientific and non-governmental organisations. The meetings address current issues arising from the implementation of international conventions on chemicals and their connection with the fulfilment of the Czech Republic's obligations arising from the implementation of the Convention.
On 26 October 2021, the National Risk Assessment Panel was established by the Council as a platform to accelerate the transfer of research results on human and environmental exposure to toxic substances and their risks into the development of national and European strategies and to ensure the involvement of the Czech Republic in the European Partnership for the Assessment of the Risks of Chemicals (PARC). The PARC Panel is an open expert structure that contributes at national level to the coordination of activities related to environmental monitoring and biomonitoring of human exposure to toxic substances and assessment of effects and risks of chemicals, provides expert input at national level, regularly reports on its activities to the Council and receives input from the Council on its activities related to national capacity and legislative needs.

In addition, several electronic databases and information systems, which are publicly available, serve to inform and raise awareness of POPs. These include GENASIS (Global Environmental Assessment System, GENASIS: Home), which is associated with the Unified Environmental Information System (UEIS) of the Czech Republic and serves the MoE as an official POP inventory tool for support in decision-making and for the implementation of multilateral environmental agreements. The GENASIS information system developed at Masaryk University by the RECETOX Centre in cooperation with the Institute of Biostatistics and Analyses provides comprehensive information on concentrations of substances in the environment and human tissues, serves for the standardised storage of data from a wide range of providers, ensures their international availability and enables their further use. The portal and its tools enable visualisation, analysis, interpretation and clear presentation of data and can be used by a spectrum of users from experts and decision-makers to the public. The system is also used internationally, presenting data from international monitoring networks such as the Global Air Passive Sampling (GAPS) operated by Environment and Climate Change Canada or the Latin American Passive Air Network (LAPAN) coordinated by the University of Rio Grande in Brazil, and providing support to decision makers internationally - its most important partners are UNEP, EMEP and GEOSS.
For the purposes of the Global Monitoring Plan (GMP) of the Stockholm Convention, the RECETOX Centre in the Czech Republic has developed an information system presenting all global data on the contamination of air, water, blood and breast milk with substances included in the Convention, the so-called GMP data warehouse. It also includes the visualisation of this data on the internet (GMP data warehouse (pops.int)), where the GMP DWH clearly displays available information on spatial and temporal trends in concentrations of the monitored substances necessary for assessing the effectiveness of international treaties, including analytical tools and online data visualisation. Both of the above environmental databases are also linked to the GEOSS Global Information Systems.
The Czech Republic also uses websites and other media to share information on POPs. The website of the National Centre (National Centre for Toxic Compounds | MUNI RECETOX) contains key documents including the statutes of the National Centre and its governing body - the Council of the National Centre, the text of the National Implementation Plan of the Stockholm Convention in its original and updated version, and information on POPs-related project outputs and other POPs-related activities.
Information on POP issues is also published in the journal of Masaryk University MUNI (Magazine M: News from MUNI | em.muni.cz)
Other awareness-raising activities include competitions, popularisation activities and presentations of activities at COP meetings, accompanying events, etc. Examples of activities are listed below; a full list is available on the National Centre's website.
In 2018-22, RECETOX employees held or organised dozens of lectures on POPs (e.g. Science to Go, Scientists' Night, Chemistry Café, FyBiCh and ViBuch seminars, etc.). In 2021, a number of events were held at which RECETOX ensured the participation of its experts. Specifically, there were 19 conferences, seminars or trainings and 21 awareness-raising events. These activities also included an information campaign on the 20th anniversary of the Stockholm Convention. In addition to social media, the director of the National Centre K. Šebková appeared on Czech Television on 23 May 2021, on the occasion of this anniversary. She stressed that the Convention is still relevant after 20 years and the role played by the Czech Republic, specifically the RECETOX Regional Centre (SCRC), in the work of the Convention. In 2022, 19 awareness-raising and educational events were held and RECETOX continued to disseminate information and raise awareness on POPs.

2.8.2. Education on POPs in the Czech Republic

In the Czech Republic, several institutions are systematically educating about POPs. These include Masaryk University, Charles University, the University of Chemistry and Technology, the University of South Bohemia, Technical University in Liberec, Tomas Bata University in Zlín, University of Ostrava and J.E. Purkyně University in Ústí nad Labem. In addition to universities, non-governmental non-profit organisations (NGOs) are also active in the field of education, as described in Chapter *2.9. Significant NGO activities*.
In the field of education, the National Centre/RECETOX offers courses focused on national, regional and global strategies and processes in the field of chemicals (courses ‘Environment and Health - Environmental Policies, Strategies and Tools’ and ‘Policy and Strategy for Environmental Protection from Chemical Pollution’), which are attended by students of the Faculty of Science of Masaryk University. The topics of both courses are focused on chemicals, so they specifically address e.g. the activities of the National Centre on Toxic Compounds and the Stockholm Convention Regional Centre (SCRC), developments and activities under the Stockholm Convention, EU strategies such as The European Green Deal or legislative and regulatory frameworks at European and global level (e.g. REACH, Global Framework for Chemicals, etc.).

The most important educational event of RECETOX is the Summer School, which RECETOX has been organising in cooperation with the Ministry of the Environment every year since 2005. Each year it is thematically focused on a specific area. Further information on the topics of the individual schools is available on the MUNI | RECETOX website.

2.8.3. Presentation of the Czech Republic's activities to the international community

The Czech Republic regularly informs the international community about its activities. It organised accompanying events at the Conferences, COP 8-11 (2009-2023). Information is shared on national and international activities such as the MONET monitoring network, electronic tools for monitoring POPs in the environment, project results and capacity building programmes in monitoring, laboratory capacity and expertise for the implementation of the Stockholm Convention and chemicals management in general, and the full range of RECETOX activities including the sharing of training and briefing materials.
At the international level, RECETOX was involved in the Czech Presidency of the EU Council, where it contributed its expertise. A follow-up activity was the organisation of an international scientific symposium on environmental and health crisis management. The symposium also included a discussion on concrete steps towards greater cooperation between European centres focusing on global change, environment, sustainable development and population health. The participants agreed on the need to create an international platform that would not only act as a think-tank and help identify urgent problems and ways to solve them, but also facilitate better networking of all players necessary to achieve transformational change: not only research and educational institutions and funders, but also partners from the public and private sphere.
A significant recognition of RECETOX's involvement in international cooperation was the awarding of an honorary doctorate (doctor honoris causa) to the Director of RECETOX at Örebro University in Sweden. On this occasion, she presented her research at a public lecture and also spoke about RECETOX activities at the national and international level. The collaboration of RECETOX at the international level, specifically with WHO, has resulted in success in the form of the designation of RECETOX as the WHO Collaborating Centre. RECETOX's collaboration with WHO will focus on assessing the risks associated with population exposure to chemicals. RECETOX had to prove during the long selection process that it had the prerequisites to meet the high WHO standards that guarantee the prestige of collaborating centres.
Within the EnvHealth network, in which RECETOX is involved, activities in the field of the impact of air pollution on human health are coordinated between major research centres.
In terms of project involvement, RECETOX was involved in 21 European projects (H2020) in 2021-22, 4 of which were newly launched, 18 national research projects (e.g. GACR, CHRC, MoA), 3 application projects (TACR, MIT), 2 large research infrastructure projects and 6 Operational Programmes projects. RECETOX is involved in a number of international capacity building projects on POPs issues.

2.8.4. Sharing information and education on an international level

The Czech Republic shares its experience in addressing POPs-related issues mainly through the Stockholm Convention Regional Centre for Capacity Building and Technology Transfer (SCRC) in Central and Eastern Europe, which is also part of the RECETOX Centre at Masaryk University in Brno, and which the Czech Republic hosts on the basis of its official designation in the decision of the Conference of the Parties SC-4/23 of May 2009. The Regional Centre has long supported 23 countries in Central and Eastern Europe and serves as a strategic partner for more than 30 countries in Africa and Asia. In addition to the supported countries, the main partners of the Regional Centre are the secretariats of the Stockholm Convention and other chemicals conventions, international organizations (UNEP, UNIDO, UNDP and WHO), development agencies and other stakeholders whose activities are related to chemicals management. SCRC focuses on capacity building projects in developing countries, organising conferences, seminars and summer schools. It also supports scientific cooperation and research projects with partner countries and institutions in the fields of chemicals management, environmental protection and human health. It enables the use of experience, instrumental and expert capacities available in Brno and the Czech Republic at the international level and contributes to improving the management of chemicals in partner countries and institutions, solving environmental problems and accelerating the implementation of the Stockholm Convention and other conventions in the field of chemicals and waste by the Parties.
The flagship educational activity of the SCRC is the International Summer School on Environmental Chemistry and Toxicology, which RECETOX and the SCRC have been organising regularly in June since 2005. The one-week course in English provides theoretical knowledge and practical skills in

environmental sampling and laboratory analysis, data analysis and interpretation, and impact and risk assessment. In particular, it contributes to capacity building to evaluate the effectiveness of the Stockholm Convention and its Global Monitoring Plan. Since 2007, RECETOX has been working with UNEP and the Ministry of Environment on its preparation. Almost 1000 participants from more than 80 countries attended the Summer School between 2005-2023 and the information gained from the most important scientific capacities in the field as well as practical experience is useful not only for scientists and university students, but also for government employees, control authorities, analytical laboratory workers and industry.
Experts from the Czech Republic are also frequently invited as experts to work on projects aimed at identifying the extent of environmental contamination, consulting on practical solutions for environmental decontamination and remediation, and conducting risk assessments at national and international level. For example, RECETOX experts worked with UNDP, UNIDO and NATO to build capacity in Armenia, Kazakhstan and Kyrgyzstan between 2015 and 2023, on intensive and long-term cooperation with Turkey, Bosnia and Herzegovina and Serbia between 2013 and 2015, and short-term training in Armenia, Brazil, China, Ghana, South Korea, Malaysia, Mali, Maldives, Seychelles, Ukraine and other countries between 2012 and 2016. The SCRC is now involved in the implementation of three large GEF5-funded regional projects in the country for 2019-2023 supporting POPs monitoring in Asia, Africa and the Pacific Island States.
In addition to the activities of the RECETOX Centre, it is also necessary to mention the significant activities of the Czech Republic in the field of development cooperation and aid, which also focus on environmental protection and have long been dealing with the issue of chemicals. In this context, we can mention, for example, POPs-related projects (mostly remediation) in Vietnam, the Balkans, and Africa, e.g. by Dekonta or Geomin and others.
NGOs also have extensive activities abroad, as discussed in Chapter *2.9. Relevant activities of non-governmental stakeholders.* Some of their activities are supported by the Transition Programme within the framework of development and transformation cooperation managed by the Ministry of Foreign Affairs of the Czech Republic.

Conclusions
The current level of awareness and the information exchange mechanism with target groups at the national level is a fully functional and proven way to ensure successful and effective implementation of the Convention at the national level. The state-of-the-art electronic tools and information portals developed by RECETOX in cooperation with the National Centre for Toxic Compounds also contribute significantly to this.
The National Centre is very active in education and awareness raising. The Czech Republic is developing a wide range of activities at the international level, supporting other Parties and international organisations. The Czech Republic has been successful in preparing and implementing POPs projects, as well as in development cooperation and assistance or capacity building, and in effectively making the results of its activities, scientific results and applications developed, for example, by the Centre for Research on Toxic Compounds in the Environment (RECETOX) visible to international organisations and decision-makers.

2.9. Relevant activities of non-governmental stakeholders

The Ministry of the Environment registers more than 40 non-governmental organizations operating in the Czech Republic in the field of environmental education and protection, of which only a few are profiled in the field of chemicals and environmental pollution (e.g. Arnika, Centre for Environment and Health, Children of the Earth, Frank Bold, Greenpeace, Hnutí Duha - Friends of the Earth Czech Republic, Society for Sustainable Living - SSL or Zelený kruh). In addition to the larger organisations, there are a number of local organisations and initiatives dedicated to individual causes, many of which are also related to POPs issues, such as Herout (Heřmanův Městec), Calla (České Budějovice), Ekozahrada pod věží (Horní Počaply), Zelená pro Pardubicko (Pardubice), Vsetínské fórum (Vsetín) or Frygato-Eko (Karviná). Some consumer organisations (SOS Association) or Kokoza, Ekodomov, CZ Biom, as well as some basic organisations of the Czech Union of Nature Conservationists and environmental education centres also deal with the issue of toxic substances or waste. In addition to the above-mentioned NGOs, the Ostrava-based organization Nádech also focuses on air pollution, although its focus is not directly on POPs, but on dust particles, for example.
Local civic initiatives dealing with waste, especially those opposing the construction of new incinerators, renewed the activities of the Pro 3R Coalition (KOALICE PRO 3R) in 2020. Most of the coalition's goals and demands are directed at waste management issues, but the following are also related to POPs:

- Stricter measurement of toxic substances and limits for their discharge at waste incineration plants (WEEE)

- Establishment of a publicly accessible database on the management of incineration residues
- Creating a legislative framework for the regulation of technologies referred to as 'chemical recycling'

Indirectly related to POPs was Greenpeace's 'Plastic is a Trap' campaign, which took place in 2018.

