National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants

First update for the period 2023–2028

November 2023

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Acronyms and abbreviations

ABS	acrylonitrile butadiene styrene
ARSO	Slovenian Environment Agency
BC	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
BDE	brominated diphenyl ethers
c-DecaBDE	decabromodiphenyl ether
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CRC	Chemicals Review Committee
CRT	cathode ray tube
DDD and DDE	1,1-dichloro-2,2-bis(p-chlorophenyl) ethane and 1,1-dichloro-2,2-bis(chlorophenyl) ethylene
DDT	dichloro-diphenyl-trichloroethane
DG	Directorate-General
DINCH	bis(7-methyloctyl) cyclohexane-1,2-dicarboxylate
DLP	good laboratory practice
ECHA	European Chemicals Agency
EEE	electrical and electronic equipment
EMEP/EEA	European Monitoring and Evaluation Programme/European Environment Agency
EPS	expanded polystyrene
EU	European Union
Eurostat	Statistical Office of the European Union
PPP	plant protection product
IPCC	Intergovernmental Panel on Climate Change
HBM	human biomonitoring
HBB	hexabromobiphenyl
HBCDD	hexabromocyclododecane
HCBD	hexachlorobutadiene
HCH	hexachlorocyclohexane
HIPS	high impact polystyrene
IJS	Jožef Stefan Institute
LCD	liquid crystal display
AA-EQS	annual average value of the water chemical status parameter
MGTS	Ministry of the Economy, Tourism and Sport of the Republic of Slovenia
MOPE	Ministry of the Environment, Climate and Energy of the Republic of Slovenia
MKGP	Ministry of Agriculture, Forestry and Food of the Republic of Slovenia
MORS	Ministry of Defence of the Republic of Slovenia
MZ	Ministry of Health of the Republic of Slovenia
NAP	national action plan
NDK-OSK	maximum allowable concentration of the water chemical status parameter
NIJZ	National Institute of Public Health
NIP, NIP POPs	National Implementation Plan for Persistent Organic Pollutants
NEAP	National Environmental Action Programme
NGO	non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
WEEE	waste electrical and electronic equipment
EQS	environmental quality standards
EP	environmental permit
EC	environmental consent
PAH	polycyclic aromatic hydrocarbons
PBDE	polybrominated diphenyl ethers
PBT	persistent, bioaccumulative, toxic
PCB	polychlorinated biphenyls
PeCB	pentachlorobenzene
PCDD/PCDF	polychlorinated dibenzo-p-dioxins and dibenzofurans

PCN	polychlorinated naphthalenes
PCP	pentachlorophenol
PFOA	perfluorooctane octanoic acid
PFAS	per- and polyfluoroalkyl substances
PFOS	perfluorooctane sulfonic acid
POPRC	Persistent Organic Pollutants Review Committee
POPs	persistent organic pollutants
POPs Protocol	Protocol on Persistent Organic Pollutants to the Convention on Long-Range Transboundary Air Pollution (CLRTAP)
RC	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
REACH	registration, evaluation, authorisation and restriction of chemicals
SC	Stockholm Convention on Persistent Organic Pollutants
SCCP	short-chain chlorinated paraffins
SORS	Statistical Office of the Republic of Slovenia
CKTF UKCL	Centre for Clinical Toxicology and Pharmacology of the University Medical Centre Ljubljana
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
URSK	Chemicals Office of the Republic of Slovenia
UVHVVR	Administration for Food Safety, Veterinary Sector and Plant Protection
XPS	extruded polystyrene

1. INTRODUCTION

Persistent organic pollutants (POPs) are stable, degradation-resistant and toxic chemicals that are transported by air, water and migratory species across international boundaries and deposited far from the place of release, where they accumulate in terrestrial and aquatic ecosystems. As they are lipophilic (fat soluble) they bioaccumulate in adipose tissues. Because of their negative impact, they are a threat to humans, animals and the environment. These chemicals are also classified as PBT substances (persistent, bioaccumulative, toxic). In the Republic of Slovenia, they are covered by the Stockholm Convention on Persistent Organic Pollutants[i] (hereinafter: the Stockholm Convention), Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants (hereinafter: the POPs Regulation) and the Protocol on Persistent Organic Pollutants to the Convention on Long-Range Transboundary Air Pollution (CLRTAP) (hereinafter: the POPs Protocol).

In accordance with paragraph 1 of Article 7 of the Stockholm Convention [1], each Party shall:

(a) develop and endeavour to implement a plan for the implementation of its obligations under this Convention;

(b) transmit its implementation plan to the Conference of the Parties within two years of the date on which this Convention enters into force for it; and

(c) review and update, as appropriate, its implementation plan on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties.

The Republic of Slovenia signed the Stockholm Convention on Persistent Organic Pollutants on 22 May 2001 in Stockholm and transposed it into its body of law on 2 April 2004. The Convention entered into force for the Republic of Slovenia on the 90th day after the deposit of the instrument of ratification, on 2 August 2004.

In accordance with paragraph 1 of Article 5 of the Stockholm Convention, each Party to the Stockholm Convention is required to develop an action plan for measures to reduce or eliminate emissions from unintentional production within two years of the entry into force of the Convention and subsequently implement it as part of its national implementation plan.

The first national action plan, entitled the National Implementation Plan for the Management of Persistent Organic Pollutants in the Period 2009–2013, was approved by the Government of the Republic of Slovenia on 19 July 2009. This National Implementation Plan (hereafter: the NIP) covered 12 substances (pesticides: aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene, chlordane, mirex, toxaphene, DDT), industrial chemicals (hexachlorobenzene and polychlorinated biphenyls) and unintentionally produced substances (polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and hexachlorobenzene), which were included in the Annexes of the Stockholm Convention in 2004. The NIP, translated into English, was sent to the Secretariat of the Stockholm Convention and the European Commission in 2010.

In July 2017, the Government of the Republic of Slovenia took note of the report on the implementation of the National Implementation Plan for the Management of Persistent Organic Pollutants for the period 2009–2016, the preparation of which was coordinated by the Chemicals Office of the Republic of Slovenia. The report summarises progress in the implementation of the Stockholm Convention on Persistent Organic Pollutants and the National Implementation Plan for the Management of Persistent Organic Pollutants. The Government of the Republic of Slovenia also took note of the staffing problems of the competent authorities for the implementation of the Stockholm Convention on Persistent Organic Pollutants and other international binding instruments to which the Republic of Slovenia is party.

The present document is the first update of the National Implementation Plan for POPs which Slovenia is required to prepare in accordance with point c) of paragraph 1 of Article 7 of the Stockholm Convention.

It provides an overview of the status of the following chemicals: alpha hexachlorocyclohexane, beta hexachlorocyclohexane, lindane – gamma hexachlorocyclohexane, hexabromobiphenyl (HBB),

hexabromodiphenyl ether and heptabromodiphenyl ether (commercial name: octabromodiphenyl ether), chlordecone, pentachlorobenzene, tetrabromodiphenyl ether and pentabromodiphenyl ether, technical-grade endosulfan and its related isomers, hexabromocyclododecane (HBCDD), hexachlorobutadiene HCBD, pentachlorophenol and its salts and esters – PCP, polychlorinated naphthalenes, decabromodiphenyl ether (commercial blend, c-DecaBDE), short-chain chlorinated paraffins (SCCPs), perfluorooctanoic acid, its salts and PFOA-related compounds, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, and dicofol.

The document is based on the UNEP guidance [2] for the preparation of a national implementation plan for the Stockholm Convention. The update of the NIP is valid for the period 2023–2028. In updating the NIP, Slovenia has followed the five proposed steps of the NIP review and update process:

– organisation;

– establishment of POPs inventories and assessment of national infrastructure and capacity;

– priority assessment and objective setting,

– formulation of the NIP; and

– endorsement by the Government of the Republic of Slovenia and submission to the Secretariat of the Stockholm Convention, the Commission and EU Member States and ECHA.

By updating the NIP, Slovenia meets its obligations to include new POPs in the Annexes of the Stockholm Convention from 2009 to 2019.

The document was prepared by a team of experts from the Chemicals Office of the Republic of Slovenia (hereinafter: URSK), the Slovenian Environment Agency (hereinafter: ARSO), the Ministry of Health of the Republic of Slovenia (hereinafter: MZ), the Ministry of the Environment, Climate and Energy of the Republic of Slovenia (hereinafter: MOPE) and the Slovenian Administration for Food Safety, Veterinary Sector and Plant Protection.

The ministry responsible for chemicals and the ministry responsible for the environment are the competent authorities for the implementation of the POPs Regulation.

1.1 Information on Slovenia

Slovenia is divided into 12 statistical regions and has 212 municipalities (Figure 1). Legislative power is centralised and at the national level. Local communities are involved in matters which municipalities can regulate independently and which concern only their inhabitants (e.g. spatial planning, construction, local public services for environmental protection).

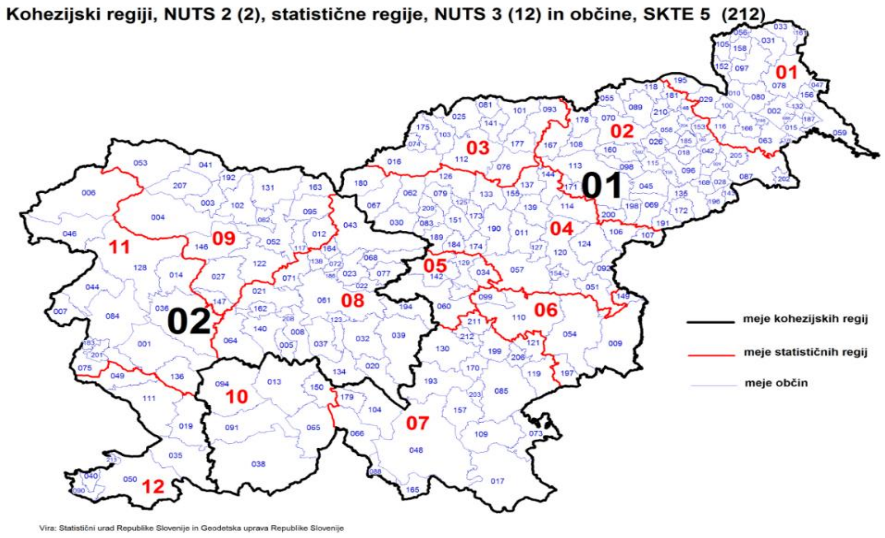

Figure 1: Statistical regions and municipalities of Slovenia

The State may delegate certain tasks falling within its competence to municipalities, provided that it also provides the municipality with the means to that end. This is a system of delegated powers, which allows municipalities to regulate the legal relations relating to the delegated tasks by means of their own implementing regulations, to implement them through their own bodies and administration and within the limits of their responsibility. Municipalities may have responsibilities in areas including health and safety at work, environmental protection, water and underground caves.

The Republic of Slovenia is party to a number of global, regional or sub-regional environmental agreements in various areas, such as human health, nature protection and biodiversity, climate change and transboundary air and water pollution.

In the area of public health and environmental protection, it ensures a healthy living environment for all its citizens. Public health is governed by regulations on human health and health and safety at work, national programmes and other regulations governing each area. Regulations of the URSK further regulate the protection of health and the environment from chemicals and prevent the misuse of chemicals. In 2016, the Resolution on the National Healthcare Plan 2016–2025 "Together for a Healthy Society" was adopted, providing the strategic framework for the management and development of the healthcare system in Slovenia and the basis for the drafting and adoption of relevant laws on health insurance and healthcare services; it is also the basis for the receipt of financial resources. The rights to social security and healthcare are among the fundamental rights of the individual.

In the environmental field, Slovenia ensures a healthy living environment for all its citizens and promotes and coordinates efforts towards sustainable development, based on the efficient and economical use of natural resources, while ensuring social well-being. To this end, Slovenia cooperates with the European Union on environmental standards and rules, ensures adequate water supplies, water quality and sustainable management of surface and groundwater and the sea, as water is one of the most important natural resources, and strives to strengthen awareness among all its citizens of their shared responsibility for the environment, natural surroundings and physical space. It works in partnership with local communities to achieve the Sustainable Development Goals by promoting the participation of individuals, groups and civil society organisations.

1.2 Programme guidelines and legislation

Slovenia became a member of the European Union in May 2004. Since then, it has been subject to EU policy on the protection of human health, animals and the environment from hazardous chemicals, in addition to its internal policy. Slovenia has been a member of the Organisation for Economic Co-operation and Development (OECD) since 2010. Depending on its capabilities and priorities, representatives of the Chemicals Office of the Republic of Slovenia attend meetings of the working groups on chemicals and good laboratory practice (GLP).

The Republic of Slovenia is a party to the Stockholm Convention on POPs, the Rotterdam National Implementation plan for the Stockholm Convention on Persistent Organic Pollutants - First update for the period 2023 - 2028, and other international conventions, such as the Aarhus Convention and the Barcelona Convention, and protocols such as the Protocol on Persistent Organic Pollutants (POPs), which is designed to promote cooperation in internationally coordinated actions to protect human health, animals and the environment from the effects of POPs. In 2006, it joined the Strategic Approach to International Chemicals Management because of the need to improve tools and procedures to protect human health and the environment, and to ensure that chemicals are used and produced in a way that minimises adverse impacts on human health and the environment.

The Chemicals Office of the Republic of Slovenia (the Ministry of Health) and the Slovenian Ministry of Environment, Climate and Energy are responsible for the regulations on POPs, each within their own spheres of competence. The URSK is the focal point for the Stockholm and Rotterdam Conventions, and its responsibilities include legislation on chemicals (the Chemicals Act, the REACH Regulation, the CLP Regulation, etc.) and biocidal products. The ministry responsible for the environment is the focal point for the Basel Convention. It draws up and implements environmental protection regulations (for example, for individual environmental segments: air, water, soil, climate change, emissions and waste). ARSO collects and interprets environmental data.

Plant protection products (PPPs) are regulated by national and EU-level regulations on plant protection products. Active substances for use in PPPs are first approved by the European Commission for the EU area. PPPs containing approved active substances are approved or registered for placing on the market and use in the territory of Slovenia by the Administration for Food Safety, Veterinary Sector and Plant Protection (UVHVVR), which is the competent authority for the implementation of the regulations on PPPs.

The list of regulations includes the regulations used for the NIP review – Slovenian legislation and European Union legislation.

The following regulations are relevant for POPs:

POPs regulations

- Stockholm Convention on Persistent Organic Pollutants and the Act Ratifying the Stockholm Convention on Persistent Organic Pollutants (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 32/04 – International Treaties)
- Regulation (EU) 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants
- Decree on implementation of the Regulation of the European Parliament and of the Council on persistent organic pollutants (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 4/05)
- Council Decision of 19 February 2004 concerning the conclusion, on behalf of the European Community, of the Protocol to the 1979 Convention on Long Range Transboundary Air Pollution on Persistent Organic Pollutants (2004/259/EC)
- Council Decision of 14 October 2004 concerning the conclusion, on behalf of the European Community, of the Stockholm Convention on Persistent Organic Pollutants (2006/507/EC)

Chemicals regulations

- Chemicals Act (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 110/03 – official consolidated version, 47/04 – ZdZPZ, 61/06 – ZBioP, 16/08, 9/11 and 83/12 – ZFfS-1)
- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC
- Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of hazardous chemicals (recast; 01/09/2020)
- Act Ratifying the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Official Gazette of the Republic of Slovenia [*Uradni list RS*] – International Treaties, No 26/99)

Plant protection products regulations

- Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC
- Plant Protection Products Act (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 83/12)
- Decree on the implementation of Regulations (EC) and (EU) on placing plant protection products on the market (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 5/15, 59/19 and 9/20)
- Commission Decision of 2 December 2005 concerning the non-inclusion of endosulfan in Annex I to Council Directive 91/414/EEC and the withdrawal of authorisations for plant protection products containing this active substance
- List of plant protection products whose trading and use are prohibited or restricted in the Republic of Slovenia from 15 June 1996 (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 47/96)
- Commission Decision of 30 September 2008 concerning the non-inclusion of dicofol in Annex I to Council Directive 91/414/EEC and the withdrawal of authorisations for plant protection products containing that substance
- Rules on conditions for the placing of plant protection products on the market and the keeping and communication of data on such placing on the market (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 107/13 and 30/18)
- Rules determining points of entry and conditions for introduction of plant protection products into the European Union customs territory and detailed control procedure (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 78/15)
- Order prohibiting the placing on the market and use of defined plant protection products in the territory of Republic of Slovenia (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 31/11 and 83/12 – ZFfS-1)
- Rules on obtaining a certificate of fulfilling the conditions for good experimental practice (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 63/06, 42/08 and 83/12 – ZFfS-1)
- Rules on expert tasks of evaluation of active substances and plant protection products, and requirements for the education of evaluators (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 64/14)
- Rules on training on plant protection products (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 85/13)

- Rules on the requirements for the correct operation of equipment for the application of plant protection products, and on the conditions and method for inspections of such equipment (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 36/19)
- Rules on integrated pest management (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 43/14)
- Rules determining harmonised risk indicators due to pesticide use (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 54/19)

Electrical and electronic equipment regulations

- 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; text with EEA relevance (2011/65).
- Rules on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 113/20)

Biocidal products regulations

- Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products, as last amended by Regulation (EU) No 334/2014 of the European Parliament and of the Council of 11 March 2014 amending Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products, with regard to certain conditions for access to the market
- Commission Delegated Regulation (EU) No 1062/2014 of 4 August 2014 on the work programme for the systematic examination of all existing active substances contained in biocidal products referred to in Regulation (EU) No 528/2012 of the European Parliament and of the Council
- Decree on the implementation of Regulations (EU) concerning the making available on the market and use of biocidal products (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 81/18)
- Act Repealing the Biocidal Products Act (ZPVZBioP) (Official Gazette of the Republic of SIovenia [*Uradni list RS*], No 25/14)

Foodstuffs regulations

- Act Regulating the Sanitary Suitability of Foodstuffs, Products and Materials Coming into Contact with Foodstuffs (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 52/00, 42/02 and 47/04 – ZdZPZ)
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy
- Rules on drinking water (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 19/04, 35/04, 26/06, 92/06, 25/09, 74/15 and 51/17)

Environmental regulations

- Environmental Protection Act (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 44/22 and 18/23 – ZDU-1O)
- Decree on surface water status (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 14/09, 98/10, 96/13, 24/16 and 44/22 – ZVO-2)
- Decree on groundwater status (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 25/09, 68/12, 66/16 and 44/22 – ZVO-2)
- Decree on the emission of substances and heat when discharging waste water into waters and the public sewage system (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 64/12, 64/14, 98/15 and 44/22 – ZVO-2, 75/22 and 157/22)

- Decree on the discharge and treatment of urban wastewater (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 98/15, 76/17, 81/19, 194/21 and 44/22 – ZVO-2)
- Decree on the emission of substances from the discharge of rainwater from public roads (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 47/05 and 44/22 – ZVO-2)
- Waters Act (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 67/02, 2/04 – ZZdrI-A, 41/04 – ZVO-1, 57/08, 57/12, 100/13, 40/14, 56/15, 65/20 and 35/23 – Constitutional Court Decision)
- Decree on the detailed content and method of drawing up a water management plan (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 26/06, 5/09, 36/13 and 74/16)
- Decree on the water management plan in the Danube and Adriatic river basin districts (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 67/16)
- Decree on ambient air quality (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 9/11, 8/15, 66/18 and 44/22 – ZVO-2)
- Decree on arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 56/06 and 44/22 – ZVO-2)
- Rules on monitoring the status of surface water (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 10/09, 81/11, 73/16 and 44/22 – ZVO-2)
- Rules on groundwater monitoring (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 31/09 and 44/22 – ZVO-2)
- Rules on drinking water (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 19/04, 35/04, 26/06, 92/06, 25/09, 74/15 and 51/17)
- Rules on initial measurements and operational monitoring of wastewater (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 94/14, 98/15 and 44/22 – ZVO-2)
- Rules on soil quality monitoring (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 68/19 and 44/22 – ZVO-2)

Waste regulations

- Commission Regulation (EU) No 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives
- Decree on waste (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 37/15, 69/15, 129/20, 44/22 – ZVO-2 and 77/22)
- Decree on waste (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 77/22)
- Decree on waste landfill (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 10/14, 54/15, 36/16, 37/18, 13/21 and 44/22 – ZVO-2)
- Decree on the emission of substances in the discharge of landfill effluent (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 62/08 and 44/22 – ZVO-2)
- Decree on the implementation of the Regulation (EC) on shipments of waste (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 78/16 and 94/21)
- Decree on limit values, alert thresholds and critical levels of dangerous substances in the soil (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 68/96, 41/04 – ZVO-1 and 44/22 – ZVO-2)
- Decree on the emission of substances into the atmosphere from stationary sources of pollution (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 31/07, 70/08, 61/09, 50/13, 44/22 – ZVO-2 and 48/22)
- Decree on waste incineration and co-incineration plants (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 8/16, 116/21 and 44/22 – ZVO-2)
- Decree on the types of activities and installations which give rise to industrial emissions (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 68/22)

- Decree on the management of waste plant protection products that contain hazardous substances (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 119/06, 84/18 – ZIURKOE and 44/22 – ZVO-2)
- Decree on packaging and packaging waste (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 54/21, 208/21, 44/22 – ZVO-2 and 120/22)
- Decree on management of waste arising from construction work (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 34/08 and 44/22 – ZVO-2)
- Decree on waste electrical and electronic equipment (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 55/15, 47/16, 72/18, 84/18 – ZIURKOE, 108/20 and 44/22 – ZVO-2)
- Decree on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 34/08, 9/09 and 44/22 – ZVO-2)
- Decree on the mandatory municipal public utility service of municipal waste collection (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 33/17, 60/18 and 44/22 – ZVO-2)
- Act Ratifying the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette of the Republic of Slovenia [*Uradni list RS*] – International Treaties, Nos 15/93 and 23/04).

1.2.2 Basic legislation

1.2.2.1 Stockholm Convention on Persistent Organic Pollutants

The Stockholm Convention on Persistent Organic Pollutants [1] provides a framework, based on the precautionary principle, for the elimination of the production, use, import and export of certain hazardous chemicals (POPs), their safe handling and disposal, and the elimination or reduction of releases of certain unintentionally produced POPs. In addition, it prescribes measures to reduce releases from stockpiles and waste, rules for the inclusion of new chemicals in its annexes, provisions on information exchange, training, research and development and monitoring.

The Republic of Slovenia deposited its instrument of ratification of the Stockholm Convention on 4 May 2004. Meetings of the Parties were held annually for the first three years after the entry into force of the Convention, with all subsequent meetings taking place at two-year intervals. From 2004 to the end of 2019, six meetings of the Parties to the Stockholm Convention have been held; at the first three meetings, the Parties established a system of functioning of certain expert groups (e.g. the Review Committee, the regional and coordination groups for the assessment of the effectiveness of the convention and the review of the monitoring) and a reporting system by preparing and approving the necessary forms for this purpose, drawing up the expert guidelines, and adopting the decisions necessary for the achievement of the basic objectives of the Stockholm Convention. Since 2009, meetings of the Conference of the Parties to the Stockholm Convention have been dedicated to the inclusion of new POPs. Nineteen new POPs were added to Annexes A, B and C from 2009 to 2019. The Conference of the Parties also confirmed the designation of regional technical assistance centres, approved various expert guidelines to improve the implementation of the Stockholm Convention and updated the reporting form.

At the meetings of the Conference of the Parties, the Review Committee regularly reports on the consideration and preparation of risk management assessments for new POPs candidates. The Stockholm Convention now covers 31 individual substances or groups of substances included in Annexes A, B and/or C.

1.2.2.1.1 Implementation plan (NIP) for POPs

In accordance with Article 7 of the Stockholm Convention and Article 9 of the POPs Regulation, Slovenia, as a Party to the Convention and an EU Member State, is required to prepare and implement

a national implementation plan [3] and to update it regularly for new pollutants, which are added to the Annexes to the Convention every two years by the Conference of the Parties.

The Stockholm Convention and the POPs Regulation both contain the same provisions on the preparation and updating of a national implementation plan. When a country adopts its implementation plan, it must inform thereof the other EU Member States, ECHA and the Commission, and also the Secretariat of the Convention in accordance with point (b) of paragraph 1 of Article 7 of the Convention.

The NIP update process focuses on the reassessment of the existing national priorities and action plans and on new POPs and their action plans. It should be flexible to ensure long-term planning and commitment.

The NIP is reviewed and updated in response to factors. Factors due to which a review and update of the NIP may be necessary are either external or internal:

– external:

(a) changes in obligations arising from amendments to the Convention or its Annexes, including the addition of chemicals to Annexes A, B or C;
(b) decisions of the Conference of the Parties that may affect how Parties implement Convention obligations, including the adoption of guidance or guidelines;
(c) changes in the availability of technical or financial assistance;
(d) changes in access to infrastructure external to the Party (for example, disposal facilities).

– internal:

(a) reporting under Article 15 of the Convention indicating that a Party's implementation plan is not adequate;
(b) a change in national priorities;
(c) a significant change in national circumstances (for example, infrastructure or institutional arrangements);
(d) inventories of POPs, after improvement or updating, indicating a change in the scope of the problem to be addressed.

For Slovenia, both external and internal factors are important, as referred to in point (a) of the preceding paragraph.

The first National Implementation Plan for the Management of Persistent Organic Pollutants was developed for the period 2009–2013 and included 12 substances (pesticides: aldrin, dieldrin, endrin, Res je malo neroden zapisheptachlor, hexachlorobenzene, chlordane, mirex, toxaphene, DDT), two industrial chemicals (hexachlorobenzene and polychlorinated biphenyls) and unintentionally produced substances (polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and hexachlorobenzene).

During the first update process, the NIP was reviewed for existing and new POPs, with a focus on the assessment of the internal preferred options. Table 1 lists all POPs included in the annexes of the POP regulations covered by this NIP.

Table 1: POPs as evident from the Stockholm Convention (SC), the POPs Protocol and the POPs Regulation.

Intentionally produced POPs	**CAS No.**	**Included in:**		
		SC	**POPs Protocol**	**POPs Regulation**
Annex A – Substances subject to elimination (28)				
aldrin	309-00-2	yes	yes	yes
dieldrin	60-57-1	yes	yes	yes
endrin	72-20-8	yes	yes	yes

heptachlor	76-44-8	yes	yes	yes
hexachlorobenzene (HCB)	118-74-1	yes	yes	yes
chlordane	57-74-9	yes	yes	yes
mirex	2385-85-5	yes	yes	yes
toxaphene	8001-35-2	yes	yes	yes
polychlorinated biphenyls (PCB)		yes	yes	yes
alpha hexachlorocyclohexane	319-84-6	yes	yes	yes
beta hexachlorocyclohexane	319-85-7	yes	yes	yes
lindane – gamma hexachlorocyclohexane	58-89-9	yes	yes	yes
hexabromobiphenyl (HBB)	36355-01-8	yes		yes
hexabromodiphenyl ether and heptabromodiphenyl ether (commercial name: octabromodiphenyl ether)	68631-49-2; 207122-15-4; 446255-22-7; 207122-16-5	yes	yes	yes
chlordecone	143-50-0	yes	yes	yes
pentachlorobenzene	608-93-5	yes	yes	yes
tetrabromodiphenyl ether and pentabromodiphenyl ether	5436-43-1; 60348-60-9	yes	yes	yes
technical endosulfan and its related isomers	115-29-7; 959-98-8; 33213-65-9	yes	/	yes
hexabromocyclododecane (HBCDD)	25637-99-4; 3194-55-6; and others	yes	/	yes
hexachlorobutadiene HCBD	87-68-3	yes	yes	yes
pentachlorophenol and its salts and esters – PCP	87-86-5; 131-52-3; 27735-64-4; 1825-21-4	yes	/	yes
polychlorinated naphthalenes, including other naphthalenes	70776-03-3	yes	yes	yes
decabromodiphenyl ether (commercial blend, c-DecaBDE)	1163-19-5	yes		yes
short-chain chlorinated paraffins (SCCP)	85535-84-8; 68920-70-7; 71011-12-6; 85536-22-7; 85681-73-8; 108171-26-2	yes	yes	yes
dicofol	115-32-2 10606-46-9	yes	/	no
perfluorooctanoic acid, its salts and PFOA-related compounds	335-67-1	yes	/	no
Annex B – Substances subject to restriction (2)				
DDT (1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane)	50-29-3	yes	yes	yes
perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	1763-23-1; 307-35-7; and others	yes	yes	yes
Annex C – Unintentionally produced POPs (7)				
polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)		yes	yes	yes
hexachlorobenzene (HCB)	118-74-1	yes	yes	yes
polychlorinated biphenyls (PCB)		yes	yes	yes

hexachlorobutadiene (HCBD)	87-68-3	yes	yes	yes
pentachlorobenzene	608-93-5	yes	/	yes
polychlorinated naphthalenes, including other naphthalenes	70776-03-3	yes	yes	yes
polycyclic aromatic hydrocarbons (PAH)*		no	yes	yes

***** Benzo[a]pyrene, benzo(b)fluoranthene, benzo[k]fluoranthene and indeno[1,2,3-cd]pyrene

1.2.2.1.2 Proposals for new POPs

The listing of new POPs in the Stockholm Convention is in accordance with Article 8 of the Stockholm Convention. Any Party may propose the listing of a new POP to the Secretariat of the Convention. The Secretariat of the Convention examines the proposal and checks whether it contains the information specified in Annex D. The Persistent Organic Pollutants Review Committee (POPRC) examines the proposals and decides whether the review of the chemical is warranted and whether the requirements of Annex D are met. If so, it invites the Parties and other stakeholders to submit additional information and creates a risk profile, otherwise it rejects the proposal. The POPRC also draws up a risk management evaluation. On the basis of the risk profile and risk management evaluation, the POPRC recommends to the Conference of the Parties that it consider the chemical for listing in Annexes A, B and/or C.

1.2.2.2 Regulation on persistent organic pollutants

Regulation (EU) 2019/1021 (POPs Regulation) replaced Regulation (EU) 850/2004 in 2019. The updated Regulation provides a common legal framework for the effective implementation of the Union's obligations under the POPs Protocol and the Stockholm Convention.It covers substances covered by the Stockholm Convention and the POPs Protocol. It aims to protect human health and the environment from POPs by prohibiting, phasing out as soon as possible or restricting the manufacturing, placing on the market and use of substances subject to the Stockholm Convention or the POPs Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution, by minimising, with a view to eliminating where feasible as soon as possible, releases of such substances, and by establishing provisions regarding waste consisting of, containing or contaminated by POPs. The Regulation transfers responsibilities, mainly technical, to the European Chemicals Agency (ECHA).