Among NGOs, Arnika is the most involved in the protection of wetlands and watercourses, the reduction of environmental pollution by toxic substances and waste, and the promotion of public participation in environmental decision-making. It cooperates significantly with other NGOs at the level of the Czech Republic and internationally.
Arnika (Protecting our environment. (arnika.org)) is a Czech non-profit organization founded in 2001. It has branches in České Budějovice, Děčín, Havířov and Prague and works in two programmes, of which POPs are dealt with mainly in the Toxic Compounds and Waste programme. Part of Arnika's international activities are aimed at helping non-profit organisations from countries in Central Eastern Europe, South-East Asia or Africa, which in some cases have less experience with toxic substances and often have difficult conditions for their work, among others due to the lack of capacity for chemical analysis in their home country.
Arnika is involved in the work of two international networks of NGOs focused on toxic substances and waste:
- International Pollutants Elimination Network (IPEN) - IPEN | A Toxics-Free Future, which addresses the full range of toxic substances in the environment and
- Chemicals Working Group of EEB - Chemicals (eeb.org).

Previously, Arnika was also more actively involved in the work of two other networks:
- Health Care Without Harm - HCWH - Health Care Without Harm (noharm.org)
- Global Alliance for Incineration Alternatives (GAIA), Homepage - GAIA (no-burn.org).

The following is a brief overview of Arnika's most important national and international POPs activities over the last ten years:

- Czechia Poison Free - a long-term campaign/project focused on POPs and heavy metal contamination in consumer goods; it included a series of analyses of toys and other consumer products made from black plastic recyclate for the presence of brominated flame retardants (BFRs) and brominated dioxins (PBDD/Fs); (DiGangi et al., 2017; Petrlik, Behnisch, et al., 2018; Straková & Petrlík, 2017a, 2017b; Straková, 2018)
- Don't Burn, Recycle and Waste Oscar - projects focused on waste management in which Arnika promotes, among other things, waste prevention, limiting waste incineration as a source of POPs and strict implementation of the BAT/BEP guidelines of the Stockholm Convention for sources of dioxins according to Article 5 and Annex C of the Convention. As part of the awareness campaign Don't Burn, Recycle, Arnika published an extensive study Waste Incinerators and the Environment (arnika.org) in September 2023 (Jelínek et al., 2023) to support advice for active citizens in the locations of planned new waste incineration projects.
- Several projects aimed at advising citizens and public administration on the issue of chemicals and waste , including the project 'We have the right to know aka The future of a Europe without poisons', in the framework of which Arnika published the book 'How to live well, healthy and environmentally friendly' ((PDF) How to live well, healthy and environmentally friendly - second, expanded edition (researchgate.net) aimed at ordinary consumers and including advice on how to avoid POPs and other toxic substances.
- Rivers without poisons - a petition action that was triggered by the cyanide poisoning of the Bečva River, but at the same time responded to the growing problem of PFAS in the waters and demanded their addition to the IPR. This followed a study by Arnika that found PFAS in surface waters in Prague, including elevated concentrations in a stream below Prague airport (Mach et al., 2020).

POPs were or are also dealt with in Arnika's one- to multi-year foreign projects in the following countries: Armenia, Australia, Belarus, Bosnia and Herzegovina, Montenegro, China, Indonesia, Kazakhstan, Moldova, Serbia, Thailand and Ukraine. The results of some of these have been presented in papers for the Dioxin conferences (see below); (Adu-Kumi et al., 2019; Grechko, Amutova et al., 2021; Grechko, Petrlik, et al, 2021; Kuepouo, et al. 2022; Møller, et al. 2021; Petrlik, Ismawati, et al. 2022; Petrlik, et al. 2017; Petrlik, Strakova, et al. 2022; Petrlik, Teebthaisong, et al. 2018; Teebthaisong, et al. 2018; Teebthaisong, et al. 2021).
In 2015-2016, Arnika addressed, among other things, PCBs and other POPs contamination of the Elbe River, PCBs and other POPs at the Hůrka u Temelína and Odra operations (Mach & Petrlík, 2016), the Hůrka u Temelína operation (Mach, 2017), which handles ash from waste incineration and metallurgy, and PCBs and other POPs at the Lhenice site (Mach et al., 2016). Arnika also addressed the POPs issue in the context of integrated permitting and EIA processes. In Klatovy, in cooperation

with local residents, Arnika managed to push for the clean-up of the old pesticide warehouse in Luby, contaminated mainly with DDT and lindane (Pesticide warehouse in Klatovy - Luby (arnika.org). Its remediation was completed in 2012.
Since 2001, Arnika's Toxic Compounds and Waste Programme has hosted the secretariat of the IPEN (International POP Elimination Network) Working Group on Dioxins, PCBs and Waste, which in 2021 transferred to the IPEN Research Centre located in Arnika. Since 2008, Arnika has also been the IPEN Coordination Centre for the Central and Eastern Europe region, which in 2020 expanded its scope to include Western Europe - the IPEN CEWE hub. The region managed by Arnika in Central and Eastern Europe covers the following countries: Estonia, Latvia, Lithuania, Belarus, Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Serbia, Montenegro, Bosnia and Herzegovina, Albania, Kosovo, Macedonia, Romania and Bulgaria. In 2020, they will be joined by all the EU countries plus Norway and Switzerland. Arnika represents IPEN at the EU ('Competent Authorities for POPs'), the Basel Convention Small Intersessional Working Group for POP Waste and the Stockholm Convention Expert Group on Toolkit and BAT/BEP.
The results of Arnika's international projects, together with the IPEN and HEAL networks, include two studies - one focusing on brominated flame retardants in recycled plastic products (toys and consumer items for women) from 19 European countries (Strakova et al., 2018) and the other evaluating PFAS in disposable paper food packaging in several European countries (Strakova et al., 2021). Both studies include the results of measuring products from the Czech Republic for the presence of PFAS, PBDE, HBCD and other BFRs.
Arnika also represents Czech NGOs in negotiations on IPR in a group established by the Ministry of the Environment, as well as in the Council of the National Centre for Toxic Compounds.
Since 2015, Arnika experts have regularly authored or co-authored papers at symposia focused on POPs, held regularly under the abbreviated title Dioxin (http://www.dioxin20xx.org), and abstracts from the conferences are published in the Organohalogen Compounds database (https://dioxin20xx.org/organohalogen-compounds-database-search/). Four of them focused on the PCDD/F content in fly ash from waste incinerators, including some data from the Czech Republic (Katima et al., 2018; Petrlik & Bell, 2017; Petrlik et al., 2021; Weber et al., 2015). One of the abstracts summarised the presence of PCDD/Fs in waste from the current chlorine production at Spolana Neratovice (Bell et al., 2021). Four of them evaluated PBDEs, HBCDs and PBDD/Fs in consumer goods from the Czech Republic (DiGangi et al., 2011; Møller et al., 2021; Petrlik et al., 2019; Strakova et al., 2017; Straková, 2018).
In 2022, Arnika helped the BioDetection Systems research centre from the Netherlands to organize the 'BioDetectors Conference' in Prague, where activities in the field of POP detection using bioassay analysis were widely presented by NGOs from all over the world (besides the Czech Republic and the EU, also from Asia and Africa; see 13th BioDetectors conference 2022 - Bio Detection Systems.
Older international and national activities can be found in previous versions of the NIP.
In 2022 and 2023, Arnika collaborated with experts from IPEN and other NGOs from around the world on two global studies summarizing the results of several years of research on POPs: (1) a summary of the results of analyses of domestically produced eggs for dioxins (PCDD/Fs), dl PCBs and brominated dioxins (PBDD/Fs) in 13 mixed samples from potentially contaminated sites from 30 countries (Petrlik, Bell et al., 2022) and (2) a global survey of the presence of brominated dioxins, dioxin and thyroid activity in samples of consumer articles, primarily toys, made from recycled plastics in 26 countries (Behnisch et al., 2023). Both studies recommended tightening the limits for POPs in waste to even lower levels than the EU did in its last revision. The highest concentration of PCDD/F + dl PCBs in the Czech sample of eggs was 31.9 pg TEQ/g fat from the vicinity of a plant recycling PVC insulation from electrical cables. Some of the studies listed above recommended specific tightening of the limits for POPs in waste: for PCDD/Fs and dl PCBs to a minimum of 1 ng TEQ/g and for PBDEs to a level of 50 mg/kg.
Projects receive support from foreign foundations, the European Commission and individual citizens of the Czech Republic. Some of the projects abroad have also received support from the Ministry of Foreign Affairs of the Czech Republic.

2.10. Technical infrastructure for POPs assessment

Overview of technical infrastructure for POPs assessment, measurement, analysis, management, research and development - links to international programmes and projects. Evaluation of available national expertise, instrumentation and tools to monitor the occurrence and trends in POP concentrations, research and involvement in international programmes in this area.

2.10.1. Monitoring

Monitoring of POPs is required by Articles 15 and 16 of the Convention. Article 16 obliges Parties to review the effectiveness of the Convention and to set up a mechanism to enable this. As a result, the effectiveness of measures taken against POPs is monitored on the basis of their occurrence and trend (by tracking the change in concentrations over time) in three matrices that have been approved by decisions of the Conference. **POP concentrations are determined in air, human tissues** (breast milk or blood) and **surface water** (only hydrophilic POPs).
An overview of the relevant programmes of individual ministries monitoring POPs has been summarised in the document 'Setting up POP monitoring and processing and use of POP data in the Czech Republic', version 2019. This document is developed and approved by the Council of the National Centre for Toxic Compounds. The first version of the document with this topic under the title 'POPs Monitoring Concept' was created already in 2008 and since then the document has been updated several times by the Council in order to fulfil the commitment to POPs monitoring and also with the aim of searching for the possibility of optimisation and efficiency of POPs monitoring in the Czech Republic, also in view of the inclusion of other substances in the Convention and thus the increasing costs of monitoring, analysis and evaluation of data. This task continues for the next period and has become an ongoing task with regular review. The documents are available on the website of the Ministry of the Environment Strategic documents - Ministry of the Environment (mzp.cz).
The first inventory of POPs occurrence in the Czech Republic in all environmental components was made in 2003 and after updating it was included in the first NIP (2006). Since then, information on each POP was updated annually and published in recent years through the GENASIS information system (GENASIS: Home). This inventory covers a wider range of matrices than required by the Convention and allows for a comprehensive assessment of POPs in the Czech Republic.
The Czech Republic also has unique and long-standing experience with monitoring, including participation in international networks (EMEP) and the operation of such a monitoring programme at the international level, as described below for the MONET programme. Since 2006, it has been transferring its experience and knowledge to other countries and serves as an important pillar of global POPs monitoring. In addition, the Czech Republic is developing new sampling methods, especially for air and water, but also focusing on other factors affecting human health (exposome).
Monitoring of pesticides in general, including those included in the Convention, is relatively well set up in the Czech Republic and the overview of the relevant programmes of individual ministries is also summarized in the document 'Setting up POPs monitoring in the Czech Republic'. Data on the occurrence of pesticides included in the Convention are collected by the relevant sectoral institutions (MoA/CISTA - soils, MoE/CHMI and MoA/SEP - pesticides that are priority substances in water according to Directive 2000/60/EC on water). The MoH/NIPH collects data as part of the Population Health Monitoring, both the population burden and (like the MoH) the contamination of the food basket with pesticides and other contaminants. Ambient air monitoring is also carried out within the MONET monitoring network (operated by NC/RECETOX). Among the obsolete pesticides listed in the Convention, HCB, HCH, DDT have been monitored directly in soil since 1994, as have PCBs. PAHs have been monitored since 1996.

Monitoring POPs in major components of the environment as required by the Convention
POPs are monitored in the Czech Republic on a long-term basis in all matrices required by the Convention, but this does not apply to all 'new' ones, the monitoring of which still needs to be set up. In addition, POPs are also monitored in other components of the environment. Thus, information on POP monitoring in the basic matrices and in key POP monitoring programmes is provided below.

Air
POPs listed in the Convention and the POPs Protocol are monitored in the air within the EMEP, MONET_CZ, MONET_EU and the Population Health Monitoring System of the Czech Republic.
Within EMEP, this is active monitoring, ambient air sampling is carried out once a week for 24 hours. Monitoring has been carried out since 1988. Organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) are regularly analysed in samples collected by active sampling. In addition, since 2011, they have set concentrations for polychlorinated dibenzo-p-dioxins and furans (PCDD/Fs), cyclodiene pesticides, dioxin-like polychlorinated biphenyls (dl-PCBs) and polybrominated diphenyl ethers (PBDEs). With the development of analytical methods, the determination of perfluorinated compounds (PFCs) was further introduced in 2012, as well as 4 isomers of hexabromocyclododecane (HBCDD) in 2013.
Within the MONET_CZ programme, long-term (since 2003) passive monitoring of POPs is carried out at 32 sampling sites (28 days each) and monitors chlorinated pesticides (PCBs, HCH, DDT, HCB, PeCB and PAHs). Another passive air sampling programme is MONET_EU. There are three sampling sites in the Czech Republic (Košetice, Praha-Libuš, Svratouch), sampling takes 84 days and since 2012 the OCP content of PCDD/F, dl-PCB, PBDE, HBCDD and PFC is determined. The analysis of 4

isomers of hexabromocyclododecane (HBCDD) was initiated in 2013. Data obtained in MONET are listed on the portal GENASIS:Home. More information on the programmes is available on the website of the Environmental Monitoring Network | MUNI | RECETOX.

Human tissue

The Population Health Monitoring System is a coordinated system of collecting data on the quality of environmental components that represent direct pathways of human exposure to factors harmful to health and assessing their impact on the health status of the Czech population. The system has been implemented since 1994 on the basis of Resolution of the Government of the Czech Republic No. 369/1991 Coll., is included in the Act on the Protection of Public Health No. 258/2000 Coll., as amended, and is one of the priorities of the Action Plan for Health and Environment of the Czech Republic, which was approved by Government Resolution No. 810/1998 Coll. The State Institute of Public Health publishes annual summary reports in which the results of the monitoring are presented. The reports are available in Czech and English (Results of the Health and Environment Monitoring System - NIPH | Official website of the National Institute of Public Health in Prague (szu.cz). As part of the regular monitoring of POPs, individual breast milk samples are collected in the Czech Republic (max. 200 respondents).

OCPs (PCBs, DDT, HCB) have always been analysed in the individual samples collected since 1994. Since 2009, the range of substances monitored has increased. Brominated flame retardants and polyfluorinated substances were also determined retrospectively in some archived samples.

The occurrence of pentachlorobenzene (PeCB) in breast milk was monitored for the first time in 2020 as part of the national biomonitoring. The presence of PeCB at detectable levels was found in almost 70 % of the milk samples.

The Czech Republic has also repeatedly participated in UNEP-WHO breast milk studies. These samples are analysed in only two reference laboratories in the world (FVUA Freiburg, all POPs except PFOS) and Örebro (PFOS only). Data for all countries involved in UNEP-WHO sampling campaigns until 2014 are included in the global POPs monitoring database, the GMP data warehouse (pops.int).

For the WHO studies, one mixed sample per Czech Republic is collected from 50 mothers. The range of POPs analysed in the Czech Republic and in this programme differs.

At the EU level, since 2014, the HBM4EU project and the subsequent PARC project have been working to harmonise all biomonitoring activities, in which both the NIPH and the National Centre are involved.

Water

In 2009, so-called PFOS-based compounds were included in Annex B of the Convention. As these are water-soluble compounds, it was recommended that Parties initiate the monitoring of these substances in surface water in decisions adopted at the Conference (SC - 5/18, 6/23, 7/25).

In the Czech Republic, PFOS have been monitored in surface waters since 2016. They were identified as an indicator for assessing ecological status in 2011[29]. Other POPs are monitored in water as part of the chemical status assessment in surface waters (monitoring by SEP): aldrin, eldrin, dieldrin, heptachlor, HCB, HCH, pentachlorobenzene, endosulfan, HBCDD, PCP, HCBD, DDT, PFOS. In biota, brominated diphenyl ethers (congeners 28, 47, 99, 100, 153 and 154), HCB, HCBD, PFOS, HBCDDs, heptachlor and PCDDs, PCDFs and dioxin-effect PCBs (12346789OCDDs, 1234678HpCDD, 1234789HpCDF, 123478HxCDD, 123478HxCDF, 123678HxCDD, 123678HxCDF, 123789HxCDD, 123789HxCDF, 12378PeCDD, 12378PeCDF, 234678HxCDF, 23478PeCDF, 2378TCDD, 2378TCDF, PCB 105, 114, 118, 123, 126, 156, 157, 167, 169, 189, 77, 81) are monitored (performed by the CHMI) to assess the chemical status. Other substances are monitored in solid matrices (sediments and biota, implemented by the CHMI) to assess trends in the concentrations of these substances in sediment or biota (point 5 of Annex No. 2 to GR 401/2015 Coll.). The following POPs are monitored in groundwater by the CHMI: HCH, DDT, PCBs (28, 52, 101, 118, 138, 153, 180) and PFOS.

All data are collected online through IS-ARROW, the Information System for Monitoring Water Quality in the Czech Republic (Assessment and Reference Reports of Water Monitoring). The information is available on the website of the Czech Hydrometeorological Institute.

The National Centre for Toxic Compounds is actively involved in the development of the global surface water monitoring network Aqua GAPS (Aqua-gaps: a network of networks (passivesampling.net)).

[29] By amendment of GR 61/2003 Coll. = GR 23/2011 Coll.; GR No. 61/2003 Coll. was replaced by GR No. 401/2005 Coll. with the same title

Monitoring of POPs in other matrices

Soil, sewage sludge, sediment

Basal monitoring of agricultural soils is carried out on the basis of Act No. 156/1998 Coll. as amended[30] and Act No. 147/2002 Coll.[31] It consists in monitoring physical and chemical parameters in the soil on permanent monitoring areas using permanent procedures. The system was established in 1992. It currently operates at 214 sites.

As part of the Basal Soil Monitoring, soil samples are taken annually from 40 sites to monitor POPs. HCH isomers, HCB, DDT group substances (o´,p´- and p´p´- DDT, DDE, DDD), PCBs (7 congeners - 28, 52, 101, 138, 153, 180) and 16 EPA PAHs are analysed in the samples.
Sediment (5) and sludge (14) samples are regularly monitored for POPs to monitor the quality of soil inputs and to determine food production safety.

Monitoring of sewage sludge is carried out within the programmes of the relevant ministries (CISTA, NIPH...); it covers most of the POPs, but there is not enough data for the overall evaluation of trends. CISTA focuses on monitoring sludge that is expected to be applied to agricultural land or as a raw material for compost. Selected POPs that are regularly monitored annually are: HCB, PCB, DDT, HCH isomers, some PFAS (PFHxA, PFHpA, PFOA, PFNA, PFDA, PFOS) and selected PBDE congeners (9 congeners - 28, 47, 66, 85, 99, 100, 153, 154, 183). The mean PBDE concentration found in 10 sludge samples in 2022 was 9.78 $\mu g.kg^{-1}$ of dry matter, median 9.09 $\mu g.kg^{-1}$ of dry matter, the lowest mean values so far in the monitoring period. The range of PBDE levels since 2010 is between 1.74 and 112.01 $\mu g.kg^{-1}$ of dry matter. Individual PFAS compounds were determined in 14 sludge samples in 2022. The lowest levels were measured for PFHpA and PFNA, with PFHpA values often below the limit of quantification. On the other hand, PFOS reached the highest concentrations with a maximum of 21.3 $\mu g.kg^{-1}$ of dry matter in a sample from a WWTP in the South Bohemia Region.
The limit values for applications to agricultural land are set by Decree No. 273/2021 Coll. on details of waste management for 3 groups: AOX, PCBs and PAHs. Most POPs do not have such limits. Since 2004, AOX content higher than 500 ppm was detected in 12 samples/11 WWTPs, PCB content higher than 0.6 ppm was detected in 6 samples/6 WWTPs, PAH content of 10 ppm was exceeded in 105 samples/51 WWTPs. The results of the monitoring of foreign substances in soil and food chains are compiled annually in the form of an annual report and published on the Institute's website: CISTA | CISTA (eagri.cz).

POPs in transport

There have been no significant changes in transport-related POPs data since the last NIP, 2018. Emissions of PCDD/Fs and PCBs from transport have a downward trend, mainly related to fleet renewal, and are generally in the order of milligrams. It is not possible to determine from the CORINAIR emission factor database if these emissions in older vehicles are linked to so-called halogen carriers or if they are due to traces of chlorine in petrol. Another possibility is the presence of traces of chlorinated volatile organic compounds in the air (from solvents). Under combustion conditions in vehicle engines, PCDDs, PCDFs and PCBs can also be formed from these substances present in the supply air. The emission factors of PCDDs and PCDFs are very low, in the order of $pg.km^{-1}$, so the formation of this minimal amount is likely even by burning fuels that do not contain halogen carriers. This assumption is supported by the fact that the database includes emission factors for diesel vehicles where halogen additives were not used. Data for PCDDs/PCDFs have been updated in 2021, excluding water transport. For PCBs, according to the 'Emission Inventory Guidebook 2019', the emission factor for diesel in rail transport is not known, only the emission factor for coal is given. The resulting emissions are shown in the charts. The extent of the presence of flame retardants in transport vehicles is unknown. Perfluorooctane sulfonates PFOS and related substances (e.g. perfluorooctane sulfonamides - PFOSA, perfluorooctane acetates - PFOA) were also produced for the treatment of vehicle interiors.

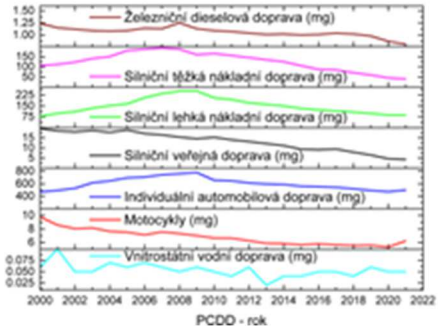
POPs content in food and selected veterinary commodities

The assessment of food basket contamination in the Czech Republic has been regularly carried out since 1994 or 1996 for most POPs included in the Convention within the framework of the Population Health Monitoring System in the Czech Republic in Relation to the Environment (subsystem IV) in the SAMPLEMON programme (sampling of foods representing the typical food composition of the Czech

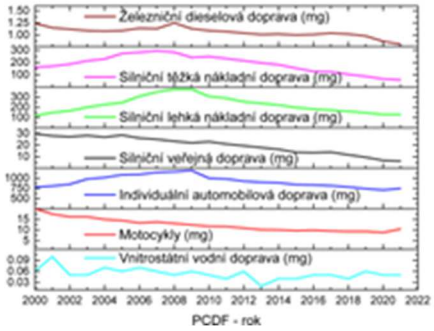
[30] Act of 12 June 1998 on Fertilizers, Soil Improvers, Plant Biostimulants and Growing Media and on Agrochemical Testing of Agricultural Soils (Act on Fertilisers)
[31] Act of 20 March 2002 on the Central Institute for Supervising and Testing in Agriculture and on amendments to certain related acts (Act on the Central Institute for Supervising and Testing in Agriculture)

population). The data is released annually in the form of an annual summary report published by the National Institute of Public Health.

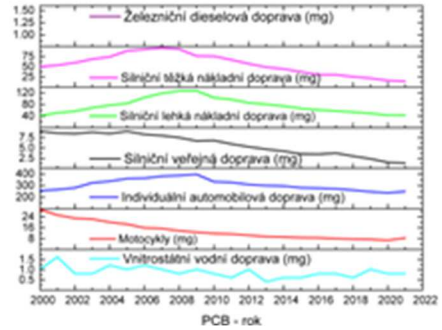
PCDDs



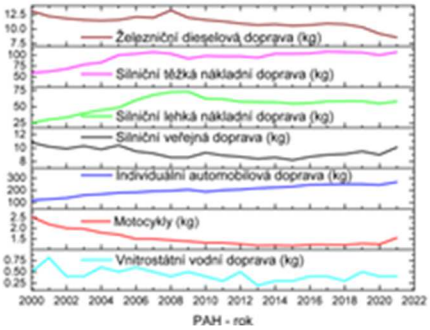
PCDFs



PCBs



PAHs



Charts: Total emissions of PCDD/Fs, PCBs and PAHs from traffic in the Czech Republic

Železniční dieselová doprava - Rail diesel transport
Silniční těžká nákladní doprava - Road heavy goods transport
Silniční lehká nákladní doprava - Road light goods transport
Silniční veřejná doprava - Road public transport
Individuální automoilová doprava - Individual road transport
Motocykly - Motorcycles
Vnitrostátní vodní doprava - National water transport
Rok – year

OCPs and PCBs are analysed as standard, PCDD and PCDF exposures are only analysed if there is sufficient funding for analysis.

Assessment of the exposure of the Czech population to POPs

Assessment of the exposure of the Czech population is carried out regularly in the SAFEMON programme (subsystem IV).

The State Institute of Public Health publishes annual summary reports in which the results of the monitoring are presented. The most recent 2021 report, which produced an estimate of the average chronic exposure dose to pollutants from the entire food basket of the 'average Czech citizen' over the period 2020-2021, shows that pesticides continue to have widespread but low contamination by the pesticide metabolites DDT and lindane, which, according to current knowledge, do not pose a significant health risk, provided that they are assessed as individual chemicals and not in a mixture.

Exposure rates of the Czech population estimated from actual food consumption (SISP04) are still at low exposure levels, e.g. below 0.1 % of tolerable daily intake (TDI) for the DDT sum, below 0.1 % of acceptable daily intake (ADI) for lindane, 1.2 % of TDI for hexachlorobenzene. These are traditional results, with fluctuations in the number of detections from year to year due to low concentrations of these substances in food and consequent low exposure doses.

Conclusions

The Czech Republic has unique experience and data in monitoring. POPs have been monitored in various components of the environment since 1988 or since the mid-1990s.