1.2.2.3 Protocol on persistent organic pollutants

Slovenia ratified the Protocol on Persistent Organic Pollutants [5] (hereinafter: POPs Protocol) by way of the Act Ratifying the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants in November 2005. In accordance with the Protocol, Slovenia reports annually to the CLRTAP Secretariat and to the European Commission on its national inventories of atmospheric emissions of pollutants for the previous year. The reporting includes the following POPs: polycyclic aromatic hydrocarbons (PAHs), dioxins/furans (PCDDs/PCDFs), polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB). The EMEP/EEA methodology is used for the inventory of atmospheric pollutant emissions. This is the prescribed methodology for national emission inventories and reporting in accordance with the Act Ratifying the Convention on Long-Range Transboundary Air Pollution, its Protocols and to meet the requirements of Directive (EU) 2016/2284 on the reduction of national emissions of certain air pollutants.

1.2.2.4 Decree on implementation of the Regulation of the European Parliament and of the Council on persistent organic pollutants

The Decree on the implementation of the POPs Regulation (Official Gazette of the Republic of Slovenia [*Uradni list RS*], No 4/2005), [6] sets out the tasks for the implementation of the POPs Regulation, the competent authorities, supervision and penalty provisions. The competent authorities are the ministry responsible for chemicals and the ministry responsible for the environment, where:

– the ministry responsible for chemicals issues authorisations for exemptions, prepares reports, information and data within its competence and sends them to the Commission, cooperates with administrative and professional bodies and institutions and international organisations responsible for implementing the rules in this field, obtains data for reporting purposes and draws up a national implementation plan;

– the ministry responsible for the environment carries out tasks in the area of waste management and discharges into the environment, prepares reports, information and data within its competence and sends them to the Commission, cooperates with administrative and professional bodies and institutions and international organisations responsible for implementing the rules in this field, obtains data for reporting purposes and participates in the drawing up of a national implementation plan.

1.2.3 Legislation related to POPs

All internal and EU rules directly regulating POPs are listed in the previous section. This section presents the most relevant other rules.

1.2.3.1 Chemicals Act

The Chemicals Act (Zkem) was last amended in 2012. It regulates trade in chemicals, sets out measures to protect the health of people and the environment from the harmful effects of chemicals, and prescribes obligations and procedures to be complied with by legal and natural persons that manufacture, store, place on the market or use chemicals in the Republic of Slovenia. It also contains the legal basis for the implementation of human biomonitoring.

1.2.3.2 REACH Regulation No 1907/2006

REACH stands for registration, evaluation, authorisation and restriction of chemicals. It entered into force in June 2007. It establishes a procedure for collecting and assessing information on the properties and hazards of substances. It aims to protect human health and the environment from the risks that hazardous chemicals may pose, while at the same time promoting the competitiveness of the chemical industry in the Union. REACH applies to all chemicals, both those used in industry and those used in everyday life, for example chemicals in products such as clothing, furniture, electrical appliances, cleaning products and paints. Companies have to register all these substances, working together with other companies registering the same substance. The European Chemicals Agency (ECHA) assesses the compliance of individual registrations with the legal requirements, and individual EU Member States have to evaluate the selected substances to see if there are concerns for human health and the environment. If risks exist, ECHA's competent authorities and scientific committees assess whether they can be managed. If the risks cannot be managed, the European Union prohibits the hazardous substances, restricts their use or requires a prior authorisation for the substance. REACH's aim is also to substitute the most hazardous substances with less dangerous ones in the long term and to promote alternative methods for the hazard assessment of substances in order to reduce the number of tests on animals.

Under REACH, prohibitions and restrictions are regulated in Title VIII and adopted prohibitions and restrictions are listed in Annex XVII. The procedure is initiated by the Commission or a Member State, followed by the preparation of a dossier in accordance with Annex XV. After the dossier has been checked for conformity with the requirements, it is submitted for public consultation, during which stakeholders (including industry) may submit comments thereon. During this period, the URSK, as a rule, contacts all companies that have submitted data (safety data sheets and annual quantity data) for the chemical concerned, as required by the Chemicals Act. The restriction is then considered by the two expert committees (the Risk Assessment Committee and the Socio-Economic Analysis Committee),

followed by a decision on the specific prohibition or restriction. A decision on a prohibition or restriction results in an amendment to Annex XVII of REACH.

1.2.3.3 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The export of certain hazardous chemicals is regulated by the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and Regulation (EU) No 649/2012 concerning the export and import of hazardous chemicals. Through this mechanism, importing countries are informed of the entry of certain of the most hazardous chemicals into their territory, and can either grant consent or refuse it if they do not allow the chemical concerned to be used in their country. Regulation (EU) No 649/2012 imposes obligations on exporters to non-EU countries, thereby promoting shared responsibility and cooperation in international trade in hazardous chemicals, protecting human health and the environment, and providing information on the hazardous properties and risks and the appropriate use of hazardous chemicals, including to developing countries. The majority of POPs, 19 of them, are also listed in Annex III of the Rotterdam Convention.

A review of the data from the last ten years in the ePIC information system confirms that Slovenia has only had exports for research and analytical use.

1.2.3.4 Regulations on plant protection products

Plant protection products (PPPs) are preparations used in agriculture for protecting plants and crops from pests, pathogens and weeds. Their active substances may have hazardous properties and, in order to protect human health and the environment, they are evaluated before they are placed on the market and their acceptable use is determined. The regulations on plant protection products cover the registration of PPPs and the granting of authorisations for their placing on the market and use, as well as the sustainable use of PPPs, including all measures taken by the UVHVVR to ensure that PPPs are used correctly and in such a way that their use does not pose a risk to the environment and human health.

New substances with POPs properties cannot be approved for use in plant protection products in the EU under the approval criteria of Regulation (EC) 1107/2009. In the field of plant protection products, other products that do not have POPs properties are registered and, on the basis of Directive 2009/128/EC on the sustainable use of pesticides, the MKGP encourages the development of integrated pest management and the use of non-chemical methods of plant protection.

Annex II to Regulation (EC) 1107/2009 contains criteria under which an active substance is not approved for use in plant protection products if it is considered to be a persistent organic pollutant.

1.2.3.5 Environmental Protection Act

The Environmental Protection Act regulates the protection of the environment against pollution as a prerequisite for sustainable development and, in this context, sets out the basic principles and measures related to environmental protection, environmental monitoring and information, economic and financial instruments for environmental protection and public services for environmental protection.

Furthermore, the Act lays down environmental quality standards for individual pollutants according to the parts of the environment affected by them and environmental remediation of diffuse sources of pollution. Environmental quality standards are set on the basis of EU directives. Environmental quality standards are set for air, water, groundwater, soil and noise. For air, the country's territory is divided into zones, sub-zones and agglomerations, classified according to pollution levels. In areas with excessive pollution levels, measures are taken to reduce and eliminate pollution. For soil, pollution levels are also

determined for individual areas and remediation is carried out (contaminated soil in kindergarten playgrounds in Celje, the Mežica Valley).

The Act also regulates waste management, areas of environmental restrictions, environmental emergency response, remediation of damage following an environmental disaster, the institution of environmental impact assessment, environmental permits and supervision.

1.2.3.6 Waste

Waste management includes the collection of waste, the transport of waste, the trade in waste, the submission of waste for further processing, and the recovery and disposal of waste, including the monitoring of such management.

Waste management regulations are adopted on the basis of the Environmental Protection Act. The basic regulation governing waste is the Decree on waste. It lays down general management rules and other conditions for preventing or minimising the adverse impacts of the generation and management of waste, reducing the overall impact of the use of natural resources and improving the efficiency of the use of natural resources. The decree applies to all types of waste. It is complemented by specific waste regulations which further specify the management of a particular type of waste or waste stream or which specify a particular way of managing waste or particular waste management installations or facilities. Specific regulations also further regulate the transboundary movement of waste.

The design, manufacture, distribution, consumption and use of products should be such as to help prevent the generation of waste and increase the possibilities for preparing the waste arising from these products for reuse and recycling.

The implementation of the decree is under the responsibility of the MOPE, which is responsible for issuing administrative acts and keeping records. ARSO is responsible for collecting and compiling the reports and data resulting from waste management reports. Liable persons are required to report once a year, by 31 March of the current year, on their waste management for the previous calendar year. Those responsible for waste collection, treatment, recovery and disposal are also obliged to report on waste management. Original generators of waste generating ten tonnes or more of waste or five kilograms or more of hazardous waste per year are also obliged to report. ARSO publishes online waste management data collected on the basis of waste management reports received.

1.2.3.7 Transboundary shipments of waste

Transboundary shipments of waste are regulated by both international legislation (the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, ratified by Slovenia in August 1993) and European legislation (Regulation 1013/2006 on shipments of waste). Both regulations aim to protect human health and the environment from the various impacts that waste, especially hazardous waste and its transboundary shipments, can cause. The Inspectorate of the Republic of Slovenia for the Environment and Spatial Planning, as the competent authority for waste shipments, issues consents for transboundary shipments of waste on the basis of applications.

1.2.4 Relevant strategies

1.2.4.1 National action plan to achieve the sustainable use of plant protection products for the period 2012–2022, amendments for the period 2018–2022

The plan builds on the Thematic Strategy on the Sustainable Use of Pesticides adopted by the European Parliament in 2002. The European Commission has followed these guidelines by adopting a package of legislation laying down strict criteria for the registration of plant protection products (PPPs), the

collection of data on the sale and use of PPPs, and measures under the legislation on the sustainable use of PPPs. All these measures are covered by the national action plan aimed at reducing the risks of the potential impact of PPPs on human health, animals, drinking water, surface and groundwater and other environments. The NAP is reviewed and updated every five years.

1.2.4.2 Operational Plan for Waste Management of the Republic of Slovenia, April 2022

The objectives of the programme, drawn up in accordance with the Environmental Protection Act, are to comply with the principle of sustainable waste management, implement measures to prevent waste and ensure the regulatory management of waste. The plan takes into account the strategic orientations of European policies which, while emphasising waste prevention, give priority to the preparation of waste for reuse and recycling over energy recovery, and to waste recovery over waste disposal, if and where this is the best option from the point of view of environmental protection, taking into account technical feasibility and economic viability.

1.2.4.3 National Environmental Action Programme 2020–2030

The National Environmental Action Programme 2020–2030 (NEAP 2020–2030) is a long-term strategic document for environmental protection. It was developed to define the orientations, objectives, tasks and actions of environmental protection stakeholders in order to achieve the environmental vision where "protected nature and a healthy environment in Slovenia and outside its borders will enable current and future generations to live a quality life". The NEAP 2020–2030 outlines actions to achieve the goals regarding the management of chemicals, such as managing the risks of chemical use to human health and the environment, strengthening stakeholder capacity, monitoring the exposure of the environment and population to chemicals, inter-ministerial cooperation, raising awareness among users of chemicals, and introducing elements of a circular economy to reuse substances and reduce their waste. Operational programmes have also been adopted in specific areas, such as waste management and air quality.

1.2.4.4 2030 Agenda for Sustainable Development

Slovenia is fully committed to all 17 goals of the 2030 Agenda and to conducting reviews of progress at the national level, which are initiated and led by the Member States. In July 2020, Slovenia presented for the second time its national efforts to achieve all of the 2030 Agenda's Sustainable Development Goals. The implementation of measures for the management of chemicals will also contribute to its goals.

1.2.4.5 National Water Management Programme

Water management is regulated by regulations in the fields of water, the environment and nature protection in a manner comparable at the European level and comprehensively addresses water protection, use and regulation. The common and overarching objective of these regulations is to manage water in an integrated and long-term manner in a comparable way in all river basin districts of the Member States of the European Community, as well as those countries outside the Community with which they share river basin districts.

1.2.4.6 Plan for substances of very high concern

The objective of the Plan for substances of very high concern is to include substances of very high concern (such as carcinogens, mutagens, or reproductive toxicants, PBTs and others) on a regular basis (once a year) in a candidate list, which constitutes the basis for further review and authorisation of substances under REACH.

1.2.4.7 Circular economy

In March 2020, the European Commission adopted a new Circular Economy Action Plan. It is one of the main building blocks of the European Green Deal, the new European agenda for sustainable growth. The EU's transition to a circular economy will reduce pressure on natural resources and create

sustainable growth and jobs. It is also a prerequisite to achieve the EU's 2050 climate neutrality target and to halt biodiversity loss.

The new action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented and the resources used are kept in the EU economy for as long as possible.

1.2.4.8 The Union's Chemicals Strategy for Sustainability

The EU's Chemicals Strategy for Sustainability – Towards a Toxic-Free Environment – adopted in 2020 provides a comprehensive basis for EU action on chemicals. It includes two fundamental objectives: improving the EU's environmental and consumer protection policy on substances, while boosting innovation and promoting competitiveness. The strategy is intended to promote the transition to chemicals that are inherently safe and sustainable. Priority should be given to safe innovations that could substitute problematic substances to the greatest extent possible.

The strategy is based on six working documents, such as those on per- and polyfluoroalkyl substances (PFAS), assessing and managing combined exposure to several chemicals and associated risks, and reviewing the adequacy of the framework for endocrine-disrupting chemicals.

2. USES AND ASSESSMENT OF THE POPS SITUATION IN SLOVENIA

POPs are highly stable compounds that have been used in the past as pesticides in agriculture and as input materials in industry, or are formed as unintentional by-products in various industrial processes and incineration.

Humans and other living organisms are exposed to POPs mainly through food and drinking water, and by inhaling air. As they move up the food chain, their concentrations in organs and adipose tissues continuously increase (bioaccumulate), with the highest concentrations in organisms at the top of the food chain.

The first NIP provides an overview of the situation and the measures envisaged to protect human health, animals and the environment for twelve pollutants, namely pesticides (aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene, chlordane, mirex, toxaphene, DDT), industrial chemicals (polychlorinated biphenyls) and unintentionally produced substances (polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and hexachlorobenzene).

This document incorporates the findings of the implementation of the first NIP for the first twelve pollutants in section 2.10 and provides an overview of use of the new POPs whose inclusion in the Annexes of the Convention was adopted by the Conference of the Parties to the Stockholm Convention in the period 2009–2019. These are the following chemicals: alpha hexachlorocyclohexane (α-HCH), beta hexachlorocyclohexane (ß-HCH), lindane – gamma hexachlorocyclohexane (γ-HCH), hexabromobiphenyl (HBB), hexabromodiphenyl ether and heptabromodiphenyl ether (commercial name: octabromodiphenyl ether), chlordecone, pentachlorobenzene, tetrabromodiphenyl ether and pentabromodiphenyl ether, technical-grade endosulfan and its related isomers, hexabromocyclododecane (HBCDD), hexachlorobutadiene HCBD, pentachlorophenol and its salts and esters (PCP), polychlorinated naphthalenes, decabromodiphenyl ether (commercial blend, c-DecaBDE), short-chain chlorinated paraffins (SCCPs), perfluorooctanoic acid, its salts and PFOA-related compounds, perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride, and dicofol.

According to the available data, POPs do not pose a significant direct risk to human health and the environment in the Republic of Slovenia. Nevertheless, we all need to be careful when using, storing

and disposing of electrical and electronic equipment and certain products and articles containing these substances.

2.1 Pesticides

The first National Implementation Plan concerned the inventory and assessment of the situation for nine pesticides included in the Annexes of the Convention in 2004. These were chemicals that have not been produced and used in Slovenia since 1982.

Data from the annual reports on the generation, collection and treatment (recovery and disposal) of waste, including from PPPs, are available on the ARSO website.