Air monitoring by active sampling has been carried out since 1988. Since 1994, 52 air samples per year have been regularly collected and since 2012, all POPs in the Convention as well as some candidate substances are analysed. Since 2003, a passive sampling network MONET_CZ has also been established to regularly monitor these POPs: PCBs, HCH, DDT, HCB, PeCB, and PAHs; since 2012, in addition, PCDD/Fs, dioxin-like PCBs (dl PCBs), PBDEs, HBCDDs, and fluorinated substances (PFCs) have been analysed at three network sites (Košetice, Libuš, Svratouch). All the information obtained is published in the GENASIS portal (GENASIS: Home).
Currently, the operation of the MONET network is only supported by the RECETOX research infrastructure.
Surface water abstractions are also taking place in the Czech Republic and some POPs are being analysed according to legislation (implementation of the Water Framework Directive and the obligation to designate PFOS as a priority substance from 2013). In the Czech Republic, spatially, locally and institutionally irregular analyses are carried out in other matrices (soil, atmospheric deposition, biota, substances in the food basket). The range of substances determined, the frequency of sampling and the sampling sites vary, but this information is also an important contribution to the national POPs inventory.
Long-term monitoring of POPs in human matrices has been carried out in the Czech Republic since the 1990s. Breast milk and contamination with selected POPs has been monitored regularly since 1994, with a reduction in the number of samples and types of substances since 2011. The scope of the analysis also depends on the project funding. The results are published on the NIPH website and in professional journals. The Czech Republic is also participating in a UNEP-WHO study monitoring POPs in breast milk.
Based on the data obtained in the MONET programme, from the long-term integrated monitoring of POPs in Košetice, it can be concluded that POP levels for pesticides are decreasing significantly over the long term, although they are still measurable for DDT + metabolites and HCB.
The most frequently detected PBDE congener was BDE 209, which is the main component of the decaBDE technical mixture. On the other hand, the emergence of novel brominated flame retardants (NBFRs) has been observed as a replacement for PBDEs.
Long-term individual data in breast milk indicate a continuing downward trend of POP concentrations in the environment and clearly confirm the effectiveness of measures and restrictions on POP use in the Czech Republic.
With regard to food contamination and population exposure, the exposure rate of the Czech population is estimated from actual food consumption (SISP04) and reached low exposure doses - e.g. below 0.1% of tolerable daily intake (TDI) for the DDT sum, below 0.1% of the acceptable daily intake (ADI) for lindane, 0.3% of the tolerable daily intake (TDI) for hexachlorobenzene. The results confirm the persistence of surface contamination of food with these POPs, but at low concentrations which, according to current knowledge, do not pose a significant health risk when assessed as individual chemicals rather than in mixtures.
The MONET national monitoring network is linked to existing international monitoring programmes within EMEP and AMAP. In 2009, some stations of the MONET_CZ network were included in the MONET_Europe passive air monitoring network. The network also includes the Central European background station Košetice (CHMI in cooperation with the National Centre), where air monitoring programmes EMEP, MONET and GAPS take place.

2.10.2. Identification of POP releases

Releases (sources) of POPs can be traced both from EMEP for selected POPs to air, and then from IPR (or E-PRTR), where, in addition to air, releases to water, soil and in transport (not for all POPs) are also monitored. Substances of concern include the following POPs listed in the Convention: aldrin, dieldrin, endrin, heptachlor, chlordane, chlordecone, HBB, HCB, HCBD, lindane, mirex, PCB, toxaphene, PeCB, PCP, DDT, PCDD + PCDF (dioxins + furans), PBDE, HCH (alpha and beta), endosulfan, perfluorocarbons (PFCs), and chloralkanes (C10 - C13) or short chain chlorinated hydrocarbons (SCCPs), brominated diphenyl ethers (PBDEs): hexa-BDE and hepta-BDE; salts and esters of pentachlorophenol, polychlorinated naphthalenes (PCN), a separate entry for benzo(a)pyrene. For some POPs not yet monitored in the IPR, no agreement on thresholds was found and they are not on the IPR list. On the other hand, twenty selected chemicals from the PFAS group have been added to the list of monitored substances as a result of a change in legislation (amendment of Government Regulation No. 145/2008 Coll.). Their aggregate quantity will be monitored starting from a volume of 0.05 kg per year. The first reporting for the selected PFASs will cover the year 2024, with the actual reporting taking place in the following year 2025. For PFASs, dozens of operators will be affected by the reporting obligation in the first year. The industries concerned must check whether the substance is present in their operations. In the next period, according to the estimates of the Ministry of the Environment, the reporting of PFASs will stabilise at units to tens of notifiers.

Additional POPs may also be added to the list of notifiable substances by including POPs not yet listed in the European E-PRTR, in the framework of the revision of Regulation (EC) No 166/2006 on the E-PRTR. The results would then be reflected in the IPR. Of the substances included in the Convention, the transfer of information on transmission in waste concerns HCB, PCBs, PCCD/PCDFs and naphthalene, see **Table 7**.
Methodological support to the Ministry of the Environment is continuous, during reviews of integrated permits in relation to newly adopted BAT conclusions. In the case of POP emitting equipment, this is taken into account in the reviews. The Industrial Emissions Directive 2010/75/EU (IED) is currently being revised, as is Regulation (EC) No 166/2006 on E-PRTR.
The issue of water treatment is addressed by Government Regulation No. 401/2015 Coll. In terms of water treatment, perfluorinated pollutants are currently the most problematic and are receiving a lot of attention in the EU. Releases of some of these substances are also subject to reporting to the IPR. It must also be part of the permit for the discharge of wastewater into surface waters.
Water treatment initiation processes are the result of a standard legislative process that takes into account developments in the field and new knowledge.

Conclusions
The implementation of measures against POPs releases into the environment is possible if these releases are sufficiently known. Information from the IPR register on releases of POPs is valuable and often the only source of information on the possible sources and origin of POPs in the environment. Thus, reducing and increasing the number of notifiable substances in this register should only be undertaken after careful consideration of all the circumstances and, for some substances that have already been phased out, reconsideration for re-inclusion. The need for tasks for the MoE (methodology, inclusion of other substances) will depend on the results of the revision of EU regulations.

Table 7: Releases of POPs monitored in the IPR, respectively E-PRTR

Stockholm Convention	**Name in E-PRTR and/or IPR**	**E-PRTR Regulation**			**Government Regulation on IPR**	**Note**
Name of substance		Releases to air	Releases to water/Transmissions in wastewater	Releases to soil	Transmission in wastewater	
Aldrin	Aldrin	1	1	1	X	
Chlordane	Chlordane	1	1	1	X	
DDT	DDT	1	1	1	X	
Dieldrin	Dieldrin	1	1	1	X	
Endrin	Endrin	1	1	1	X	
Heptachlor	Heptachlor	1	1	1	X	
Hexachlorobenzene (HCB)	Hexachlorobenzene (HCB)	10	1	1	1	
Mirex	Mirex	1	1	1	X	
Toxaphene	Toxaphene	1	1	1	X	
Polychlorinated biphenyls (PCBs)	Polychlorinated biphenyls (PCBs)	0.1	0.1	0.1	1	
Polychlorinated dibenzo-p-dioxins (PCDDs)	PCDD+PCDF (dioxins+furans) (as TEQ)	0.0001	0.0001	0.0001	0.001	It is monitored together with PCDF in E-PRTR and IPR.
Polychlorinated dibenzofurans (PCDFs)	PCDD+PCDF (dioxins+furans) (as TEQ)	0.0001	0.0001	0.0001	0.001	It is monitored together with PCDD in E-PRTR and IPR.

Stockholm Convention	**Name in E-PRTR and/or IPR**	**E-PRTR Regulation**			**Government Regulation on IPR**	**Note**
Name of substance		Releases to air	Releases to water/Transmissions in wastewater	Releases to soil	Transmission in wastewater	
Hexabromobiphenyl (HBB)	Hexabromobiphenyl	0.1	0.1	0.1	X	
Pentabromodiphenyl ether (pentaBDE)	Brominated diphenyl ethers (PBDEs)	X	1	1	X	In E-PRTR and IPR monitored as a whole - i.e. brominated diphenyl ethers. Tetrabrominated diphenyl ether (tetraBDE) and pentabrominated diphenyl ether (pentaBDE) are the main components of commercial pentabrominated diphenyl ether. hexaBDE and heptaBDE are also newly monitored.
Octabromodiphenyl ether (octaBDE)	Brominated diphenyl ethers (PBDEs)	X	1	1	X	In E-PRTR and IPR monitored as a whole - i.e. brominated diphenyl ethers. Hexabrominated diphenyl ether (hexaBDE) and heptabrominated diphenyl ether (heptaBDE) are the main components of commercial octabrominated diphenyl ether. hexaBDE and heptaBDE are also newly monitored.
Pentachlorobenzene	Pentachlorobenzene	1	1	1	X	
Lindane	Lindane	1	1	1	X	
α-hexachlorocyclohexane	1,2,3,4,5,6-hexachlorocyclohexane (HCH)	10	1	1	X	Monitored as a whole in E-PRTR and IPR - i.e. 1,2,3,4,5,6-hexachlorocyclo-hexane.
β-hexachlorocyclohexane	1,2,3,4,5,6-hexachlorocyclohexane (HCH)	10	1	1	X	Monitored as a whole in E-PRTR and IPR - i.e. 1,2,3,4,5,6-hexachlorocyclo-hexane.
Chlordecone	Chlordecone	1	1	1	X	

Stockholm Convention	Name in E-PRTR and/or IPR	E-PRTR Regulation			Government Regulation on IPR	Note
Name of substance		Releases to air	Releases to water/Transmissions in wastewater	Releases to soil	Transmission in wastewater	
Perfluorooctane sulphonate (PFOS), its salts and perfluorosulfonyl fluoride	X	X	X	X	X	Is not fully covered in E-PRTR and IPR. It contains only perfluorocarbons and now also PFOS as part of the 20 selected PFASs.
Technical endosulfan and its isomers	Endosulphate	X	1	1	X	
Hexabromocyclododecane (HBCDD)	X	X	X	X	X	
Pentachlorophenol and its salts and esters	Pentachlorophenol (PCP)	10	1	1	X	Salts and esters of PCP are also newly covered in IPR.
Polychlorinated naphthalenes	Naphthalene	100	10	10	100	PCNs in relation to naphthalenes are also newly monitored in IPR.
Hexachlorobutadiene	Hexachlorobutadiene (HCBD)	X	1	1	X	

2.10.3. POPs research in the Czech Republic

Research in the field of POPs has been conducted in the Czech Republic over the long-term, systematically since 1983. Significant expertise, at least at the European level, can be found in the RECETOX centre of Masaryk University. Its research on POPs combines short-term laboratory experiments with long-term field studies, leading to a broader understanding of the mechanisms of environmental processes affecting the emission and fate of chemicals in the outdoor and indoor environment and associated human exposure. Sensitive sampling techniques and analytical methods are used to study the behaviour, distribution and transport of chemicals, exposure and associated risks, and laboratories accredited according to CSN 17025 are used. The data obtained are used to develop database systems, test deterministic and stochastic models suitable for relationship analysis, predict environmental changes and impacts, and support decision-making processes. In recent years, research has focused on connections with other disciplines, and so in the POPs field, in addition to the traditional monitoring of substances in the environment, the focus of research groups has been on the exposure of the human population to complex chemical mixtures. New screening methods are being developed for the targeted and untargeted analysis of emergent substances and their mixtures in indoor and outdoor environmental samples, water, food and consumer products to characterize toxic mixtures typical for inhalation, dermal or dietary exposure. Such large-scale screening is combined with the biomonitoring of human tissues and laboratory models capable of predicting the distribution of the monitored substances in the human body.

RECETOX cooperates with a number of partners in research, both from the scientific field abroad, and often also from the application sector - state and regional administration, industry and small businesses, as well as international organisations.

Every year RECETOX publishes research papers that monitor the levels of transfer between different environmental components - air, soil, landfill surroundings and water environment are monitored (e.g. Brůžová, Tereza - diploma thesis: Assessment of Occupational Exposure - Firefighters' POPs Burden (2021), Sobotka, Jaromír - dissertation: Establishment of a Network for the Long-term Monitoring of Organic Pollutants in the Water Environment (2021), Kotačka, Tomáš - diploma thesis: Development of a Detection System for the Study of Endocrine Disruptive Substances in the Environment (2022),

Stuchlík Fišerová, Petra - diploma thesis: Mass Spectrometry Methods For Assessing the Impact of Chemical Exposure on Human Metabolism (2022).
Between 2017-2023, the following POPs-focused projects are underway:
ERA Planet - ERA-PLANET - The European network for observing our changing planet (ERA-PLANET, 689443 for the period - 2/2016-1/2021 - project supported by Horizon 2020 - Climate action, environment, resource efficiency and raw materials (Societal Challenges). For this ERA-Planet project, a network of 36 partner organisations from 15 European countries was set up. The aim of the project is to strengthen the European research area in the field of Earth observation and to reinforce the EU's position in the Group on Earth Observations (GEO) and in the Copernicus programme. The project provided more accurate, comprehensive and supportive information in four areas: Smart Cities and Resilient Societies; Resource Efficiency and Environmental Protection; Global Change and International Environmental Conventions; Polar Regions and Natural Resources. In addition, ERA-PLANET provides advanced tools to support decision-making and technologies to better monitor the global environment and share information and knowledge from other Earth observation fields.
In particular, the Global Change and International Conventions section aims to contribute to improving the availability and quality of Earth observation data and information needed to monitor persistent organic pollutants (POPs) and mercury and to predict changes in the global environment from the data. For more information about the project, visit http://eraplanet.meteo.noa.gr.
In 2017-2023, RECETOX was involved in the e-shape project, specifically in the pilot project 'EO-based surveillance of POP pollution'. E-shape is an initiative that combines decades of public investment in Earth observation and cloud services into services for decision makers, citizens, industry and researchers. 37 pilot applications under 7 thematic areas address societal challenges, promote entrepreneurship and sustainable development, in line with the three main priorities of GEO (Sustainable Development Goals, the Paris Agreement and the Sendai Framework).
HBM4EU (European Human Biomonitoring Initiative) was a project submitted by a consortium of 26 countries under Joint Programming in HORIZON 2020 in 2016. The project was initiated by the European Commission to create a single European platform for human monitoring for 2017-2021. The project was 70% co-financed by EU funds and implementation started in January 2017 and will be completed in 2022. The project covered 18 groups of chemicals: phthalates and their substitutes, extinguishers/flame retardants (not only brominated), bisphenols, perfluorinated substances, chromium and cadmium, polyaromatics in relation to atmospheric contamination, emergent substances, toxic mixtures and anilines. During 2015, a detailed inventory of capacity, data and knowledge was developed for each of these nine groups of priority chemicals at EU level. In the Czech Republic, the National Human Monitoring Panel (HBM4CZ) was established in October 2015 as a national expert and institutional structure for the long-term and sustainable involvement of the Czech Republic in the European biomonitoring initiative. The Panel is subordinate to the Council of the National Centre for Toxic Compounds and ensures the transfer of information from science to policy, responds to requests from the decision-making sphere in the Czech Republic (submitted by the Council of the National Centre) and at the national level elaborates priority topics in connection with the implementation of HBM4EU and subsequently the PARC partnership. Members of the national panel are mainly scientists and experts in human monitoring and priority substances of concern, but also representatives of key ministries and other stakeholders. For the Czech Republic, the HBM4EU project has enabled 70% co-financing of biomonitoring-related activities, i.e. the biomonitoring of the population itself, support for ongoing epidemiological studies, better exploitation of available information from national registries, health databases and data from national and environmental monitoring, and at the same time making this information available to decision-makers and ministries in such a form that it can be comprehensively used in the development of national strategies, policies and legislation. It serves to refine national priorities in health and environmental legislation and to identify directions and research needs where more information is needed.