2.1.1 Alpha hexachlorocyclohexane, alpha isomer of HCH, and beta-hexachlorocyclohexane, beta-isomer of HCH

Although the intentional use of the alpha-isomer of HCH and the beta-isomer of HCH as insecticides was abolished years ago, these chemicals are still produced globally as an unintentional by-product of lindane. For every tonne of lindane produced, approximately six to seven tonnes of other isomers, including alpha- and beta-HCH, are generated. There may also be releases from stockpiles and contaminated sites, so there may be large stocks of isomers of HCH in the environment globally.

The placing on the market and use of technical-grade hexachlorocyclohexane was banned in Slovenia by the Trade in Poisonous Substances Act (Official Gazette of the SFRY [*Ur. l. SFRJ*], No 13/1991).

2.1.2 Lindane, gamma hexachlorocyclohexane, gamma isomer of HCH

Lindane has been used in the past as a broad-spectrum insecticide for seed and soil treatment, tree and wood treatment, and treatment against ectoparasites in both veterinary and human applications. Alternatives for lindane are available. The placing on the market and use of technical-grade hexachlorocyclohexane was prohibited in Slovenia in 1991 and the placing on the market and use of lindane as an ingredient in plant protection products was prohibited in 1996.

Lindane was used in Slovenia as an insecticide for the control of plant pests:
– in sprays: lindane 20-EC: mainly against apple blossom weevil, sawflies, psyllids;
– as dustable powder: bilan P-2: against flea beetles, young caterpillar stages, soil pests, and
– as a granulate: geolin G-1,5, against soil pests.

Until 2000, it was also used in lice shampoos, for poultry control, as a fertiliser, as a disinfectant and as a wood preservative (ingredient in paints and varnishes) in concentrations of 0.5 to 2 %.

There was no production of hexachlorocyclohexane in Slovenia. The study Identification of hazardous substances in the territory of the Republic of Slovenia with a view to preparing programmes for the reduction of pollution of the aquatic environment (*Identifikacija nevarnih snovi na področju RS z namenom priprave programov zmanjševanja onesnaževanja vodnega okolja*) (National Institute of Chemistry, Ljubljana, September 2003) shows that according to data from the Chemical Information System for the period 2000–2002 and the General Customs Directorate, only 0.3 kg of hexachlorocyclohexane was imported into Slovenia in 2002, which may mean that there are no diffuse sources of emissions of hexachlorocyclohexane in Slovenia.

2.1.3 Chlordecone

Chlordecone is a synthetic chlorinated organic compound that was mainly used as an agricultural pesticide, an insecticide for controlling termites and other insects. It was synthesised in 1951 and introduced commercially worldwide in 1958. Due to its long half-life, it can still be found in some plant or

animal foods and in some water sources worldwide. The placing on the market and use of chlordecone as an ingredient in plant protection products was prohibited in 1996.

Alternatives to chlordecone exist and can be implemented inexpensively. Data on the placing on the market and possible use of PPPs with chlordecone in Slovenia are not available.

2.1.4 Technical-grade endosulfan and its related isomers

Endosulfan is a broad-spectrum insecticide synthesised in 1956. It has been used worldwide for pest control on various crops such as coffee, cotton, rice, sorghum and soybean. It has also been used to control ectoparasites in cattle and as a wood preservative.

Endosulfan was last used as a PPP in Slovenia in Thiodan E-35 as a contact insecticide against the following plant pests: aphids, sawflies, apple blossom weevil, fall webworm (orchards), grape erineum mite (vineyards), common pollen beetle and cabbage seed pod weevil (industrial plants). Its placing on the market and use took place until June 2006, and the disposal and use of stocks continued until June 2007. Information on possible stocks of waste PPPs is not available.

2.1.5 Pentachlorophenol, its salts and esters

Pentachlorophenol (PCP), in the form of phenol or its sodium salt (PCP-Na), has been used in the past mainly as a fungicide in wood, textile and leather preservatives, as an herbicide and insecticide, as a disinfectant and antifouling agent, in cooling towers, and in the production of rope and paper. Pentachlorophenol is a potent cell poison that interferes with various enzyme systems. In plants, it inhibits growth and photosynthesis and oxygen production. The technical-grade product has a purity of 87% (+/-2%).

Its use has declined significantly due to its high toxicity and slow biodegradation. The placing on the market and use of pentachlorophenol as an ingredient in plant protection products was prohibited in 1996.

2.1.6 Dicofol

Dicofol is an organochlorine pesticide (acaricide) that has been used in the past to control a variety of mite species in orchards, vineyards, hop fields and ornamental crops in such a way that it could only be applied once a year on the same plot of land. The chemical structure of dicofol is similar to dichloro-diphenyl-trichloroethane (DDT). DDT is one of the intermediates in the production of dicofol and may remain in the product as an impurity after the synthesis reaction. Dicofol differs from DDT by the presence of one hydroxyl group (OH). It accumulates in the environment, increasing its transport and biomagnification potential in terrestrial ecosystems.

The placing on the market and use of dicofol containing less than 78% p,p'-dicofol or more than 1 g/kg of DDT or DDT-related compounds as an ingredient in plant protection products was prohibited in Slovenia in 1996.

Two PPP were registered in Slovenia in the past: DICOFOL E-20 and KELTHANE-E with a dicofol content of 200 g/L. These PPPs were first registered at the end of 1995 and cancelled in February and September 2004 respectively, which was also the date for the sale and use of stocks. According to the waste management reports to date, no waste that would be DDT or contain DDT has been detected.

Dicofol was also identified as an active substance in biocidal products at the EU level in 2000. The first inventory of biocidal products in Slovenia in 2000 showed that there were no biocidal products with this active substance on the market and in use in Slovenia. Since 2000, the URSK, as the competent

authority for the implementation of the Regulation concerning the making available on the market and use of biocidal products, has not granted any authorisation for the making available on the market and use of biocidal products containing dicofol.

2.2 Industrial chemicals

The first NIP POPs concerned the inventory and the assessment of the situation for polychlorinated biphenyls and unintentionally produced POPs such as polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF). The present document contains the update of the information on polychlorinated biphenyls and the assessment of the situation for industrial chemicals [7] included in the Annexes of the Stockholm Convention for the period 2009–2019.

Data from the annual reports on waste generation, collection and treatment (recovery and disposal) are available on the ARSO website.

2.2.1 Pentachlorobenzene

Pentachlorobenzene (PeCB) has been used as a fungicide, flame retardant or as an intermediate in the production of pesticides, in particular the fungicide pentachloronitrobenzene. It has also been produced as an unintentional by-product, for example as an impurity in solvents, in barrel and open fire burning, accidental fires and burning of forests for agricultural purposes.

Pentachlorobenzene was prohibited by the Stockholm Convention in 2010. The production and use of PeCB in Slovenia is unknown. The substance is one of the priority hazardous substances for monitoring under the Water Framework Directive.

2.2.2 Hexabromobiphenyl

Hexabromobiphenyl (HBB) is an industrial chemical. It has been used in ABS (acrylonitrile-butadiene-styrene) thermoplastics as a flame retardant in electrical cable coatings and in polyurethane foam for automotive applications.

It is included among the substances of the Stockholm Convention and the POPs Protocol that are being phased out, which is why its use and manufacture have been completely prohibited in the EU since 2009.

HBB has not been produced in Slovenia. An inventory has shown that no data on its use are available. Based on the available data, it is estimated that the presence of hexabromobiphenyl in Slovenia is minimal, if it is present at all, most likely only as contamination from decades-old products.

2.2.3 Polybrominated diphenyl ethers

The group of polybrominated diphenyl ethers (PBDEs) includes tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial name: pentabromodiphenyl ether), hexabromodiphenyl ether and heptabromodiphenyl ether (commercial name: octabromodiphenyl ether), and decabromodiphenyl ether (commercial blend, c-decaBDE). Pentabromodiphenyl ether and octabromodiphenyl ether were listed in Annex A of the Stockholm Convention with specific exemptions in 2009 and decaBDE in 2017.

The commercial technical blend decaBDE (c-decaBDE) contains a variety of PBDE congeners, with PBDE congener 209 predominating. It is used as a flame retardant, usually with the addition of antimony trioxide, in a variety of polymers such as HIPS (high performance polystyrenes) for the manufacture of TV casings, upholstered furniture and decorative textiles.

PBDEs are widespread as flame retardants in electrical engineering, electronics, wires, polyurethane rubber, furniture and building materials. PBDEs are thought to be present in articles for general use at levels ranging from 3 to 35%. They are released from the products and articles that contain them into the environment through air, water and soil, including into food, in particular fish, meat and dairy products. Human populations are exposed to PBDEs through inhalation, ingestion and skin contact. Their use has been increasing over the last 30 years. An inventory has been taken in accordance with the UNEP guidance [8].

The only route of degradation of PBDEs is via debromination (substitution of bromine on the aromatic ring by hydrogen), which results in the formation of lower brominated PBDEs (tetraBDEs, pentaBDEs), which can be even more toxic than the parent compounds.

2.2.3.1 Pentabromodiphenyl ether and octabromodiphenyl ether

Pentabromodiphenyl ether (pentaBDE) has been used mainly as a flame retardant in products such as polyurethane foams (for use in cars, trains, buses, insulation, cable coatings, varnishes, furniture, textiles) and plastics in vehicles (car, bus, train, plane), as well as in the removal of plastics before recycling, in insulation and textiles.

Octabromodiphenyl ether has similar uses and has been used as a flame retardant in electrical and electronic appliances/parts and automotive parts (ABS-plastics and resins).

2.2.3.1.1 Overview of the use of c-pentaBDE in vehicles

In vehicles, pentaBDE is mainly present in the form of polyurethane foams that make up the seats, head restraints, armrests and roof linings. The content of commercial pentabromodiphenyl ether in polyurethane foams used for vehicles is estimated to be around 0.5–1% by weight and up to 15% by weight in roof linings. It is estimated that 5% of cars produced in Europe between 1975 and 2004 contained pentaBDE.

At the time of the inventory, a projection of the total amount of c-pentaBDE for registered vehicles (cars, buses and lorries) manufactured in the period 1975 to the end of 2004 was made; the results are shown in Table 2.

Table 2: Total amount of c-pentaBDE (kg) in registered vehicles manufactured up to 31 December 2004

	Estimated total amount of c-pentaBDE (kg)
Year	cars, buses and lorries
2009	6,388.70
2010	5,880.84
2011	5,390.62
2012	4,932.70
2013	4,443.62
2014	4,002.99
2015	3,561.10
2016	3,137.55
2017	2,680.93
2018	2,278.46
2019	1,868.15

In 2005, around 900,000 cars manufactured in 2004 and earlier were on the road. On this basis, it was assumed that the majority of these cars were manufactured in the period 1975–2004, when pentaBDE

could be used in some parts of the cars. If 60,000 cars were replaced by new cars annually, the replacement would take place within 15 years. If other factors are taken into account, such as the habits and economic capacity of users and specific socio-economic periods such as economic crises, this time could be even longer.

The data obtained are a worst-case scenario and do not include the fact that only 5% of cars are expected to contain pentaBDE. If this figure were to be taken into account, the amount of c-pentaBDE would be less than 100 kilograms. The estimate of the amount of pentaBDE in vehicles suggests that we have not yet eliminated POPs from cars, while lorries are the exception. Due to the lack of data, the situation regarding the pentaBDE content in vehicles in Slovenia cannot be assessed more precisely.

The data obtained on the disposal of old vehicles show that on average 869 cars from the period 1975–2004 are being ecologically decommissioned per year, which means that the replacement of vehicles may in fact be much slower.

2.2.3.1.2 Use of octabromodiphenyl ethers in electrical and electronic equipment

Production and consequently waste streams of Electrical and electronic equipment (EEE) are one of the fastest growing material flows of goods. As a result, it is also a major source and stream of waste and recycling. EEE may contain hexaBDE and heptaBDE. According to existing data, many products may still contain these compounds, even if alternatives exist.

2.2.3.1.2.1 Estimated PBDE content in electrical and electronic equipment in Slovenia

Electronic equipment such as televisions, computer CRT monitors and heating equipment manufactured before 2005 may contain commercial octabromodiphenyl ether as a flame retardant.

Based on the UNEP guidance [8], different projections have been made – estimates of PBDE content in the areas of household use of EEE, imports and exports of EEE, and an estimate of waste EEE (WEEE). The results of the projections are shown below.

2.2.3.1.2.1.1 Electrical and electronic equipment in use or stored at the consumer level

In order to estimate the presence of electrical and electronic equipment manufactured before and after 2005 in households, a survey was carried out in which just over 0.05% of households in Slovenia participated. The resulting estimate was projected onto all households (824,618) in Slovenia.

The EEE estimate showed that there is a small proportion of EEE manufactured up to the end of 2005 in households and that consumers generally have more devices manufactured after 2005. The reason is that new devices are more affordable but have a shorter lifetime, as repair is often not worthwhile or no longer possible. Nevertheless, the proportion of older devices is not negligible (cables, junction boxes). There are also older devices in households that are probably used less or no longer in use, but have not yet been discarded as waste by users. Mobile phones, cameras and radios account for the largest share of old devices. Since 2005, fewer cathode ray tube (CRT) monitors, which contain a higher proportion of PBDEs than LCD monitors, have been in use. The shorter lifetime of new electrical devices may have contributed positively to the reduced presence of PBDEs in Slovenian household devices.

The projected estimate of the presence of PBDEs in household appliances manufactured before 2005 (Table 3) helped us to calculate the amount of PBDEs in appliances still in households. The EEE classes listed in Table 3 were taken into account.

Table 3: Estimated total amount of PBDEs in appliances per average household and an estimate for all households in Slovenia

Category of EEE (1–4)	**Estimated total amount of PBDEs (at 0.1% by weight of appliance) (kg)** per average household	**Estimated total amount of PBDEs (at 0.1% by weight of appliance) (kg)** in all households
1. Large household appliances	0.0791	65,227
2. Small household appliances	0.0241	19,873
3. IT and telecommunications equipment	0.1276	105,221
4. Consumer equipment	0.0109	8,988

The projection of the presence of PBDEs (at 0.1% by weight of appliance) in EEE in use or stored at the consumer level assumes that 199,309.00 kg of PBDEs may be present in this category of EEE.

Due to lack of data, no estimate of stocks and EEE used for public institutions and companies has been made.

The survey of EEE also showed that the consumption of WEEE-derived plastics or the sales of second-hand EEE are not widespread in Slovenia.

2.2.3.1.2.1.2 Imports and exports of electrical and electronic equipment

According to data from the Statistical Office of the Republic of Slovenia (SORS), imports and exports of electrical and electronic equipment to and from Slovenia take place. SORS keeps data on quantities by EEE category.

Table 4: Key of categories of electrical and electronic equipment

Category code	**Category of electrical and electronic equipment**
1	large household appliances
1a	appliances used for refrigeration and freezers
2	small household appliances
3	IT and telecommunications equipment
3a	personal and laptop computer screens and other screens
4	consumer equipment
4a	television sets
5	lighting equipment
5a	gas discharge lamps
6	electrical and electronic tools
7	toys, leisure and sports equipment
8	medical devices
9	monitoring and control instruments
10	automatic dispensers

Several projections were made to estimate the potential presence of PBDEs in imported and exported EEE. All projections were made on the basis of the UNEP guidance [8].

a) Estimated PBDE content in imported and exported electrical and electronic equipment 1–4a

As data on the proportion of EEE that actually contained PBDEs are not available, the projection gives a worst-case estimate of the probability where all such products would contain PBDEs. Most PBDEs were restricted by the Convention and the POPs Regulation in 2010, so the estimate covers the period around the restriction on the production and use of electrical equipment with PBDEs. For the calculation of the presence of PBDEs in equipment by category, it is assumed that PBDEs are present in levels below or above 0.1% by weight.

The first projection presents an estimate of the mass of PBDEs based on the statistics of imported and exported electrical equipment by categories 1–4a. These categories include large and small household appliances, IT communications equipment and consumer equipment. As data on the proportion of EEE that actually contained PBDEs are not available, the projection gives a worst-case estimate of the probability where the PBDE content in all products would be less than or more than 0.1% by weight, depending on the EEE category.

Table 5: Estimated amount (t) of PBDEs in imported and exported electrical and electronic equipment for EEE categories (1–4a)

Estimated amount (t) of PBDEs in imported and exported electrical and electronic equipment for EEE categories		
Year	**Total imports – EEE categories (1–4a)**	**Total exports – EEE categories (1–4a)**
2009	6,324	165
2010	7,255	184
2011	7,220	166
2012	7,136	167
2013	7,217	137
2014	5,991	147
2015	7,482	145
2016	7,922	146
2017	9,155	155

b) Estimated PBDE content in imported and exported electrical and electronic equipment 1–4a

The second projection of PBDE content was made for imported and exported EEE products, but only for product categories 3 and 4, i.e. IT and telecommunications equipment, computer screens, consumer equipment and CRT TV monitors, as the UNEP guidance [8] provides more detailed information on PBDE content for these two categories. CRT casings contain approximately 15% c-OctaBDE, including about 10% POP-PBDEs (hexaBDE and heptaBDE). For the calculation of the polymer content and the PDBE content, the values in Table 6 were used.

Table 6: Total polymer fractions and c-OctaBDE concentrations in relevant categories of electrical and electronic equipment (data for Europe taken from UNEP guidance [8])

Relevant categories of electrical and electronic equipment (EEE)	Polymer fraction (mean, % by weight)	c-OctaBDE content (mean) in plastics (kg/t)
WEEE category 3 (without CRTs)	42%	0.225
CRT computer monitors	30%	2.54
WEEE category 4 (without CRTs)	24%	0.15
CRT-TVs	30%	0.87

Table 7: Estimated amount (kg) of PBDEs in imported and exported electrical and electronic equipment (EEE categories 3 and 4)

Estimated amount (kg) of PBDEs in CRT screens and CRT TV monitors		
Year	**Imports**	**Exports**
2009	748	3,602
2010	1,173	333
2011	767	269

The estimate represents the PBDE content in imported and exported EEE for categories 3 and 4 of EEE products with CRT monitors. In 2009, exports strongly outweighed imports. The main use of c-OctaBDE was in ABS polymers, accounting for about 95% of c-OctaBDE supplied in the EU. ABS was mainly used for housings/casings of electrical and electronic equipment, particularly for cathode ray tube (CRT) housings and office equipment such as copying machines and business printers. Some of these polymers were also used in the transport sector.

c) Estimated c-OctaBDE content in imported and exported products with CRT

For EEE products (monitors, TV sets) with CRT, a more precise ABS polymer content and c-OctaBDE concentrations were given in the UNEP guidance [8], and therefore additional projections of imports and exports of these products were made.

Table 8: Estimated amount of PBDEs in imported CRT monitors and TV sets, projections 3 and 4

		Projection 3 Estimated amount of PBDEs (kg)		Projection 4
Year	**Number of imported CRT monitors and TV sets**	**Minimum c-OctaBDE content 0.87 kg/t polymer**	**Maximum c-OctaBDE content 2.54 kg/t polymer**	**Estimated amount of PBDEs (kg)**
2009	217,602	1,420	4,145	57,794
2010	245,530	1,603	4,677	64,598
2011	23,273	152	443	14,762
2012	10,956	72	209	4,807

Table 9: Estimated amount of PBDEs in exported CRT monitors and TV sets, projections 3 and 4

		Projection 3 Estimated amount of PBDEs (kg)		Projection 4 Estimated amount of PBDEs (kg)
Year	**Number of exported CRT monitors and TV sets**	**Minimum c-OctaBDE content 0.87 kg/t polymer**	**Maximum c-OctaBDE content 2.54 kg/t polymer**	
2009	3,734,342	24,367	71,140	5,058
2010	1,687	11	32	783
2011	11,052	73	210	8,077
2012	3,419	22	65	1,545

A review of imported and exported cathode ray tube (CRT) monitors for PBDE content showed that there were no imported CRT monitors in 2009, but more than 3.7 million CRT monitors were exported, and more than 210,000 CRT TV sets were imported and 8,500 CRT TV sets were exported. Based on

these data, the amount of PBDEs was estimated. Both imports and exports of CRT monitors and TV sets have experienced some fluctuations over the last decade, and therefore the estimated amount of PBDEs in these products also fluctuates. Accordingly, the projections made show a large variation in the possible PBDE content in imported and exported CRT monitors and TV sets.

No data are available on whether EEE products still contained PBDEs after 2010.

2.2.3.1.2.1.3 Estimated c-OctaBDE content in collected waste electrical and electronic equipment (WEEE)

Data on WEEE by category 1 to 10 are collected by ARSO. It collects, inter alia, data on WEEE collected, data on WEEE collected and treated, the amount of WEEE placed on the market and the amount of WEEE collected from households and other consumers, the amount of WEEE treated in the MS, the amount of WEEE treated in other MS, the recovery rate of WEEE, the amount of reused and recycled EEE and its share, the amount of EEE reused as a complete appliance, and the amount of treated WEEE. It publishes the data on quantities on its website and reports them regularly to Eurostat.

On the basis of the data, two projections were made, one estimating the c-OctaBDE content in collected EEE and waste EEE and the other estimating the c-OctaBDE content in collected and treated WEEE. The c-OctaBDE content was only estimated for a part of the collected WEEE, as the guidance only provides the acrylonitrile-butadiene-styrene (ABS) polymer content and the c-OctaBDE concentration that are present in the polymer for product categories 3 and 4. Information on quantities was only available for the years from 2016 to 2018.

Table 10: Estimated amount of c-OctaBDE (t) in collected waste electrical and electronic equipment (WEEE) (values from Table 6 taken into account)

	Estimated amount of c-OctaBDE (t) in collected waste electrical and electronic equipment (WEEE)
Year	**Total by categories 3 and 4**
2016	1,069
2017	891
2018	854

Table 11: Estimated amount of PBDEs (t) in collected and treated waste electrical and electronic equipment (WEEE) (values from Table 6 taken into account)

	Estimated amount of PBDEs (t) in collected and treated waste electrical and electronic equipment (WEEE)
Year	**Total by categories 3 and 4**
2016	1,028
2017	982
2018	827

Estimated amounts of c-OctaBDE and PBDEs for a part of collected and treated WEEE (waste categories 3 and 4) showed a similar trend.

2.2.3.1.3 Use of PBDEs in polyurethane foam

From 1980 to 2004T, c-pentaBDE was used in the production of polyurethane (PU or PUR) foam for construction applications. The use depended on insulation needs and national regulations.

SORS has data on the amount of imported and exported polyurethane foam. The companies involved have data on polyurethane foam production and the polyurethane foam waste collected.

2.2.3.1.4 Other uses

Other uses of PBDEs include mainly use in furniture, mattresses, textiles, building materials and rubber. These uses are less important due to the relatively low overall consumption, the limited import of such used products from countries that have used PUR foam and the lack of flammability standards for certain uses.

2.2.4 Hexabromocyclododecane

Hexabromocyclododecane (HBCDD) was restricted in 2013 by its inclusion in Annex A of the Stockholm Convention, and was included in the POPs Regulation in 2016. It was also included as an SVHC in Annex XIV – List of substances subject to authorisation – of REACH in 2011. Since August 2015, its placing on the market and use within the EU has been banned.

Hexabromocyclododecane has been used as a flame retardant in various materials in the automotive and construction industries. It was most commonly used in polystyrene foam insulation material, while its use in electrical and electronic products was less common. It was used in the following products:

- EPS (expanded polystyrene) as a flame retardant in the construction industry,
- XPS (extruded polystyrene) for insulating structures in humid environments,
- HIPS (high impact polystyrene) in electronics, textiles and cement.

A number of chemical alternatives are commercially available. There is also a large range of alternatives in the form of polystyrene foam and granules, but it will take some time before these chemical alternatives are certified (fire rating).

During the inventory of potential production, imports and exports, stocks, recycling and waste that could contain hexabromocyclododecane, it has been established that the main use of HBCDDs is in polystyrene (EPS and XPS) in the construction and textile sectors. The review of the situation included imports and exports and mainly use in polystyrene products and textiles.

2.2.4.1 Imports and exports

Three products containing HBCDDs were imported into (and exported from) Slovenia between 2014 and 2016. As of 2017, these chemicals have no longer been imported.

2.2.4.2 Use of HBCDDs in polystyrene products

In the construction sector, EPS panels contained between 0.5% and 1.0% (by weight) of HBCDDs and XPS panels contained between 0.8% and 2.5% or 3% (by weight) of HBCDDs. Hexabromocyclododecane was used as a flame retardant until 2015 to meet the requirements to reduce the combustibility of EPS in accordance with building legislation. Since 2015, manufacturers have replaced HBCDD with various chemicals, most commonly brominated cyclic and polycyclic derivatives similar to HBCDD. It is estimated that the largest use is in the construction sector.

Projection of estimated amount of HBCDDs in imported and exported EPS panels

Table 12: Estimated HBCDD content in imported EPS panels for the period 2009–2015

	Weight (t) HBCDD

Year	Weight (t) of imported EPS panels	0.5% HBCDD content	1.0% HBCDD content	3.0% HBCDD content
2009	24,972.91	124.87	249.73	749.19
2010	28,123.07	140.62	281.23	843.69
2011	29,992.40	149.96	299.92	899.77
2012	30,889.92	154.45	308.90	926.70
2013	30,873.59	154.37	308.74	926.21
2014	31,031.45	155.16	310.32	930.94
2015	28,240.30	141.20	282.40	847.21

All EPS and XPS panels produced up to the end of 2014 are assumed to have been treated with agents containing HBCDD. Taking this into account, the calculation of the minimum and maximum HBCDD content changes if it is assumed that no EPS panels containing HBCDD have been imported since 2015. More precise data are not available.

Table 13: Calculated HBCDD content in exported EPS panels for the period 2009–2015

		Weight (t) HBCDD		
Year	Weight (t) of exported EPS panels	0.5% HBCDD content	1.0% HBCDD content	3.0% HBCDD content
2009	960.08	4.80	9.60	28.80
2010	1,834.26	9.17	18.34	55.03
2011	5,791.63	28.96	57.92	173.75
2012	4,236.08	21.18	42.36	127.08
2013	10,894.77	54.47	108.95	326.84
2014	10,083.89	50.42	100.84	302.52
2015	3,727.18	18.64	37.27	111.82

The highest amount of HBCDD was exported in EPS panels in 2013 (between 54 and 108 tonnes). The lowest amount of HBCDD was exported in 2009 (between 5 and 10 tonnes). For special EPS construction panels, the lowest amount of HBCDD was exported in 2009 when 29 tonnes of this compound were exported and the highest amount was exported in 2013 when 327 tonnes of HBCDD were exported. It is assumed that from 2015 onwards, exported EPS panels no longer contain HBCDD.

2.2.4.2.1 Use of hexabromocyclododecane in Slovenia

Hexabromocyclododecane (HBCDD, HBCDD) has been used in Slovenia as a flame retardant in the production of various polystyrene thermal insulation panels (EPS and XPS). According to reports from three companies (Fragmat TIM, d.o.o., JUB, d.o.o., Geberit, d.o.o.), the raw materials used for the production of the thermal insulation panels contained HBCDD, between 1% and 2.5% by weight of the EPS raw material. As of mid-2015, the raw materials for EPS panels no longer contained HBCDDs.

It is presumed that HBCDD is less used in other polystyrene products in Slovenia. More detailed information is not available.

2.2.4.2.2 Collection, treatment and recycling of waste polystyrene products

The use of HBCDD in EPS and XPS in the construction sector started after 1960. Waste containing HBCDDs was probably generated in the past, but data on quantities are not available.

In Slovenia, collected waste polystyrene is recycled; after recycling, it has been used in construction products since 2015. Based on reports from manufacturers in the construction sector on the avoidance of the use of HBCDDs after the ban, we conclude that there are no HBCDDs in recycled EPS or XPS in Slovenia.

2.2.4.3 Use of hexabromocyclododecane in textiles and textile products

This is the second most important use. The polymer has been sprayed onto cotton, cotton-blend and synthetic materials or synthetics, with the latter being back-coating of textiles. In addition to HBCDD, from among the POPs compounds, pentaBDE and decaBDE have also been used in textiles. HBCDD is present in flame retardant textiles in concentrations ranging from 2.2% to 4.3%, and even up to 15%. No data are available on actual use in Slovenia.

Table 14: Textiles covered by the inventory, by category

Category	Textile
1	clothing
2	protective clothing and technical textiles
3	textiles in residential and commercial upholstered furniture
4	seating and other textile interiors in vehicles (cars, buses, lorries, trains, aircraft, ships)
5	wall coverings and draperies
6	interior textiles (e.g. roller blinds and curtains)
7	bed mattress ticking
8	tents
9	other treated textiles

Certainly, at least some of the textile products treated with HBCDDs and produced in the last 40 years have reached the end of their useful life and ended up in landfills or recycling. Some products (such as vehicle seats, car parts, curtains or tents) have a longer useful life and may therefore still be in use.

Due to lack of data, there is no data on the proportion of textiles containing HBCDDs. A projection has been made showing an extreme case where all textiles could contain some HBCDDs. Actual levels are likely to be lower than those presented.

2.2.4.3.1 Use, exports and imports of HBCDD in textiles and textile products in Slovenia

The collapse of the textile industry in Slovenia in the last 30 years has led to a sharp decline in the number of employees, from 69,500 in 1990 to 17,170 in 2009 and only 8,000 in 2018. Many of the larger companies have gone bankrupt because they did not have a long-term development strategy and because they were too focused on doing business for other brands instead of developing their own. There are still 380 registered textile companies in Slovenia, but these are no longer large textile companies. As it was not possible to obtain comprehensive data on the use of HBCDD in production in the past due to the fact that large companies have gone bankrupt, an assessment was carried out for the purpose of a snapshot of the situation by examining the textile sector in terms of imports and exports and waste products collected.

On the basis of the estimated HBCDD content from the UNEP guidance [14] and SORS data on imported textile amounts, the HBCDD content in textiles was calculated by year.

Table 15: Calculated HBCDD content in exported textiles for the period 2009–2015

		2.2% HBCDD content in textiles	4.3% HBCDD content in textiles	15% HBCDD content in textiles
Year	Weight of textiles (t) imported into Slovenia	Weight of HBCDD (t) in textile waste		
2009	76,476	1,682	3,288	11,471
2010	80,840	1,778	3,476	12,126
2011	75,881	1,669	3,263	11,382
2012	67,726	1,490	2,912	10,159
2013	67,290	1,480	2,893	10,094
2014	79,146	1,741	3,403	11,872
2015	79,744	1,754	3,429	11,962

For the data of the Statistical Office of the Republic of Slovenia on the weight of exported textiles, the HBCDD content of textiles by year is also calculated based on the HBCDD content in textiles (2.2%, 4.3% and 15%). The results are shown in Table 16.