The PARC project aims to develop a new generation of chemical risk assessments to protect human health and the environment. It supports the European Union's chemical strategy for sustainability and the ambition of 'zero pollution' in the European Green Deal with new data, knowledge, methods and tools, expertise and networks.
The seven-year partnership under Horizon Europe has a total funding volume of €400 million for seven years, of which 50% is funded by the European Union and 50% by Member States. The main objective of PARC is to promote European cooperation, advance research, increase knowledge of chemical risk assessment and train relevant methodological skills. The results will help launch European and national strategies to reduce the risks posed by hazardous chemicals to health and the environment. They will also help to reduce animal testing and put in place next generation risk assessment strategies. As a transnational European project, PARC involves almost 200 environmental or public health institutions from 28 countries and three EU institutions, including the European Chemicals Agency (ECHA), the European Food Safety Authority (EFSA) and the European Environment Agency

(EEA). RECETOX is involved in almost all PARC work packages, leading work package 9 to contribute to the development of a research infrastructure for chemicals.

The CELSPAC - FIREexpo project is carried out in cooperation between RECETOX and FSpS MU to study the occupational exposure of firefighters to PFAS, PAHs, flame retardants and other substances, and to assess the impact of exposure on their health, physical condition, fitness and wellness. The study has been ongoing since 2017 and focuses on professional, senior firefighters, as well as rookies undergoing several stages of rigorous training, and a control group. In total, nearly 170 participants took part in the study.

The aim of the INFERNO project (Investigation of the effects of per- and polyfluoroalkyl substances on reproductive health in the fire-fighting environment) is to clarify the effect of selected chemicals on the reproductive health of firefighters. Firefighters are exposed to various toxic substances when performing their service, both during their training and during the interventions themselves, including perfluorinated and polyfluorinated substances, but also extreme physical influences such as extreme heat, which can negatively affect their reproductive health, or in simple terms, their fertility. The relevance and necessity of the project is underlined not only by the current and growing debate on the impact of these chemicals on male fertility in the professional community, but also by the general increase in infertility, which in recent years has plagued at least one-fifth of couples in the Czech Republic and up to 48.5 million couples worldwide.
Perfluorinated and polyfluorinated substances (PFAS) are a very broad group of organic substances which, due to their unique properties, are used not only in industry, in various daily use products, but also in special extinguishing mixtures used to extinguish specific types of fires, such as aviation and hydrocarbon fuel fires. However, the disadvantage of these substances is their persistence (due to the fluorine atoms in the molecule, they are very stable substances), i.e. their durability and resistance to decomposition, which causes their long persistence and gradual accumulation in the environment. Some of these substances are considered hazardous to health precisely because of their combined properties and persistence. In particular, their carcinogenic effects, disruption of the immune and endocrine systems, but also their effect on fertility in both men and women are discussed.
RECETOX often coordinates several projects that focus on updating the National Implementation Plans of the Stockholm Convention and/or supporting legislation that transposes it. These projects are the Global Development, Review and Update of National Implementation Plans under the Stockholm Convention on Persistent Organic Pollutants - Addendum project for Albania, Armenia, Kazakhstan (GEF), the NIP update project in Moldova and the project in cooperation with SIDA entitled ‘Preparation of legislative acts and training on the implementation of the Stockholm Convention in Bosnia and Herzegovina (BIH/RFP/023/20)‘.

Reference list

Adu-Kumi, S., Petrlík, J., Akortia, E., Skalsky, M., Pulkrabova, J., Tomasko, J., Bell, L., Hogarh, J. N., Kalmykov, D., & Arkenbout, A. (2019). Short-chain chlorinated paraffins (SCCPs) in eggs from six countries. Organohalogen Compounds, 81(2019), 337-339.

Behnisch, P., Petrlík, J., Budin, C., Besseling, H., Felzel, E., Hamm, S., Strakova, J., Bell, L., Kuepouo, G., Gharbi, S., Bejarano, F., Jensen, G. K., DiGangi, J., Ismawati, Y., Speranskaya, O., Da, M., Pulkrabova, J., Gramblicka, T., Brabcova, K., & Brouwer, A. (2023). Global survey of dioxin- and thyroid hormone-like activities in consumer products and toys. Environment International. https://doi.org/10.1016/j.envint.2023.108079

Bell, L., Petrlík, J., Costner, P., & Arkenbout, A. (2021). Dioxins in waste from chlor-alkali plant: A case study. Organohalogen Compounds, 82(2021), 163-166.

Björklund, S., Weidemann, E., & Jansson, S. (2023). Emission of Per- and Polyfluoroalkyl Substances from a Waste-to-Energy Plant Horizontal Line Occurrence in Ashes, Treated Process Water, and First Observation in Flue Gas. Environmental Science and Technology, 57(27), 10089-10095. https://doi.org/10.1021/acs.est.2c08960

Borůvková, J., Gregor, J., Šebková K., Bednářová, Z., Kalina, J., Hůlek, R., Dušek, L., Holoubek, I. & Klánová, J. (2015). GENASIS - Global Environmental Assessment nad Information System [Online]. Masaryk University. 2015.

CHMI. (2022). Hydrologická Ročenka České Republiky 2021 (Hydrological Yearbook of the Czech Republic 2021).

Degrendele, C., Wilson, J., Kukučka, P., Klánová, J. & Lammel, G. (2018). Are Atmospheric PBDE Levels Declining in Central Europe? Examination of the Seasonal and Semi-Long-Term Variations, Gas-Particle Partitioning and Implications for Long-Range Atmospheric Transport. Atmospheric Chemistry and Physics, 18(17), 12877-90. https://doi.org/10.5194/ACP-18-12877-2018

D'Hollander, W., Herzke, D., Huber, S., Hajslova, J., Pulkrabova, J., Brambilla, G., De Filippis, S., Bervoets, L. & de Voogt, P. (2015). Occurrence of Perfluorinated Alkylated Substances in Cereals, Salt, Sweets and Fruit Items Collected in Four European Countries. Chemosphere, 129(June), 179-185. https://doi.org/10.1016/J.Chemosphere.2014.10.011.

DiGangi, J., Strakova, J., & Bell, L. (2017). POP Recycling Contaminates Children's Toys with Toxic Flame Retardants.

DiGangi, J., Strakova, J., & Watson, A. (2011). A survey of PBDEs in recycled carpet padding. Organohalogen Compounds, 73, 2067-2070.

Dorte, H., Huber, S., Bervoets, L., D'Hollander, W., Hajslova, J., Pulkrabova, J., Brambilla, G. et al. (2013). Perfluorinated Alkylated Substances in Vegetables Collected in Four European Countries; Occurrence and Human Exposure Estimations. Environmental Science and Pollution Research, 20(11), 7930-7939. https://doi.org/10.1007/S11356-013-1777-8/FIGURES/2

Grechko, V., Amutova, F., Petrlík, J., Kalmykov, D., Bell, L., Skalsky, M., Vachunova, Z., & Konuspayeva, G. (2021). Persistent Organic Pollutants (POPs) in Chicken Eggs and Camel Milk from Southwestern Kazakhstan. Organohalogen Compounds, 82(2021), 139-142.

Grechko, V., Petrlík, J., Bell, L., Strakova, J., Dulgaryan, O., Jopkova, M., & Sir, M. (2021). Dioxins and dioxin-like PCBs in chicken eggs and fish from Alaverdi, Armenia. Organohalogen Compounds, 82(2021), 97-100.

Hloušková, V., Lanková, D., Kalachová, K., Hrádková, P., Poustka, J., Hajšlová, J. & Pulkrabová, J. (2013). Occurrence of Brominated Flame Retardants and Perfluoroalkyl Substances in Fish from the Czech Aquatic Ecosystem. Science of The Total Environment, 461-462(September), 88-98. https://doi.org/10.1016/J.SCITOTENV.2013.04.081

Ismawati, Y., Petrlík, J., Arisandi, P., Bell, L., Beeler, B., Grechko, V., & Ozanova, S. (2021). Dioxins (PCDD/Fs) and dioxin-like PCBs (dl-PCB) in free-ranged chicken eggs from toxic hotspots of Java. Organohalogen Compounds, 82(2021), 21-24.

Jelínek, N., Petrlík, J., & Ožanová, S. (2023). Spalovny odpadů a životní prostředí (Waste incinerators and the environment). Arnika - Toxické látky a odpady. (Arnika - Toxic substances and waste). Waste

incinerators and the environment. Retrieved from https://english.arnika.org/publications/waste-incinerators-and-the-environment

Jílková, S., Melymuk, L., Vojta, Š., Vykoukalová, M., Bohlin-Nizzetto, P., & Klánová, J. (2018). Small-Scale Spatial Variability of Flame Retardants in Indoor Dust and Implications for Dust Sampling. Chemosphere, 206(September), 132-141. https://doi.org/10.1016/J.CHEMOSPHERE.2018.04.146

Karásková, P., Venier, M., Melymuk, L., Bečanová, J., Vojta, Š., Prokeš, R., Diamond, M. L., & Klánová, J. (2016). Perfluorinated Alkyl Substances (PFASs) in Household Dust in Central Europe and North America. Environment International, 94(September), 315-324. https://doi.org/10.1016/J.ENVINT.2016.05.031

Katima, J. H. Y., Bell, L., Petrlík, J., Behnisch, P. A., & Wangkiat, A. (2018). High levels of PCDD/Fs around sites with waste containing POP demonstrate the need to review current standards. Organohalogen Compounds, 80, 700-704.

Kuepouo, G., Jelinek, N., Bell, L., Petrlík, J., & Grechko, V. (2022). Trials of Burning PFASs Containing Wastes in a Waste Incinerator and Cement Kiln assessed against Stockholm Convention Objectives. Organohalogen Compounds, 83(2022), 179-182.

Kukučka, P., Audy, O., Kohoutek, J., Holt, E., Kalábová, T., Holoubek, I., & Klánová, J. (2015). Source Identification, Spatio-Temporal Distribution and Ecological Risk of Persistent Organic Pollutants in Sediments from the Upper Danube Catchment. Chemosphere, 138(November), 777-783. https://doi.org/10.1016/J.Chemosphere.2015.08.001

Logerová, H., Tůma, P., Stupák, M., Pulkrábová, J., & Dlouhý, P. (2019). Evaluation of the Burdening on the Czech Population by Brominated Flame Retardants. International Journal of Environmental Research and Public Health, 16(21), 4105. https://doi.org/10.3390/ijerph16214105

Mach, V. (2017). Contamination by Persistent Organic Pollutants and Heavy Metals in the Surroundings of the Waste Treatment Facility Hůrka. Retrieved from https://english.arnika.org/publications/contamination-by-persistent-organic-pollutants-and-heavy-metals-in-the-surroundings-of-the-waste-treatment-facility-hůrka

Mach, V., & Petrlík, J. (2016). Znečištění vodních toků perzistentními organickými polutanty ve vybraných zájmových oblastech (Pollution of watercourses by persistent organic pollutants in selected areas of interest).

Mach, V., Petrlík, J., & Straková, J. (2016). Aktuální znečištění a šíření kontaminace perzistentními organickými polutanty z areálu skladu nebezpečných odpadů ve Lhenicích (Levels of pollution by POP and its spreading from the storage of hazardous waste in Lhenice, Czech Republic).

Mach, V., Straková, J., Brabcová, K., Grechko, V., & Møller, M. (2020). Forever chemicals round and round - Contamination of water bodies with perfluorinated substances and brominated flame retardants in the Prague area. Arnika - Toxics and Waste Programme.