Table 16: Calculated HBCDD content in exported textiles for the period 2009–2015

		2.2% HBCDD content in textiles	4.3% HBCDD content in textiles	15% HBCDD content in textiles
Year	Weight of textiles (t) exported from Slovenia	Weight of HBCDD (t) in exported textile waste		
2009	70,907	1,560	3,049	10,636
2010	75,203	1,654	3,234	11,280
2011	78,482	1,727	3,375	11,772
2012	74,541	1,640	3,205	11,181
2013	77,066	1,695	3,314	11,560
2014	85,758	1,887	3,688	12,864
2015	82,714	1,820	3,557	12,407

2.2.4.3.2 Collection and treatment of textile waste

Data on the collection and treatment of textile waste are difficult to obtain and scattered across different sources. The inventory was carried out using Eurostat data for Slovenia, data from various municipal companies, textile collectors and research data from the textile sector.

Table 17: Data on the weight of textile waste collected in Slovenia in the period 2010–2016

	Textile weight (t)
Year	Collected textile waste
2010	7,403
2012	6,834
2014	8,320
2016	8,732

Source: Eurostat

Textile waste is not only generated in households as discarded clothes, car parts or upholstered furniture. Eurostat provides data on textile waste generated in different sectors of production and other activities. In 2010, households generated about ten times less textile waste (562 tonnes) than various industries (5,886 tonnes). The textile, clothing and leather industry, which generated 4,619 tonnes of textile waste in 2010, accounts for the largest share among manufacturing industries.

During the making of the inventory, a survey was sent to the Slovenian municipalities, asking them about the weight of textile waste collected. A total of 18 out of 212 municipalities responded to the survey, representing a sample of 29% of Slovenians. From the data collected for the 18 municipalities, the total weight of textile waste collected was calculated and, within this, the total weight of clothing collected was also calculated.

There is no data on the proportion of textiles containing HBCDDs. The projection of the hexabromocyclododecane content in the collected textile waste is therefore an extreme estimate of the probability where all textile waste would contain some proportion of this compound. In accordance with the HBCDD inventory guidance, concentrations of 2.2%, 4.3% and 15% have been used for the HBCDD content.

The projection made showed that, with a 2.2% HBCDD content, the weight of this compound in the collected textile waste ranges from 44.7 to 61.9 tonnes. If the HBCDD content is 4.3%, then 87.4 to 120.9 tonnes of this compound are present in textiles. In the extreme case, if the HBCDD content is 15%, between 304.8 and 421.7 tonnes of HBCDD are present in textiles. In addition to this projection, a separate projection was made for the HBCDD content in waste clothing, which showed that at a 2.2% HBCDD content, the weight of this compound in the collected waste textiles ranges from 0.2 to 4.7 tonnes, at a 4.3% HBCDD content from 0.3 to 9.2 tonnes and at a 15% HBCDD content from 1.2 to 32.2 tonnes.

The survey on post-consumer textile waste in Slovenia has showed that in 2011, most of the textile waste collected in collection centres was taken to Austria for incineration. In 2013 textile waste, mostly clothing, was collected, recycled, handed over or sold and sent to landfill by collection centres. In 2013, 6,748 tonnes of waste was generated by production and service activities in the leather and textiles industry. Of this, 132 tonnes or 2% of textile waste was disposed of in landfills. In the second category of waste (which includes waste packaging, absorbents, wiping cloths, filter materials and protective clothing), 6,308 tonnes of textile waste were delivered to other units around the country. Only 21 tonnes or 0.3% ended up in landfills.

In Slovenia, eight collection centres collect only clothing and face problems with collection. In 2012, each of these collection centres collected an average of around 4 tonnes of clothing, and a total of 32 tonnes of textile waste. Other collection centres (43) also collect clothing and textiles. In 2013, 650 tonnes of textile waste were collected.

As the interest in recycling and reuse is increasing, there is a possibility of POPs contamination when recycling textiles. Textiles have been produced at different times and on a global scale. Nevertheless, we estimate that, based on the available data, the actual presence of hexabromocyclododecane in textiles in Slovenia is low or negligible.

2.2.5 Hexachlorobutadiene

Hexachlorobutadiene (HCBD) has in the past been used as a solvent for elastomers, a cooling medium in transformers, an adsorption agent for gas cleaning, a biocidal product to prevent algae fouling in cooling systems and as a PPP in viticulture.

HCBD is mainly formed as a by-product of high or low pressure chlorolysis used to produce chlorinated solvents such as trichloroethylene, tetrachloroethylene, tetrachloromethane and hexachloropentadiene,

and may also include vinyl chloride, allyl chloride and epichlorohydrin. There are no data on the quantities of HCBD produced and sold, and the scope of use of this substance is also not clear. HCBD is also formed during the production of chlorine by graphite electrodes and during the extraction of magnesium. It may also be formed during aluminium production as a result of the addition of hexachloroethane to the alloy degassing pellets.

Considering the possible sources of HCBD, the extent of production of the following substances in Slovenia was verified at the time of the inventory:

1) chlorine, untreated aluminium

Slovenia has aluminium and elemental chlorine production facilities. A company that produces aluminium has confirmed that no HCBD is produced during their production.

2) tetrachloromethane

There have been no imports or exports of tetrachloromethane in Slovenia between 2009 and 2019, therefore it can be concluded that tetrachloromethane is not a source of HCBD in Slovenia.

3) trichloroethylene

The imports of trichloroethylene were highest in 2010, with approximately 48,364 kilograms imported. In the same year, the largest amount was also exported (14,803 kg). Since 2010, exports of trichloroethylene from Slovenia have been very low. In accordance with the UNEP guidance on the HCBD inventory [13], the HCBD content in trichloroethylene is 0.4%. While the company can further purify trichloroethylene, the projection was made on the assumption that all imported trichloroethylene contains HBCDD. The projection showed that 887 kilograms of HCBD, formed as a by-product in the production of trichloroethylene, were imported into Slovenia between 2009 and 2019 and 86 kilograms were exported.

4) tetrachloroethylene

There is no production of tetrachloroethylene in Slovenia. Its imports and exports are higher than those of trichloroethylene. The imports of trichloroethylene were highest in 2009, estimated at 149 tonnes; since then imports have been gradually decreasing. The highest exports of tetrachloroethylene, around 36 tonnes, were in 2017 and the lowest, around 6 tonnes, in 2015. The HCBD content of tetrachloroethylene depends on how it is produced. The possible levels in the raw product are 0.2%, 0.5% and 5%.

The results of the projections made show that the annual source of HCBD of between 260 kilograms (0.5% content, 2019) and 6,800 kilograms (5% content, 2013) can be attributed to imports of tetrachloroethylene between 2009 and 2019; however, overall there was a marked decrease in imports of tetrachloroethylene and consequently in the introduction of HCBD into Slovenia between 2009 and 2019. For exports of tetrachloroethylene, the annual estimated quantities range between 31 kilograms (0.5% content, 2015) and 1,800 kilograms (5% content, 2015). The data indicate that HBCDD imports and exports were most intense in 2017 and 2018, with a noticeable decline in 2019.

Between 2009 and 2019, between 4 and 72 kilograms of HCBD were imported into Slovenia in the form of impurities in tetrachloroethylene, depending on the possible different levels of this substance in tetrachloroethylene. We estimate that imports of tetrachloroethylene represent a relatively small introduction of HCBD into Slovenia. Assuming that the exported product contained 5 µg/l HCBD, Slovenia has exported less than one kilogram of HCBD over ten years. If the exported product contained 100 µg/L HCBD, the amount exported over the same time period was around 12 kilograms of HCBD.

Since in the guideline on the HCBD inventory it is also suspected that HCBD is formed in the production of chloroprene, allyl chloride and epichlorohydrin, the data on imports and exports of these substances were also verified during the inventory against the statistics published by SORS.

Additional findings confirmed that there is no production of hexachlorocyclopentadiene in Slovenia, which could contain between 0.2% and 1.1% HCBD. No data on imports or exports of this raw material are available. There is also no production of ethylene dichloride or vinyl chloride in Slovenia, so there is no HCBD waste. Imports and exports of these raw materials between 2009 and 2019 were low.

There is also no production of epichlorohydrin and chloroprene in Slovenia, but there were imports and exports of these raw materials between 2009 and 2019. No information is available on whether the final product contains HCBD.

On the basis of the projections made, we can roughly estimate that HCBD is not a major pollution problem in Slovenia. Given that it is highly soluble in water and has a relatively high octanol/water partition coefficient, it has a relatively high half-life, which is why it is likely to be found in surface waters and especially in sediment.

2.2.6 Polychlorinated biphenyls – update

In the past, oil with polychlorinated biphenyls (PCBs) was used in certain transformers and capacitors in Slovenia. Some transformers containing PCB-containing oil are still in use, as in accordance with the provision of paragraph 6 of Article 8 of the Decree on the disposal of polychlorinated biphenyls and polychlorinated terphenyls, a transformer containing between 0.05% and 0.005% PCB by weight of transformer oil may be disposed of or decontaminated after the expiry of the time limit referred to in paragraph one of Article 8, i.e. 31 December 2010. However, it must be disposed of immediately if it is no longer in use.

PCB transformers still in use must be labelled in accordance with Article 7 of that Decree, which means that the holder of such a device must label it as containing PCBs and affix that label to the device and to the door leading to the room or building where the device is installed.

At the end of the lifetime of such a transformer, the PCB device must be handed over to persons handling PCB waste or the device must be decontaminated. Decontamination may only be carried out by a person holding a valid environmental permit issued by the MOPE/ARSO.

PCB equipment, PCB devices or PCB oil may not be disposed of in Slovenia. Persons holding a permit for the collection or other handling of PCB equipment or PCB waste must ensure that it is exported abroad, where the PCB equipment/waste/oil is disposed of by incineration at high temperature. This is also carried out by persons/companies that have a permit to do so.

Data on the disposal of PCB from various devices are available for the period 2004–2017. Data on the number of transformers in use in Slovenia are available. Transformers still in use are listed in the inventory of PCB devices (installations with more than 5 dm^3 of PCBs):

https://www.gov.si/assets/ministrstva/MOPE/Okolje/Odpadki/Podatki/Evidenca-in-nacrti-odstranjevanja-PCB-naprav-z-vec-kot-5-dm3-PCB.pdf.

Table 18: PCB devices – disposals specified by year – including electrical distribution

Year	Weight (kg) of PCB devices disposed of
2009	23,808
2010	82,370
2011	22,962
2012	10,179

2013	0
2014	5,043
2015	no data available
2017	11,150

Source: ARSO

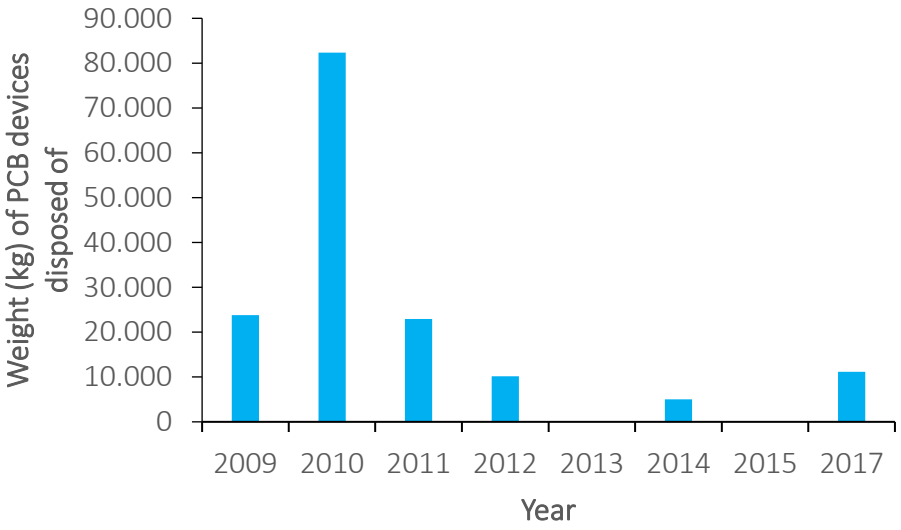

Figure 2: Weight (kg) of PCB devices disposed of by year in the period 2009–2017

The amount of PCB waste exported from Slovenia in 2017 was 2.04 tonnes and this was sent to Austria for incineration. Precise data are not available for the period 2009–2016. PCB waste was mainly exported to Austria and France for destruction (incineration). Information on PCB waste is also provided in the National Implementation Plan for the Management of Persistent Organic Pollutants for the period 2009–2013.

The Operational Plan for Waste Management of the Republic of Slovenia 2021 states that, according to data submitted by PCB holders to the competent authority, there is around 10 tonnes of equipment containing PCBs in Slovenia that has not been decommissioned or decontaminated (equipment with more than 5 dm^3 of PCBs). As a result of the decommissioning of this equipment, the new discovery of equipment residues and construction waste that contain PCB, the average annual generation of PCB-containing waste is expected to be around six tonnes.

For an update on the permanent storage of waste containing PCBs and a further review of the situation regarding food contamination and the burden on the environment, see Section 2.4 and the status of PCBs in the environment, see Section 2.6.

2.2.7 Polychlorinated naphthalenes

Polychlorinated naphthalenes (PCNs) are produced by the chemical reaction of chlorine and naphthalene. In the past, they have been used in electrical wire coatings, wood preservatives, as additives in rubber and plastics, and in capacitor dielectrics and lubricants. The commercial mixture contains 75 chlorinated "congeners" – molecules of different shapes depending on the position and number of chlorines in the PCN – and a number of by-products. Typically, commercial mixtures of these

compounds are characterised by their total chlorine content rather than their individual 'congener' content. PCNs can be released into the environment as by-products of waste incineration.

Due to the ban, there is no production, imports or use of PCNs in Slovenia.

There have been no imports or exports of PCNs since 2000.

Overview of past uses:

1) in transformers and capacitors

Polychlorinated naphthalenes were used from 1930 to 1989, a longer period of time than PCBs, which were used between 1940 and 1985. The amount of PCNs used was about ten times less than that of PCBs. On this basis, it can be estimated that transformers represent an insignificant contribution in the field of pure PCNs. Nevertheless, PCNs are present as unintended contaminants in all PCB transformer oils, as commercial PCBs contain traces of PCNs (0.01–0.09% PCB content).

MOPE only keeps data on PCB-containing devices and not on PCN-containing devices. The electricity distribution companies also do not have data on devices containing POPs. Estimates of the waste they accept for thermal treatment also do not indicate that they contain POPs.

2) in hydraulic fluids

Polychlorinated naphthalenes were used together with PCBs in hydraulic fluids in the mining sector at least until 1989. Analyses of PCBs in hydraulic oils in the mining sector and other sectors have also detected the presence of PCNs. The inventory did not provide any data to confirm the possibility of the presence of PCNs in hydraulic fluids in Slovenia.

3) in cables

Polychlorinated naphthalenes were most commonly used as flame retardants, which are POPs, in cables. PCBs and PBDEs were also used. The highest use of PCNs was between 1920 and 1960. They were mostly used for electrical equipment cables. This equipment is most likely to have outlived its useful life and is either in collection centres or landfill sites. Cables used in the construction of houses or other long-term applications may still be in use. Old cables containing PCBs (used from 1960 to 1980) and PBDEs (produced from 1970 onwards) may still be partly in use.

Over the last ten years, the length of cables across Slovenia has increased by almost 40%. In 2009, the length of cables was 28,204 kilometres, and in 2019 as many as 70,702 kilometres. However, due to renovation, new technologies and the reduced presence of cables during the critical period (1920–1960), it is very likely that the presence of PCBs in cables in Slovenia is minimal.

4) in paints

Polychlorinated naphthalenes were used in varnishes and paints used below the water surface and as raw materials for dyes. Production is thought to have continued until the 1970s and in some places until the 1980s. These paints also contained PCBs. The uses of paints containing PCBs or PCNs were similar, except that PCBs occurred to a greater extent than PCNs. These uses included, for example, paints and coatings for corrosion protection of metal structures, electrical poles, transformers, tanks (external and internal) and machinery. PCBs were thus mainly used in chloroprene paints and chloroprene varnishes, but also in PVC copolymers. Concentrations ranged from 5% to 35%.

The estimation of the use in the past of PCNs and PCBs in paints for corrosion protection of metal structures, paints used in swimming pools and other underwater paints and varnishes shows that there is a low possibility of PCBs being present in swimming pools in Slovenia, which are important for thermal tourism and recreational and professional sports activities, as these facilities are mostly well maintained

and have been refurbished since the end of the critical period in 1980 with paints that did not contain POPs.

5) in sealants and putty

Given the lifetime of these materials, it is estimated that most of the products used in Slovenia that may contain polychlorinated naphthalenes have already been replaced. The remaining, probably smaller, quantities cannot be estimated.

6) in chloroprene rubber

Polychlorinated naphthalenes were used in chloroprene rubber until around 2000. Such chloroprene rubber has been used in rubber belts, printer rubber belts and shock absorbing materials. The estimated consumption of belts in Slovenia is about 135,000–200,000 kvm/year. The lifetime of conveyor belts varies widely and depends on many factors, but their average lifetime is estimated at up to five years. Data on use in production in Slovenia are not available.

7) in wood preservatives

Polychlorinated naphthalenes were used in the past in wood preservatives, mainly in the period from 1920 to 1970 (higher chlorinated naphthalenes), while lower chlorinated naphthalenes were used until 1987.

Based on data from the Biotechnical Faculty, Chair of Wood Pests, Modification and Protection of Wood and the Chair of Adhesives, Wood Composites, Surface Treatment and Construction, it can be concluded that in the past no or negligible amounts of polychlorinated naphthalenes were used in the wood industry in Slovenia.

8) unintentional use

Polychlorinated naphthalenes can be unintentionally produced in the synthesis of chlorinated solvents (hazardous waste), chlorinated paraffins and chlorine. Polychlorinated naphthalenes can also be formed in thermal processes in incineration plants and in the metal industry (iron ore sintering). Data on the unintentional production of PCNs are not available.

2.2.8 Chlorinated paraffins with short chains

Short-chain chlorinated paraffins (SCCPs) were included in Annex I of the POPs Protocol in 2009, in Part B of Annex I of the POPs Regulation in 2012 and in Annex A (Elimination) of the Stockholm Convention in 2017.

SCCPs are chlorinated alkanes with a carbon chain length of 10 to 13 carbon atoms and a chlorine content exceeding 48% by weight. Globally, these substances have been identified for use as flame retardants in rubber used for conveyor belts in mining, plastics or textiles, as plasticisers in paints, coatings or sealants, and as lubricants in metalworking fluids.

Technically feasible alternatives are commercially available for all uses of SCCPs. Partial data on imports and exports, historical production and use of SCCPs in Slovenia indicate that quantities of products with SCCPs were small.

2.2.9 Perfluorooctanoic acid, its salts and PFOA-related compounds (PFOA, its salts and PFOA-related compounds)

Perfluorooctanoic acid, its salts and PFOA-related compounds (PFOA, its salts and FOA-related compounds) started to be restricted in 2019.

Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds include the following compounds:

(i) perfluorooctanoic acid (PFOA; CAS No. 335-67-1), including any of its branched isomers;
(ii) its salts;
(iii) PFOA-related compounds which, for the purposes of the Convention, are any substances that degrade to PFOA, including any substances (including salts and polymers) having a linear or branched perfluoroheptyl group with the moiety (C7F15)C as one of the structural elements.

PFOA, its salts and PFOA-related compounds fall within a family of perfluoroalkyl and polyfluoroalkyl substances (PFASs). These substances are used widely in the production of fluoroelastomers and fluoropolymers, for the production of non–stick kitchen ware, and in food processing equipment. PFOA-related compounds are used as surfactants and surface treatment agents in textiles, paper, packaging, paints and firefighting foams.

Alternatives to all uses of PFOA in fire-fighting foams exist.

No data are available on the use of perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds in Slovenia.

2.2.10 Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride (PFOS, its salts and PFOSF)

PFOS-compounds belong to the large family of perfluoroalkyl compounds. PFOS is both intentionally produced and an unintended degradation product of related anthropogenic chemicals. PFOS is a fully fluorinated anion, which is commonly used as a salt or incorporated into larger polymers. Under REACH, PFOS are substances of very high concern (SVHC).

The current use of PFOS-compounds is widespread and includes use in electrical and electronic parts or products, fire-fighting foam, hydraulic fluids (for aviation), textiles (e.g. carpets) and insulation materials, photocopiers and (colour) printers, photo-imaging (photographic printing, coating on film), etching agents for compound semiconductors and ceramic filters, metal plating (hard metal plating) only in closed-loop systems, leather and leather products, insecticides for control of ants, in the semiconductor and liquid crystal display (LCD) industries, in paper and packaging, and in rubber and plastics.

PFOS does not follow the classic pattern of other POPs, which are stored into fatty tissues, but instead binds to proteins in the blood and the liver.

Alternatives to PFOS are available for some applications, but for some applications (photo imaging, semi-conductor or aviation hydraulic fluids) technically feasible alternatives to PFOS are not available. In Slovenia, PFOS was last used in hard metal plating. Other most likely uses such as production, imports and exports, stock, recycling and waste were verified during the inventory.

In 2016, approximately 45 kilograms of tetraethylammonium perfluorooctane sulfonate were imported into Slovenia from the EU and 118 kilograms of this compound were commercially available in products intended for hard metal plating. The last import of products with PFOS intended for this use took place in 2017. In that year, approximately 23 kilograms of tetraethylammonium perfluorooctane sulfonate were imported and only 15 kilograms were used in products for hard metal plating. There have been no imports of products with PFOS since 2018.

No data are available on the relevant stocks with confirmed PFOS content in Slovenia.

An inventory has shown that:

- there is no PFOS in textiles and upholstered furniture;
- no significant quantities or concentrations of PFOS have been used in leather and clothing;
- it can be concluded that the contribution of this sector is minimal or negligible, as most of the possible paper products in which PFOS was used have probably reached the end of their useful life and as there is no information from the paper industry in Slovenia on the past use of any of the relevant POPs;
- the information obtained for toners and printing inks did not confirm the presence of PFOS;
- the EU already restricted the use and marketing of fire-fighting foams containing PFOS in 2006, with the exception of stocks that could be used until 2011. The estimated amount of foaming agents consumed and newly purchased in Slovenia is 10% of the total amount of foaming agents. This means that the entire stock of foaming agents in Slovenia is replaced within 10 years. According to the Stockholm Convention documents on PFOS, manufacturers of foaming agents had phased out the use of PFOS by 2006. Based on these data, it can be concluded that there are no foaming agents in Slovenia that still contain PFOS;
- PFOS has been used as an anti-corrosion additive to hydraulic fluids in civil and military aircraft to prevent evaporation, fires and corrosion – when reviewing the documentation for the hydraulic oils in use, we assess that hydraulic fluids in aviation are used in closed systems that do not come into contact with the environment, even when PFOS is used;
- PFOS has not been identified as an existing biocidal active substance that could be used in biocidal products in accordance with Regulation (EC) No 1896/2000. No information is available on the possible historical use of biocidal products for the control of ants with PFOS.

None of the stakeholders has more detailed information on possible use in commercial sectors (imports and exports, collected waste and treated waste products for the commercial sector).

The inventory did not confirm any other use of PFOS than that for hard metal plating.

2.3 Estimate of releases of unintentionally produced substances (Annex C)

Under the Stockholm Convention, Parties are committed to reducing total releases from anthropogenic sources for each of the chemicals listed in Annex C, with the aim of their continuous reduction and eventual elimination wherever possible.

Annex C includes the following persistent organic pollutants (POPs) that are generated and released unintentionally from anthropogenic sources:

- hexachlorobenzene (HCB),
- polychlorinated biphenyls (PCB),
- polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF),
- hexachlorobutadiene (HCBD),
- pentachlorobenzene (PeCB),
- polychlorinated naphthalenes (PNC).

Parties are required to evaluate current releases and develop and maintain inventories of pollutant sources and release estimates for the chemicals listed in Annex C of the Stockholm Convention. The evaluation of the inventories allows them to assess progress towards achieving emission reductions and to define new measures where necessary.

2.3.1 National inventories and release estimates

2.3.1.1 Air

National emission inventories for air pollutants have been developed alongside the European Monitoring and Evaluation Programme (EMEP) release reporting guidance under the Convention on Long-Range Transboundary Air Pollution (CLRTAP).

Estimates of releases of POPs to air were reported in accordance with CLRTAP and its protocols and Directive (EU) 2016/2284 on the reduction of national emissions of certain atmospheric pollutants (NEC Directive).

The annual reports contain POPs inventory data for each year from the baseline year (1990) to the last current year (N-2). The 2023 report thus includes release estimates for the period 1990 to 2021.

Slovenia is required to report on:

- hexachlorobenzene (HCB),
- polychlorinated biphenyls (PCB),
- dioxins/furans (PCDDs/PCDFs and DFs),
- polycyclic aromatic hydrocarbons (PAH):
    - benzo(a)pyrene,
    - benzo(b)fluoranthene,
    - benzo(k)fluoranthene,
    - indeno(1,2,3-cd)pyrene.

National emission inventories for air pollutants are based on the EMEP/EEA methodology developed by the Task Force on Emission Inventories and Projections of the United Nations Economic Commission for Europe (UNECE) and the European Environment Agency (EEA). EMEP/EEA (formerly EMEP/CORINAIR) is the European emission inventory guidebook for the estimation of national emissions, aligned with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

The emission guidebook has introduced sub-sectoral calculation methodologies and a software tool for data storage and further processing, allowing for the timely, transparent, accurate and as comparable as possible estimate of emissions.
Emissions are calculated as the product of activities and emission factors, where activities are numbers relating to a specific process that produces emissions and emission factors are the quantity of emissions per unit activity. Activity data included in the EMEP/EEA inventories are mainly based on official statistics. The emission factors used represent national values or default factors as suggested by the international guidance. The methodology and emission factors used in the calculation of emissions are from the EMEP/EEA air pollutant emission inventory guidebook 2019.

Data on fuel consumption for the activities were provided by SORS. Additional data on energy consumption due to the recovery of certain types of waste were obtained from verified reports from installations included in the emissions trading scheme (GHG).

The data on fuel consumption in agriculture and forestry refer only to mobile sources, while the rest of the consumption of these subsectors is included in the public and services sub-sectors. Emissions frohgm industrial processes and product use were mostly determined on the basis of statistical data on production and consumption of raw materials, using country-specific emission factors.

Default emission factors from COPERT (the computer model to calculate emissions from road traffic) were used to determine emissions from road transport. Emissions from the agriculture and waste sectors were mostly determined on the basis of statistical data. Both the emission factors from the latest version of the EMEP/EEA air pollutant emission inventory guidebook and country-specific emission factors were used.

An important source of data in the industrial process and manufacturing sectors is the REMIS database (application), which has been set up and is managed by ARSO. The REMIS database is established in accordance with the Rules on the initial measurements and operational monitoring of the emission of substances into the atmosphere from stationary pollution sources and on the conditions for their implementation (Official Gazette of the Republic of Slovenia [*Uradni list RS*], Nos 105/08 08 and 44/22 – ZVO-2). Liable persons are obliged to submit annual reports to ARSO on the performance of monitoring of emissions of substances to air; the emission data are direct measurements of emissions to air and reflect values specific to the individual installation.

Emissions of HCB, PCBs, dioxins/furans and PAHs have decreased since 1990 due to reduced use of coal in households, improvements in emission abatement technologies to reduce emissions from metal refining and smelting processes, and the introduction of stricter regulations on road transport emissions. The implementation of legislation, stricter controls and the use of best available techniques have contributed most to the reduction of emissions of POPs over the last two decades.

PAH emissions are expressed in total as 1–4, which is the sum of four substances: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene.

Between 1990 and 2021, Slovenia significantly reduced emissions - of HCB by 98%, PCBs by 91%, dioxins/furans by 33% and PAHs by 48%.

The reduction in releases of PCBs, dioxins/furans, PAHs and HCB since 1990 is due to the implementation of legislation, stricter controls and the use of best available techniques. This has influenced various factors such as the reduced use of coal in small combustion installations, improvements in metal refining and metal smelting technologies, and stricter regulations on road transport emissions.

In 2021, Slovenia did not exceed the emission levels set by the POPs Protocol for all POPs considered. Emissions are significantly lower compared to the 1990 baseline year. Total national emissions and emission sources for HCB, PCBs, dioxins/furans, PAHs are shown in Table 19 and Table 20.

Table 19: Releases of HCB, PCBs, dioxins/furans and PAHs to air in the period 1990–2021

Year/pollutant	HCB	PCB	dioxins/furans	PAH (total 1–4)
	kg	kg	g I-Teq	t
1990	21.4	415.4	21.2	8.7
1991	19.0	414.3	20.9	9.4
1992	17.8	373.0	20.0	8.4
1993	17.8	349.4	19.1	7.7
1994	17.7	322.1	18.6	7.0
1995	17.7	290.4	18.6	6.8
1996	15.1	274.0	18.4	6.6
1997	15.7	255.3	18.6	6.4
1998	15.6	243.9	18.8	6.3
1999	16.1	227.3	18.7	6.3
2000	19.5	213.6	19.3	6.3
2001	21.6	201.9	21.8	7.2

2002	0.9	184.1	17.8	6.0
2003	0.9	154.2	18.6	6.3
2004	0.9	142.5	18.2	6.1
2005	0.9	134.6	20.6	7.0
2006	0.9	122.3	19.3	6.4
2007	0.9	99.2	21.2	7.0
2008	0.9	93.5	20.7	6.8
2009	1.0	82.4	19.1	6.4
2010	1.3	75.7	19.6	6.5
2011	0.8	50.7	19.8	6.5
2012	0.8	43.7	18.8	6.3
2013	0.8	40.6	19.0	6.4
2014	0.7	40.6	16.6	5.5
2015	0.6	38.9	17.8	6.0
2016	0.6	38.9	17.8	6.0
2017	0.5	35.6	17.4	5.7
2018	0.5	35.6	15.8	5.1
2019	0.5	35.6	14.8	4.8
2020	0.5	35.4	14.1	4.5
2021	0.5	35.5	14.3	4.5
Reduction trend 1990–2021 (%)	**-98%**	**-91%**	**-33%**	**-48%**

Table 20: Sources of releases of HCB, PCBs, dioxins/furans and PAHs to air in 2021

Release source	HCB	PCB	dioxins/furans	PAH
electricity and heat production	x	x	x	x
fuel use in industry	x	x	x	x
road transport	x	x	x	x
other transport	x	x	x	x
fuel use in households and services	x	x	x	x
fugitive emissions				
industrial processes and solvent use		x	x	x
agriculture	x			
waste	x	x	x	x

2.3.1.1.1 HCB emissions

Total HCB emissions to air have decreased from 21.4 kg in 1990 to 0.46 kg in 2021, which is a 98% reduction (Figure 3). The largest reduction in emissions was recorded in 2002, when the use of hexachloroethane as a degassing agent in aluminium production was phased out. In 2021, heat and electricity production contributed the largest share (61%) of HCB emissions, followed by small combustion installations (fuel use in households and services) with 21% (Figure 4).