Maranhao Neto, G. A., Polcrova, A. B., Pospisilova, A., Blaha, L., Klanova, J., Bobak, M., & Gonzalez-Rivas, J. P. (2022). Associations between Per- and Polyfluoroalkyl Substances (PFAS) and Cardiometabolic Biomarkers in Adults of Czechia: The Kardiovize Study. International Journal of Environmental Research and Public Health, 19(21), 13898. https://doi.org/10.3390/ijerph192113898

McDonough, J. T., Kirby, J., Bellona, C., Quinnan, J. A., Welty, N., Follin, J., & Liberty, K. (2022). Validation of supercritical water oxidation to destroy perfluoroalkyl acids. Remediation Journal, 32(1-2), 75-90. https://doi.org/10.1002/rem.21711

Møller, M., Růžičková, J., Petrlík, J., Gramblicka, T., Pulkrabová, J., Bell, L., & Petrlíková Mašková, L. (2021). The ongoing hazards of toxic BFRs in toys, kitchen utensils and other consumer products from plastic in Czechia and Serbia. Organohalogen Compounds, 82(2021), 93-96.NIPH. (2021). Výsledky Systému Monitorování Zdravotního Stavu Obyvatelstva ČR ve Vztahu k Životnímu Prostředí 2020. (Results of the Health Monitoring System of the Population of the Czech Population in Relation to the Environment 2020).

NIPH. (2022a). Výsledky Systému Monitorování Zdravotního Stavu Obyvatelstva ČR ve Vztahu k Životnímu Prostředí 2021. (Results of the Health Monitoring System of the Population of the Czech Population in Relation to the Environment 2021).

NIPH. (2022b). Zpráva o Kvalitě Pitné Vody v ČR Za Rok 2021. (Report on the Quality of Drinking Water in the Czech Republic for the Year 2021).

Pálešová, N., Maitre, L., Stratakis, N., Řiháčková, K., Pindur, A., Kohoutek, J., Šenk, P., et al. (2023). Firefighters and the Liver: Exposure to PFAS and PAHs in Relation to Liver Function and Serum Lipids (CELSPAC-FIREexpo Study). International Journal of Hygiene and Environmental Health, 252(July), 114215. https://doi.org/10.1016/J.IJHEH.2023.114215

Parizek, O., Gramblicka, T., Parizkova, D., Polachova, A., Bechynska, K., Dvorakova, D., Stupak, M., et al. (2023). Assessment of Organohalogenated Pollutants in Breast Milk from the Czech Republic. Science of The Total Environment, 871(May), 161938. https://doi.org/10.1016/J.SCITOTENV.2023.161938

Petrlík, J., & Bell, L. (2017). PCDD/F in Waste Incineration Fly Ash. Organohalogen Compounds, 79(2017), 249-252. http://dioxin20xx.org/wp-content/uploads/pdfs/2017/9825.pdf

Petrlík, J., Adu-Kumi, S., Bell, L., Behnisch, P. A., Straková, J., Adogame, L., Speranskaya, O., Pulkrabová, J., & Gramblička, T. (2019). Occurrence of polybrominated dibenzo-p-dioxins and dibenzofurans (PBDD/Fs) in consumer products from recycled plastics. Organohalogen Compounds, 81(2019), 395-398.

Petrlík, J., Behnisch, P. A., DiGangi, J., Straková, J., Fernández, M., & Jensen, G. K. (2018). Toxic Soup - Dioxins in Plastic Toys. Arnika, IPEN, HEAL, BUND. https://doi.org/10.13140/RG.2.2.26295.98726

Petrlík, J., Bell, L., & Ožanová, S. (2017). Dioxiny z toxického popílku se dostávají do našeho potravního řetězce (Dioxins from toxic fly ash enter our food chain). doi:10.13140/RG.2.2.36392.19201.

Petrlík, J., Bell, L., & Žulkovská, K. (2018). Crucial Elements of the Pollutant Release and Transfer Register and Their Relationship to the Stockholm Convention.

Petrlík, J., Bell, L., Beeler, B., Møller, M., Brabcova, K., Carcamo, M., Chávez Arce, S. C., Dizon, T., Ismawati Drwiega, Y., Jopkova, M., Kuepouo, G., Mng'anya, S., Ochieng Ochola, G., & Skalsky, M. (2021). Plastic waste disposal leads to contamination of the food chain. International Pollutants Elimination Network (IPEN), Arnika - Toxics and Waste Programme.

Petrlík, J., Bell, L., DiGangi, J., Allo'o Allo'o, S. M., Kuepouo, G., Ochieng Ochola, G., Grechko, V., Jelinek, N., Strakova, J., Skalsky, M., Ismawati Drwiega, Y., Hogarh, J. N., Akortia, E., Adu-Kumi, S., Teebthaisong, A., Carcamo, M., Beeler, B., Behnisch, P., Baitinger, C., ... Weber, R. (2022). Monitoring Dioxins and PCBs in Eggs as Sensitive Indicators for Environmental Pollution and Global Contaminated Sites and Recommendations for Reducing and Controlling Releases and Exposure. Emerging Contaminants, 8(2022), 254-279. https://doi.org/https://doi.org/10.1016/j.emcon.2022.05.001

Petrlík, J., Ismawati, Y., Bell, L., Beeler, B., Grechko, V., Jelinek, N., & Septiono, M. A. (2022). POP Contamination Caused by Use of Plastic Waste as Fuel at Locations in Indonesia. Organohalogen Compounds, 83(2022), 117-121.

Petrlík, J., Kalmykov, D., Bell, L., & Weber, R. (2017). Brominated flame retardants in eggs - data from Kazakhstan and Thailand. Organohalogen Compounds, 79(2017), 167-170. http://dioxin20xx.org/wp-content/uploads/pdfs/2017/9773.pdf

Petrlík, J., Kuepouo, G., & Bell, L. (2021). Global control of dioxin in wastes is inadequate: A waste incineration case study. Organohalogen Compounds, 82(2021), 179-182.

Petrlík, J., Strakova, J., Grechko, V., Matustik, J., Trombitsky, I., Skalsky, M., & Gramblicka, T. (2022). Persistent Organic Pollutants in Free-Range Chicken Eggs from Moldova. Organohalogen Compounds, 83(2022), 89-93.

Petrlík, J., Teebthaisong, A., Bell, L., Behnisch, P. A., Da, M., Saetang, P., Ritthichat, A., & Kalmykov, D. (2018). PCDD/F and PCB in eggs - data from China, Kazakhstan and Thailand. Organohalogen Compounds, 80(2018), 369-372.Polachova, A., Gramblicka, T., Bechynska, K., Parizek, O., Parizkova, D., Dvorakova, D., Honkova, K., et al. (2021). Biomonitoring of 89 POPs in Blood Serum Samples of Czech City Policemen. Environmental Pollution, 291(December), 118140. https://doi.org/10.1016/J.ENVPOL.2021.118140.

Poláková, Š., Kubík, L., Prášková, L., Houček, J., Malý, S., & Fiala, J. (2022). Kontrola a Monitoring Cizorodých Látek v Potravních Řetězcích. Zpráva Za Rok 2021. CISTA. (Control and Monitoring of Foreign Substances in Food Chains. Report for 2021).

Rudzanova, B., Vlaanderen, J., Kalina, J., Piler, P., Zvonar, M., Klanova, J., Blaha, L. & Adamovsky, O. (2023). Impact of PFAS Exposure on Prevalence of Immune-Mediated Diseases in Adults in the Czech Republic. Environmental Research, 229 (July), 115969. https://doi.org/10.1016/J.ENVRES.2023.115969.

Řiháčková, K., Pindur, A., Komprdová, K., Pálešová, N., Kohoutek, J., Šenk, P., Navrátilová, J., Andrýsková, L., Šebejová, L., Hůlek, R., Ismael, M., & Čupr, P. (2023). Firefighters and the Liver: Exposure to PFAS and PAHs in Relation to Liver Function and Serum Lipids (CELSPAC-FIREexpo Study). Science of The Total Environment, 881(July), 163298. https://doi.org/10.1016/j.scitotenv.2023.163298

Řiháčková, K., Pindur, A., Komprdová, K., Pálešová, N., Kohoutek, J., Šenk, P., Navrátilová, J., et al. (2023). The Exposure of Czech Firefighters to Perfluoroalkyl Substances and Polycyclic Aromatic Hydrocarbons: CELSPAC - FIREexpo Case-Control Human Biomonitoring Study. Science of The Total Environment, 881(July), 163298. https://doi.org/10.1016/J.SCITOTENV.2023.163298

Semerád, J., Hatasová, N., Grasserová, A., Černá, T., Filipová, A., Hanč, A., Innemanová, P., Pivokonský, M. & Cajthaml. T. (2020). Screening for 32 Per- and Polyfluoroalkyl Substances (PFAS) Including GenX in Sludges from 43 WWTPs Located in the Czech Republic - Evaluation of Potential Accumulation in Vegetables after Application of Biosolids. Chemosphere, 261 (December), 128018. https://doi.org/10.1016/J.CHEMOSPHERE.2020.128018

Sochorová, L., Hanzlíková, L., Černá, M., Drgáčová, A., Fialová, A., Švarcová, A., Gramblička, T. & Pulkrabová, J. (2017). Perfluorinated Alkylated Substances and Brominated Flame Retardants in Serum of the Czech Adult Population. International Journal of Hygiene and Environmental Health, 220 (2), 235-243. https://doi.org/10.1016/J.IJHEH.2016.09.003

Straková, J., & Petrlík, J. (2017a). Hračka nebo toxický odpad? Jak odpoví Stockholmská úmluva? (Toy or Toxic Waste? What Will Be the Stockholm Convention Response?).

Straková, J., & Petrlík, J. (2017b). Toxická recyklace aneb Jak mohou nevytříděné odpady kontaminovat spotřební zboží v ČR.

Strakova, J., Bell, L., DiGangi, J., Pulkrabova, J., & Gramblicka, T. (2017). Hexabromocyclododecane (HBCD) found in e-waste is widely present in children's toys. Organohalogen Compounds, 79, 571-574.

Straková, J., DiGangi, J., Jensen, G. K., Petrlík, J., & Bell, L. (2018). Toxic Loophole - Recycling Hazardous Waste into New Products.

Straková, J., Petrlík, J., Pulkrabová, J., Gramblička, T. (2018). Toxic Recycling, or how unsorted waste may contaminate consumer products in the Czech Republic. Organohalogen Compounds, 80, 365-368.

Strakova, J., Schneider, J., Cingotti, N., Bennett, A., Boer, A., Brabcova, K., Brosché, S., Fernandez, M., Gorre, F., Hawke, E., Jensen, G., Malval, N., Møller, M., Müller, S., Roger, A., Veillerette, F., Wahlund, B., & Wietor, J.-L. (2021). Throwaway packaging, forever chemicals. European-wide survey of PFAS in disposable food packaging and tableware.

Strandberg, J., Raed, A., Bolinius, D., J., Yang, J-J., Sandberg, J., Bello, M., A., Gobelius, L., Egelrud, L., Härnwal, E.-L. (2021). PFAS in waste residuals from Swedish incineration plants, IVL Swedish Environmental Research Institute. PFAS in waste residuals from Swedish incineration plants (ivl.se)

Teebthaisong, A., Petrlík, J., Ritthichat, A., Saetang, P., & Strakova, J. (2018). POP contamination at 'recycling' and metallurgical site in Thailand. Organohalogen Compounds, 80, 373-376.

Teebthaisong, A., Saetang, P., Petrlík, J., Bell, L., Beeler, B., Jopkova, M., Ismawati, Y., Kuepouo, G., Ochieng Ochola, G., & Akortia, E. (2021). Brominated dioxins (PBDD/Fs) in free range chicken eggs from sites affected by plastic waste. Organohalogen Compounds, 82(2021), 199-202.

Tomasko, J., Stupak, M., Parizkova, D., Polachova, A., Sram, R., J., Topinka, J. & Pulkrabova, J. (2021). Short- and Medium-Chain Chlorinated Paraffins in Human Blood Serum of Czech Population. Science of The Total Environment, 797 (November), 149126. https://doi.org/10.1016/J.SCITOTENV.2021.149126

Tomasko, J., Stupak, M., Hajslova, J. & Pulkrabova, J. (2021). Application of the GC-HRMS Based Method for Monitoring of Short- and Medium-Chain Chlorinated Paraffins in Vegetable Oils and Fish. Food Chemistry, 355 (September), 129640. https://doi.org/10.1016/J.FOODCHEM.2021.129640

Tomasko, J., Parizek, O. & Pulkrabova, J. (2023). Short- and Medium-Chain Chlorinated Paraffins in T-Shirts and Socks. Environmental Pollution, 333 (September), 122065. https://doi.org/10.1016/J.ENVPOL.2023.122065

Tomasko, J., Hrbek, V., Kourimsky, T., Stupak, M., Hajslova, J. & Pulkrabova, J. (2022). Are Fish Oil-Based Dietary Supplements a Significant Source of Exposure to Chlorinated Paraffins? Science of The Total Environment, 833. https://doi.org/10.1016/j.scitotenv.2022.155137

Venier, M., Audy, O., Vojta, Š., Bečanová, J., Romanak, K., Melymuk, L., Krátká, M. et al. (2016). Brominated Flame Retardants in the Indoor Environment - Comparative Study of Indoor Contamination from Three Countries. Environment International, 94 (September), 150-160. https://doi.org/10.1016/J.ENVINT.2016.04.029

Vlasáková, V., Doleželová, P., Rejtharová, M., Rosmus, J., Honzlová, A., Macharáčková, P., Kuba, M., Hedvábný, P. & Tajmir, M. (2023). Státní Veterinární Správa. Informační Bulletin č. 1/2023. Kontaminace Potravinového Řetězce 'Cizorodými Látkami' Situace v Roce 2022." (State Veterinary Administration. Information Bulletin No. 1/2023. Contamination of the Food Chain with 'Foreign Substances' Situation in 2022)

Weber, R., Watson, A., Petrlík, J., Winski, A., Schwedler, O., Baitinger, C., & Behnisch, P. (2015). High levels of PCDD/F, PBDD/F and PCB in eggs around pollution sources demonstrates the need to review standards. Organohalog Compd, 77(2015), 615-618.

3. STRATEGIES AND ACTION PLANS OF THE NATIONAL IMPLEMENTATION PLAN

The third update of the National Implementation Plan, like the previous versions, pursues the fundamental objective of the Convention through five key strategic objectives, as set out in the following chapter. These objectives also result from the current situation in the field of POPs in the Czech Republic. More specific tasks are elaborated in the individual action plans and sub-strategies (chapters 3.2. - 3.12.).

3.1. The implementation of the NIP and the main strategic objectives

The implementation of the NIP in the Czech Republic is coordinated and continuously evaluated by the inter-ministerial Council of the National Centre for Toxic Compounds. Its statutes and rules of procedure are publicly available on the website of the Ministry of the Environment.
The main strategic objectives for the implementation of the objectives of the Convention in the Czech Republic are:

- Elimination of the entry of POPs into the environment and reduction of exposure to these substances
- Prioritization in dealing with old environmental burdens, improvement of the public database
- Proper management of waste containing POPs, with a focus on POPs in waste plastics
- More effective cooperation between ministries to address the issue
- Raising awareness of the issue of newly classified POPs.

The following chapters elaborate these five basic objectives into specific tasks. The activities are divided into short-term ones with an expected time horizon for their completion of up to 3 years and long-term ones, whose implementation requires a longer period of time (up to 10 years) due to their nature or the fact that they are tasks that need to be performed continuously. As the number and content of tasks changes depending on the assessment of the current status, it is no longer possible to follow the numbering of individual activities as used in previous versions. Planned activities are numbered consecutively in this version, and if the current task is related to a task from a previous version, this is indicated in a note.

3.2. Action Plan: Institutional and legislative measures

3.2.1. Short-term activities with a time horizon of up to 3 years

Number	Description	Note
3.2.1.2.	To assess the extent of POPs entry into soil through the application of sewage sludge, in particular with regard to the possible setting of limit values for POPs in relation to significant environmental risks and contamination of food chains. Submit a report on performance to the Council of the National Centre by VII/2026. Responsibility: MoE Deadline: VII/2026 Cooperation: MoA	Continuation of task 3.2.1.2. of the previous version of the NIP
3.2.1.6.	Report on the results of inspections concerning compliance of by-products and substances recovered from waste with REACH and applicable waste legislation. The CIE will forward the report to the Council of the National Centre upon request. Responsibility: CEI Deadline: continuous activity, first in XII/2025 Cooperation: MoE, MIT	Continuation of task 3.2.1.6. of the previous version of the NIP
3.2.1.7.	Establishing procedures for the management of waste that is a source of POPs so as to minimize the release of POPs into the environment. Information for the Council of the National Centre. Responsibility: MoE Deadline: XII/2024 Cooperation: MIT	Continuation of task 3.2.1.7. of the previous version of the NIP

3.2.2. Long-term strategic objectives

Number	Description	Note
3.2.2.2.	Develop a plan for financing the tasks (systemic solutions) arising from the requirements of the Convention on the basis of the documents. Responsibility: MoE Deadline: continuous activity, first by VI/2025 Cooperation: National Centre, MIT, MoA, MoT, MoD, MoH	Revised task 3.2.2.2. of the previous NIP version

3.3. Action Plan: Production, import and export, use, stockpiles, landfills and waste of chemicals listed in Annex A, Part I of the Stockholm Convention (pesticides)

3.3.1. Short-term activities (up to 3 years)

Number	Description	Note
-	-	-

3.3.2. Long-term strategic objectives

Number	Description	Note
3.3.2.1.	Ensuring data on the occurrence of pesticides in the environment with regard to the fulfilment of international obligations of the Czech Republic, implement the adopted documents on monitoring POPs in the ambient air of the Czech Republic together with the provision of systems for the evaluation and interpretation of data and information. Ensure continuation within the framework of the individual ministerial budget chapters. Report once a year to the Council of the National Centre. Responsibility: MoE Deadline: ongoing (optimally VI/calendar year) Cooperation: MoA, MoH	Continuation of task 3.3.2.1. of the previous version of the NIP

3.4. Action Plan: Production, import and export, use, identification, labelling, removal, storage and elimination of PCB and facilities containing PCB (Annex A, part II)

3.4.1. Short-term activities (up to 3 years)

Number	Description	Note
-		

3.4.2. Long-term strategic objectives

Number	Description	Note
3.4.2.1.	Continue to promote and present the construction of a facility suitable for the environmentally sound disposal of POPs, waste containing POPs and contaminated equipment and matrices based on available BAT/BEP principles, which will be applicable for the disposal of non-POPs waste in the future. Submit a situation report to the Council of the National Centre once a year Responsibility: MoE Deadline: continuous activity Cooperation: MIT	Continuation of task 3.4.2.1. of the previous version of the NIP
3.4.2.2.	Submit the results of inspections of compliance with the Air Protection Act regarding the ban on burning POP-contaminated waste oils. Provide up-to-date information on the situation. Once a year, submit a situation report to the Council of the National Centre upon its request. Responsibility: MoE Deadline: continuous activity Cooperation: CEI	Continuation of task 3.4.2.2. of the previous version of the NIP
3.4.2.3.	Submit reports to update the status and addition of PCB sites	Continuation of

	(contaminated sites, old burdens) in the relevant CSMS database at the national level, Responsibility: MoE Deadline: continuous activity, reports to the Council of the National Centre on request. Cooperation: all ministries	task 3.4.2.3. of the previous version of the NIP

3.5. Action Plan: Production, import and export, use, unconsumed waste stockpiles and waste containing POPs

3.5.1. Short-term activities (up to 3 years)

Number	**Description**	Note
3.5.1.1.	In case of new knowledge, complete inventory of sources, uses (current and past) and occurrence of already classified POPs and implement/complete inventory of sources, production, uses for newly listed substances. Provide information to the Council of the National Centre in the form of a report. Responsibility: MoE Deadline: continuous activity Cooperation: all ministries	Continuation of task 3.5.1.1. of the previous version of the NIP
3.5.1.3.	Monitor selected POPs (PCBs, PAHs) in WWTP sludge once a year. Responsibility: MoE Deadline: continuous activity	Revised task 3.5.1.3. of the previous NIP version
3.5.1.4.	Inform stakeholders about POPs and waste recycling issues. Responsibility: MoE Deadline: X/2024 Cooperation: National Centre	Revised task 3.5.1.4. of the previous NIP version

3.5.2. Long-term strategic objectives

Number	Description	Note
3.5.2.1.	Promote selective demolition and recovery or disposal of waste insulation systems. Responsibility: MoE Deadline: continuous activity, 1st report for the Council of the National Centre XII/2025 Cooperation: MoH, MIT	Revised task 3.5.2.1. of the previous NIP version
3.5.2.2.	Inspect waste management according to the POPs limits set by the regulation on POPs, including compliance with the obligations for waste acceptance at landfills. Responsibility: CEI Deadline: continuous activity, Report for the Council of the National Centre upon request. Cooperation: MoE (in the development of the inspection plan), customs administration[32]	Reworded and merged tasks 3.2.2.3 and 3.5.2.2 of the previous version of the NIP
3.5.2.3.	Submit reports on the results of inspections of products (items, mixtures and substances) placed on the market, which will be checked for compliance with the limit values for POP content according to the legislation in force. For products, focus on products intended for children, among others. Among the substances to be targeted are PFAS (textile products) and brominated flame retardants (recycled products). Submit a report on performance to the Council of the National Centre on its request. Responsibility: MoE, CEI	Continuation of task 3.5.2.3. of the previous version of the NIP

[32] The activities of customs authorities include the inspection of persistent substances, inter alia, during import from third countries. In addition, customs authorities carry out checks on the handling of waste when it is imported or exported from/to third countries and when it is imported or exported from/to other EU Member States.

	Deadline: continuous activity Cooperation: MIT, MoH	
3.5.2.4.	Continuously evaluate information on materials that may generate POPs in waste streams. Responsibility: MoE Deadline: continuous activity Cooperation: MIT	

3.6. Action Plan: Releases of substances from unintentional production

3.6.1. Short-term activities (up to 3 years)

Number	Description	Note
3.6.1.2.	Update the Council of the National Centre on the current status of addressing unintentional HCB production with a situation report. Responsibility: MoE Deadline: XII/2026 Cooperation: MIT	Continuation of task 3.6.1.2. of the previous version of the NIP
3.6.1.3.	Prepare a methodological guideline on the proper management of POPs-containing waste Deadline: XII/2024 Responsibility: MoE	
3.6.1.4.	Develop an investigation, prepare a study of the comparison of technical guidelines (BAT/BEP) available at national and international level. Responsibility: MoE Deadline: XII/2024	

3.6.2. Long-term strategic objectives

Number	Description	Note
3.6.2.1.	Evaluate and, where appropriate, implement the monitoring of emissions of other Annex C POPs. Report on performance, including information on POP occurrence rates, to the Council of the National Centre once a year upon request. Responsibility: MoE Deadline: continuous activity Cooperation: CEI	
3.6.2.5.	Identify possible additional sources of Annex C POPs, improve identification of POP sources subject to reporting to the IPR. Submit a situation report to the Council of the National Centre once a year. Responsibility: MoE Deadline: on an ongoing basis with reports on the current status of the solution to the Council of the National Centre by December each year Cooperation: CHMI, Fire Brigade	Continuation of task 3.6.2.5. of the previous version of the NIP
3.6.2.6.	Evaluate the possibility of characterizing the area with the immission burden of all POPs, including the linking of emission-immission information, with the aim of developing a policy to reduce emissions from all (including small) sources making a significant contribution to the total emission flux. Use the information to update the source part of the GENASIS expert database. Submit a situation report to the Council of the National Centre once a year Responsibility: MoE Deadline: continuously with reports on the current status of the solution to the Council by December of each year Cooperation: National Centre, MoH	Continuation of task 3.6.2.6. of the previous version of the NIP

3.6.2.7.	Promote the implementation of BAT/BEP, including the assessment of their update with regard to the reduction of releases of existing and new POPs. Once a year, submit a situation report to the Council of the National Centre Responsibility: MIT Deadline: continuously with reports on the current status of the solution to the Council by December of each year Cooperation: MoE	Modified task 3.6.2.7. of the previous version of the NIP

3.7. Strategy: Identification of significant stocks, types of commodities and wastes in use - Plan for the assessment and reduction of releases from the landfills and wastes of chemicals listed in Annex A, B and C

3.7.1. Short-term activities (up to 3 years)

Number	Description	Note

3.7.2. Long-term strategic objectives

Number	Description	Note
3.7.2.1.	Support research and development projects on new technologies and biotechnologies aimed at the progressive removal of waste and contaminated matrices, with a view to minimising risks to health and the environment. Monitor the potential of using non-incineration technologies to destroy POPs in waste. Provide an update to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, 1st report by XII/2026 Cooperation: MIT, MoH	Continuation of modified task 3.7.2.1. of the previous NIP version
3.7.2.2.	Application of BAT/BEP in the disposal of waste with POPs, including new substances, if BAT/BEP documents are available. In other cases, minimise the potential health and environmental impacts caused by possible POPs releases. Submit a report on performance to the Council of the National Centre Responsibility: MoE Deadline: continuous activity, 1st report by X/2024 Cooperation: MIT, CEI	Continuation of task 3.7.2.2. of the previous version of the NIP

3.8. Action Plan: Identification and appropriate management of contaminated sites (Annexes A, B, C)

3.8.1. Short-term activities (up to 3 years)

Number	Description	Note
3.8.1.1.	Provide pilot information on potential sites contaminated with newly listed POPs. Responsibility: MoE Deadline: 31.12.2025	

3.8.2. Long-term strategic objectives

Number	Description	Note
3.8.2.2.	Encourage the use of the 'in situ' method to reduce the potential risk of spreading pollutants from contaminated sites where hydrogeological or other conditions permit. Provide information on implementation and, if implemented, report annually on the status of the solution. Responsibility: MoE Deadline: continuous activity, 1st report by X/2024	Continuation of task 3.8.2.2. of the previous version of the NIP
3.8.2.4.	Continue to support research aimed at determining the contribution	Continuation of

	of POPs volatilization from soils, landfills and water bodies to total POPs emissions in the Czech Republic. Focus attention on monitoring existing decontamination facilities in terms of POPs releases from bulk material to be decontaminated. Responsibility: MoE Deadline: continuous activity	task 3.8.2.4. of the previous version of the NIP

3.9. Strategies to ensure the exchange and availability of information

3.9.1. Short-term activities (up to 3 years)

Number	Description	Note

3.9.2. Long-term strategic objectives

Number	Description	Note
3.9.2.1.	Enhance cooperation on chemicals and waste issues at national level between the ministries involved. Submit a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, first situation report by X/2024	Continuing, reworded task 3.9.2.1. of the previous NIP version
3.9.2.2.	Effective use of the portals of the National Centre, the MoE and other relevant sources of information on POPs. Publishing of the electronic National Centre Bulletin and Yearbook. Responsibility: MoE Deadline: continuous activity Cooperation: National Centre, all ministries and other stakeholders	Task 3.9.1.1. Of the previous version of the NIP

3.10. Action Plan: Public information, awareness, education

3.10.1. Short-term activities (up to 3 years)

Number	Description	Note

3.10.2. Strategic objectives of the NIP in the area of public awareness, information and education

Number	Description	Note
3.10.2.1.	Intensively continue to raise public awareness and education on POPs and POPs prevention and information linking. Use the activities of all concerned ministries, the National Centre, educational institutions of all levels and voluntary NGOs. In the MEYS, focus on the development and promotion of education in new progressive directions in the field of chemicals management, sustainable chemistry, life cycle assessment, health and environmental impact assessment, etc. Submit the information on implementation to the National Centre, which will prepare a summary report for the Council. The final report will be published on the National Centre's website. Responsibility: MoE Deadline: continuous activity, first X/2024 Cooperation: MEYS, MoH and other ministries, universities, associations	Continuation of task 3.10.2.1. of the previous version of the NIP
3.10.2.2.	Continue to implement educational campaigns (courses, summer schools) based on the State Programme for Environmental Education, Information and Awareness in the Czech Republic (EVVO). Submit information on the implementation to the National Centre, which will prepare a summary situation report for the Council of the	Continuation of task 3.10.2.2. of the previous version of the NIP

	National Centre. Responsibility: MoE Deadline: continuous activity, first report X/2024 Cooperation: National Centre, MEYS, other ministries	
3.10.2.3.	Ensure free public access to information on POPs in an understandable form. Following the approved documents on POPs monitoring in the Czech Republic and the development of the expert system for data interpretation and visualization GENASIS, support the development of this system and its educational modules. Submit a situational report on implementation annually to the Council of the National Centre. Responsibility: National Centre Deadline: continuous activity, first report X/2024 Cooperation: MoE, MoH, MoA	Continuation of task 3.10.2.3. of the previous version of the NIP
3.10.2.4.	Continue to implement awareness programmes at national, regional and local levels. Regularly discuss targeted campaigns at meetings of the Council of the National Centre and forward information about campaigns to the National Centre. Responsibility: MoE Deadline: continuous activity Cooperation: MEYS and other ministries	Continuation of task 3.10.2.4. of the previous version of the NIP
3.10.2.5.	Promote the issue of POPs in EU funding programmes and among the topics of grant programmes announced for NGOs. Provide a situation report to the Council of the National Centre on the status. Responsibility: MoE Deadline: annually Cooperation: SEF, MEYS, MIT	Continuation of task 3.10.2.5. of the previous version of the NIP

3.11. Action Plan: POP monitoring

3.11.1. Short-term activities (up to 3 years)

Number	Description	Note

3.11.2. Long-term strategic objectives

Number	Description	Note
3.11.2.2.	Ensuring a consistent and sustainable reporting format and smooth flow of information into the GENASIS unified information system so that analysis of environmental and health risks and long-term trends can be carried out. Responsibility: MoE Deadline: continuous activity, annually, or according to relevant sampling campaigns Cooperation: MoH, National Centre, MoA, CHMI	Continuation of task 3.11.2.2. of the previous NIP versions
3.11.2.3	Extension of the monitoring of surface waters, including solid matrices (sediments and biota) and groundwater to include POPs not yet monitored and relevant to their occurrence in the relevant matrices. These are mainly POPs that are not priority substances under WFD 2000/60/EC and its daughter directives Responsibility of the MoE Deadline: continuously from VI/2024 (conclusion of the new Monitoring Framework Programme for the period 2025-2030) Cooperation: MoA, SEP, CHMI	New task
3.11.2.4.	Regularly evaluate the setup of POPs monitoring and the processing and use of data on POPs in the Czech Republic in the framework of meetings of the Council of the National Centre. Responsibility: MoE, MIT Deadline: continuous activity, first submission of information to the Council of the National Centre in 2025 Cooperation: National Centre, CHMI	

3.12. Action Plan: Reporting

3.12.1. Strategic objectives

Number	Description	Note
3.12.1.2.	Regularly (every two years) compile the results of the national POPs inventories and information on the implementation of the tasks contained in the NIP. Publish the summary results of the inventories in the Environmental Report or MoE publications and on the websites of the MoE and the National Centre. Responsibility: MoE Deadline: annually Cooperation: MoH, MoA, National Centre	Continuation of task 3.12.1.2. of the previous NIP versions
3.12.1.3.	Ensure regular evaluation of the implementation of the NIP and submit it to the Council of the National Centre at least once a year. Responsibility: MoE Deadline: continuous activity, first X/2025 Cooperation: all ministries	Continuation of task 3.12.1.3. of the previous NIP versions
3.12.1.4.	Ensure regular public information on the implementation of the NIP in accordance with the deadline for the submission of information to the Government. Responsibility: MoE in cooperation with the NC Deadline: 30 June 2027 Cooperation: all ministries	

4. SUGGESTIONS FOR FURTHER DEVELOPMENT, CAPACITY BUILDING AND PRIORITIES

4.1. Priorities of the updated NIP

The priorities are set in view of the expected global developments in POPs

Long-term priorities
in the area of chemicals and waste, the following activities are considered long-term priorities of the updated Plan:

- Continuous update of the National POPs Inventory in the light of newly adopted POPs
- Disposal of existing POPs and waste with POPs
- Improvement of the inventory system for contaminated sites and prioritization for their remediation
- Support for the development of new disposal and remediation technologies
- Promote the development and implementation of safe and sustainable POPs substitutes, including non-chemical solutions
- Minimise exposure to POPs in all products, including imported ones, and reduce indoor exposure to POPs, especially in the case of children
- Ensure the organisational and financial monitoring of POPs in relation to the Global Monitoring Plan and the monitoring setup in the Czech Republic and newly adopted pollutants
- Support the development and implementation of the GENASIS expert system and ensure a user-friendly version that is understandable to the public
- Support basic and applied research within grant agencies, especially with regard to the risks of new types of substances and their degradation products in the environment and living organisms
- Support the activities of the National and Regional Centre
- Support POPs inspection bodies (capacity development, training of inspectors, sufficient budget for analysis, measurement and sampling, etc.) and cooperation of central government bodies in setting priorities for inspection activities in this area

Short-term priorities and challenges
The priority issues for the near future are also with regard to the Czech Republic's past activities and the evaluation of the implementation of the Plan:

- Promote the exchange of information on POPs at national level, especially with regard to polybrominated and polyfluorinated substances, as contaminated products/waste appear in the Czech Republic randomly and their collection and disposal must be addressed.
- Development of GENASIS
- Resolving PCB-related issues
- Monitoring the occurrence of POPs in the Czech Republic including new substances - through the national monitoring network MONET CR - analytical methods and data collection
- Prepare and approve a system solution for the disposal of old environmental burdens, taking into account technologies the operation of which does not lead to the creation of new POPs
- Continue to transfer the experience of the Czech Republic to other countries, in particular through the Regional Centre - on the basis of bilateral contacts with countries of the Central and Eastern Europe region, Africa and a strategic partnership with approved regional centres of the Stockholm Convention
- Continue to transfer the experience of NGOs from the Czech Republic to their partner organisations in Central and Eastern Europe, Africa, Central and South-East Asia and Latin America
- Ensuring long-term financial resources for the implementation of the Convention in the Czech Republic, effective use of existing resources and exploring the possibility of using funds available from the Operational Programme Environment

Responsibility: MoE
Deadline: evaluation at least once a year - the situation report will be prepared by the Council of the National Centre, at the latest at the end of each calendar year, for the first time in XII/2025
Cooperation: all ministries, National Centre

4.2. Further developments – research and development strategy

The suggestions in this chapter will be continuously used and supplemented.
Focus research in the field of POPs on:

- New types of pollutants - brominated substances such as polybrominated diphenyl ethers (PBDEs), brominated dioxins (PBDD/Fs), short-chain chlorinated paraffins (SCCPs), fluorinated substances and others
- Monitoring of POPs from Annex C of the Stockholm Convention in waste from various industrial sites
- Polycyclic aromatic hydrocarbons (PAHs) - focus on monitoring for additional substances in this group beyond those normally recommended by the US EPA
- Release of POPs from remediation and bioremediation
- Study of emissions from biomass combustion
- Study of leaching from contaminated sites, soils, landfills, buildings
- Study of hazardous waste co-incineration
- Support for research and development projects of the MIT and the MoE focused on technologies for the removal of POPs from all components of the environment, taking into account the criteria for monitoring the potential generation of POPs during the operation of these technologies[33]
- Implementation of an epidemiological study relating data on the burden of population groups to potential health risks

Responsibility: MoE
Deadline: continuous activity
Cooperation: NIPH (epidemiological study)

Anticipated future research levels for the next years, which could be carried out with broad participation of a number of institutions and as part of international activities related to POPs:

- Validation of transport and distribution models, as well as for studies of atmospheric processes and deposition/remission fluxes, distribution of POPs between the gaseous phase and particles in the atmosphere and between water and particles in precipitation;
- The study of gaseous exchange processes including POP measurements in components such as water, vegetation and soil;
- More detailed, sophisticated studies of air-surface exchange for POPs; a key aspect of this work will be improvements in the understanding and use of techniques for tracking chiral compounds;
- More extensive studies on the physicochemical properties of POPs under different climatic conditions as an important basis for the study of air-soil, air-water exchange processes, which are strongly temperature dependent;
- Global inventories, global distribution models;
- Study of POPs occurrence forms, bioavailability and dynamics in soils, sediments and groundwater;
- Study of the effects of POPs on humans and wildlife, including molecular modelling of biodegradation, biotransformation and toxicity mechanisms;
- Study of new types of pollutants, superhydrophobic molecules, more polar persistent substances; products of abiotic and biotic degradation
- Development of analytical methods for the determination of new types of POPs, metabolites, steroisomers and multipolar POPs
- Development and application of new progressive sampling techniques based on integral passive samplers
- Studies of deposition/emission processes, transformation processes and POP bioavailability in terrestrial ecosystems
- Evaluation of phytotoxic effects of POPs and their effects on soil microbial populations and soil fauna
- Studying the effects of real environmental mixtures
- Verification of parameters, ecological and health safety and costs of biological decontamination of low contaminated soils for the considerable importance of remediation of such contaminated soils

Responsibility: MoE
Deadline: continuous activity
Cooperation: GACR, AS, MoH, MoA, RDC, TACR

[33] UNEP - EG BAT/BEP. (2006). Annex II: Response to the request by the Conference of the Parties to the Basel Convention at its seventh meeting. Report of the second meeting of the Expert Group on Best Available Techniques and Best Environmental Practices. (UNEP/POPS/EGBATBEP.2/4). Geneva

5. TIMETABLE FOR THE UPDATED NIP

Distribution of the updated National Implementation Plan to all concerned institutions within 1 month of its consideration by the Government.
Submission of the updated Plan (I version) to the Secretariat of the Stockholm Convention within six months after its adoption by the Government of the Czech Republic.
Biennial update on the status of the National Implementation Plan by the Council of the National Centre for Toxic Compounds - first 1Q 2025.
Evaluation of the implementation of the updated National Implementation Plan by 30 June 2027. Submission of information to the Government of the Czech Republic on this date.
Meeting the long-term objectives set out in the National Implementation Plan within ten years of the Plan being adopted.

6. CONCLUSIONS ON THE IMPLEMENTATION OF THE NIP

The National Implementation Plan seeks to assess the knowledge on individual issues and to guide actions and activities that will lead to addressing POPs and meeting the Stockholm Convention's objective to protect human health and the environment from the effects of persistent organic pollutants (POPs). The Czech Republic, as a party to the Stockholm Convention, subscribes to its objective and sets itself tasks leading to its fulfilment. The tasks in the Plan are subject to periodic reassessment to reflect developments, changes in knowledge or the situation, and as a result may even decide to modify the task in the next update of the Plan. The short-term objectives set out in the previous Plan have mostly been met. However, some tasks had to be modified and kept in the short term or were transferred to the long term due to the impossibility of completing these tasks in three years. Recently, substances that are or have been used in the recent past have already been included in the Convention, making it more time-consuming and technologically and financially challenging to meet the Convention's objectives with respect to them. It is more difficult to find substitutes, procedures for separation from waste, or technologies for cleaning contaminated sites. As a typical example, fluorinated persistent organic pollutants, or the whole group of substances from which they originate (the so-called PFAS group), have recently received a great deal of attention.
The issue of chemicals that are harmful to health and the environment is broad, but persistent organic pollutants are the most dangerous group in this respect on a global scale and need to be treated as such and their negative impacts need to be reduced and eliminated. A coordinated approach, not only at the international and national level but also at the local level, including individual citizen involvement, and greater awareness and understanding of this group of chemicals are essential for the implementation of the Plan's objectives. Last but not least, strengthening the control of compliance with the legislation that has been adopted to deal with these substances is proving to be crucial to the achievement of the Convention's objective.