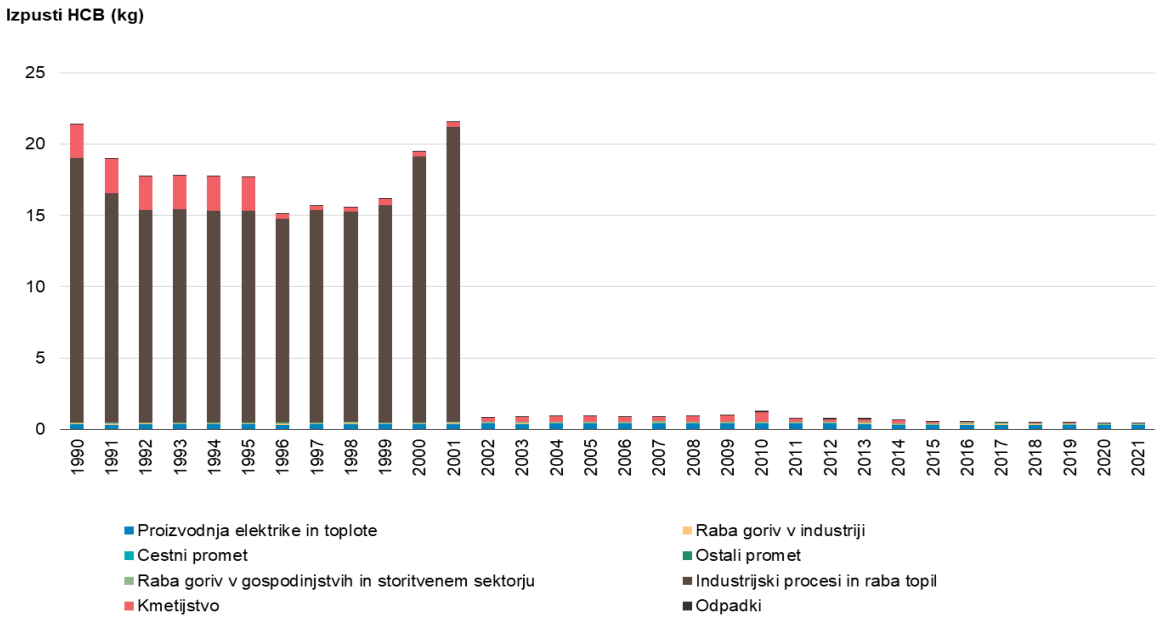

Figure 3: Releases of HCB to air in Slovenia in the period 1990–2021

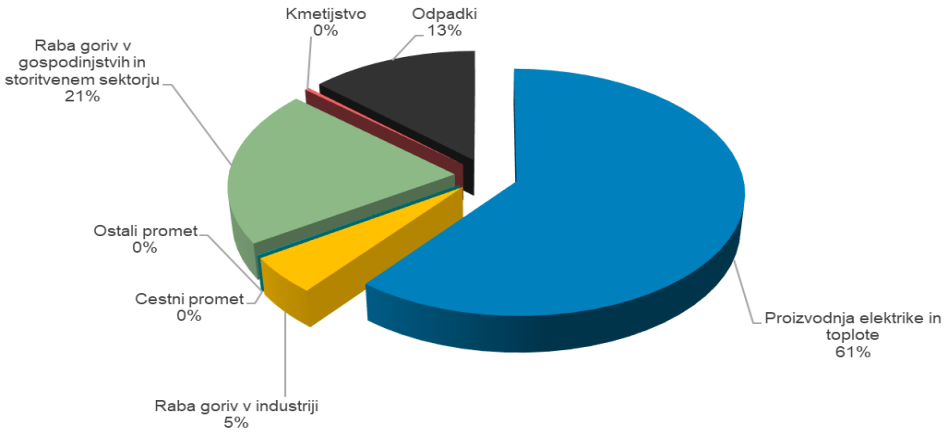

Figure 4: Contribution of individual sources to HCB releases in 2021

2.3.1.1.2 PCB emissions

National emissions of PCBs gradually decreased after 1990, when the total amount was 415.4 kg, and decreased to 35.5 kg in 2021, which is a 91% reduction (Figure 5). This has been mainly due to the gradual systematic disposal of electrical equipment with PCBs. Industrial processes and solvent use account for 99% of all PCB emissions (Figure 6).

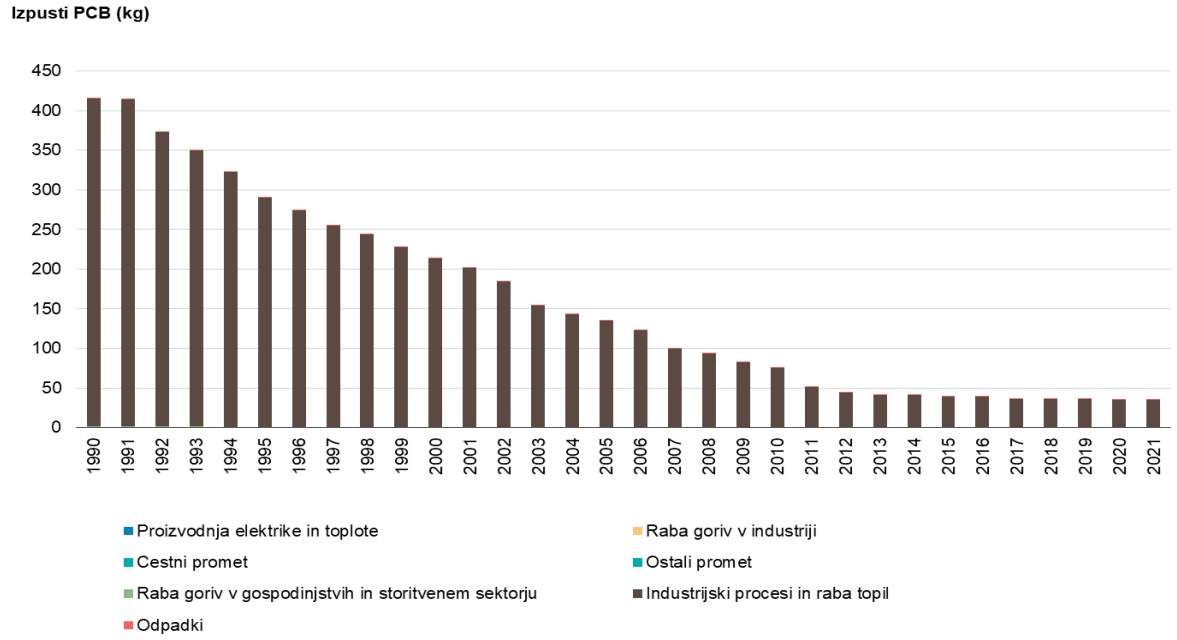

Figure 5: Releases of PCB to air in Slovenia in the period 1990–2021

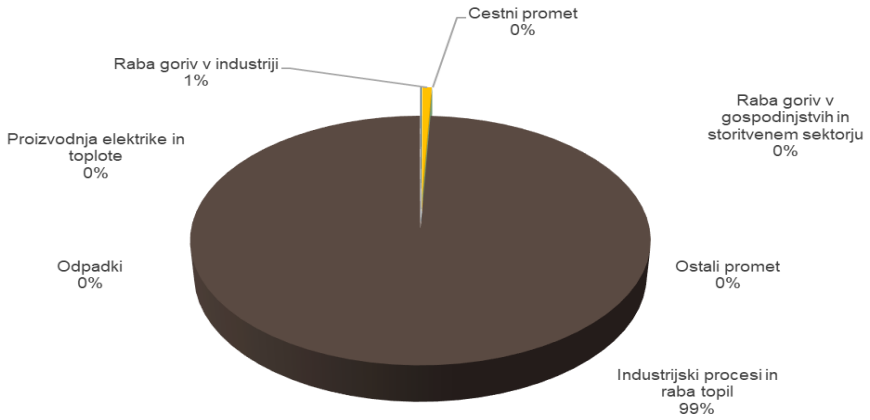

Figure 6: Contribution of individual sources to PCB releases in 2021

2.3.1.1.3 Emissions of dioxins and furans

National emissions of dioxins and furans to air have been gradually decreasing since 1990, when the total amount was 21.2 grams I-TEQ, falling to 14.3 grams I-TEQ in 2021, which is a 33% reduction (Figure 8). The reduction was mainly due to reduced fuel consumption, the introduction of district heating, the use of natural gas instead of solid and liquid fuels, and improvements in emission abatement technologies. In 2014, a significant reduction in emissions was recorded, mainly due to reduced combustion by households. This was due to an unusually warm winter and improved thermal insulation of buildings. Small combustion installations were the main source of emissions of dioxin and furan in 2021 (59%) (Figure 8).

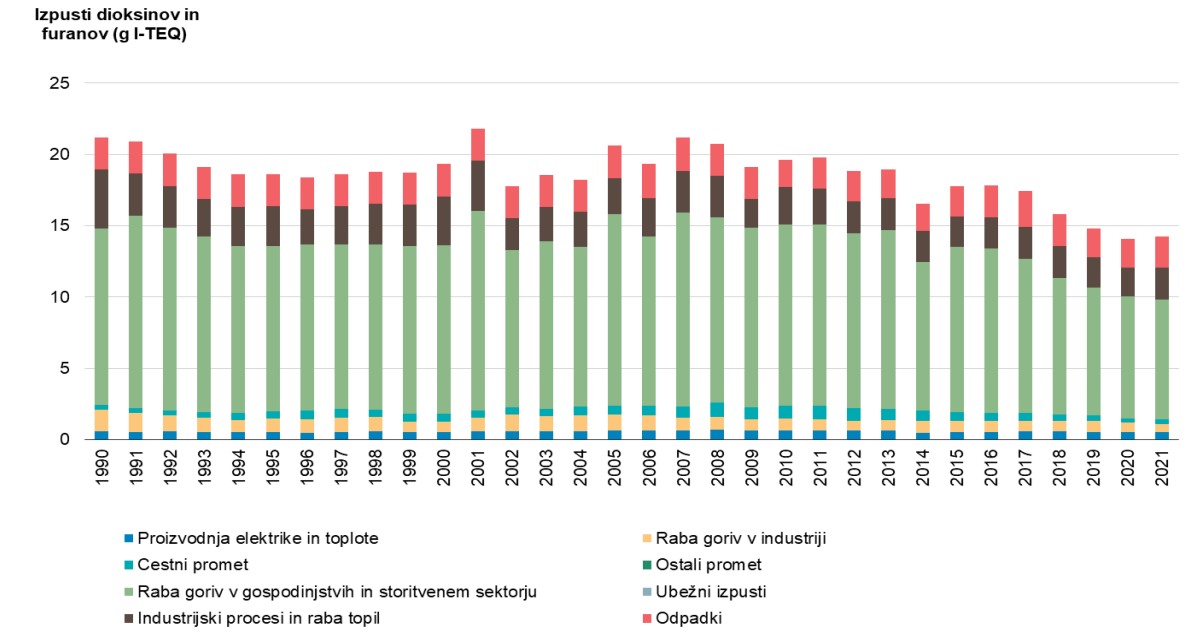

Figure 7: Releases of dioxins and furans to air in Slovenia in the period 1990–2021

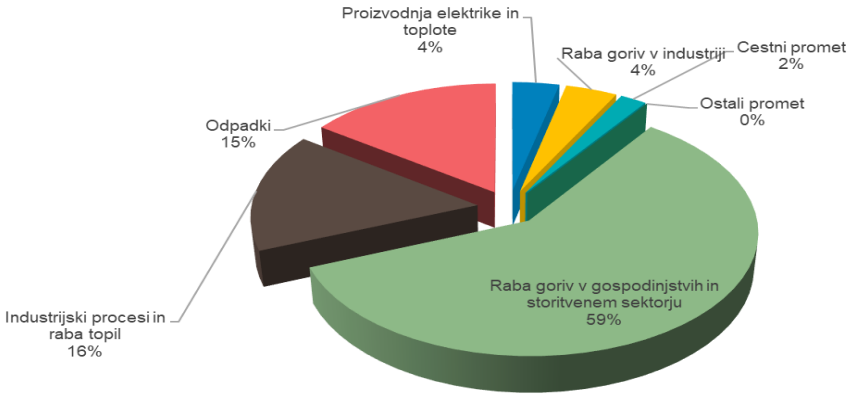

Figure 8: Contribution of individual sources to releases of dioxins/furans in 2021

2.3.1.1.4 PAH emissions

Polycyclic aromatic hydrocarbons (PAHs) are a group of compounds with two or more aromatic rings. The POPs Protocol specifies four PAH compounds that must be included in emission inventories: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene. The emissions of individual PAHs are shown in Table 21.

Table 21: Releases of individual polycyclic aromatic hydrocarbons (PAHs) in the period 1990–2021

Pollutant	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene
Unit	t	t	t	t
1990	3.08	2.72	1.72	0.83
1991	3.35	3.06	1.88	0.94
1992	3.08	2.63	1.72	0.80
1993	2.88	2.31	1.61	0.69
1994	2.68	2.01	1.50	0.59
1995	2.65	1.91	1.49	0.56
1996	2.63	1.81	1.48	0.53
1997	2.58	1.66	1.45	0.49
1998	2.58	1.61	1.44	0.47
1999	2.61	1.60	1.46	0.47
2000	2.61	1.54	1.46	0.46
2001	3.07	1.72	1.72	0.49
2002	2.48	1.50	1.38	0.45
2003	2.58	1.53	1.43	0.47
2004	2.47	1.48	1.37	0.46
2005	2.95	1.66	1.65	0.49
2006	2.60	1.53	1.44	0.48
2007	2.95	1.61	1.65	0.49
2008	2.84	1.54	1.59	0.46
2009	2.72	1.47	1.52	0.44
2010	2.75	1.50	1.53	0.46
2011	2.75	1.47	1.54	0.45
2012	2.65	1.41	1.48	0.43
2013	2.72	1.44	1.52	0.44
2014	2.27	1.28	1.26	0.41
2015	2.51	1.35	1.40	0.42
2016	2.51	1.33	1.41	0.40
2017	2.37	1.27	1.33	0.38
2018	2.10	1.18	1.18	0.37
2019	1.96	1.13	1.09	0.37
2020	1.81	1.07	1.00	0.37
2021	1.80	1.04	1.00	0.35

The sum of the emissions of benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene can be expressed as PAH emissions (total 1–4). The emission factors for individual PAHs are not always known, but the emission factor for total 1–4 is known. In such cases, the sum of the emissions of the individual compounds is therefore not equal to the total 1–4 emission.

National emissions of PAHs to air have fallen from 8.6 tonnes in 1990 to 4.5 tonnes in 2021, which is a 48% reduction (Figure 9); the reduction has been driven by the reduced use of coal in households and improvements in emission abatement technologies. The reduction in emissions in 2014 was driven by lower consumption of wood biomass in households. A warm winter and improved thermal insulation of

buildings contributed to lower fuel consumption. The most important source of PAHs in 2021 was household fuel use with an 80% share (Figure 10).

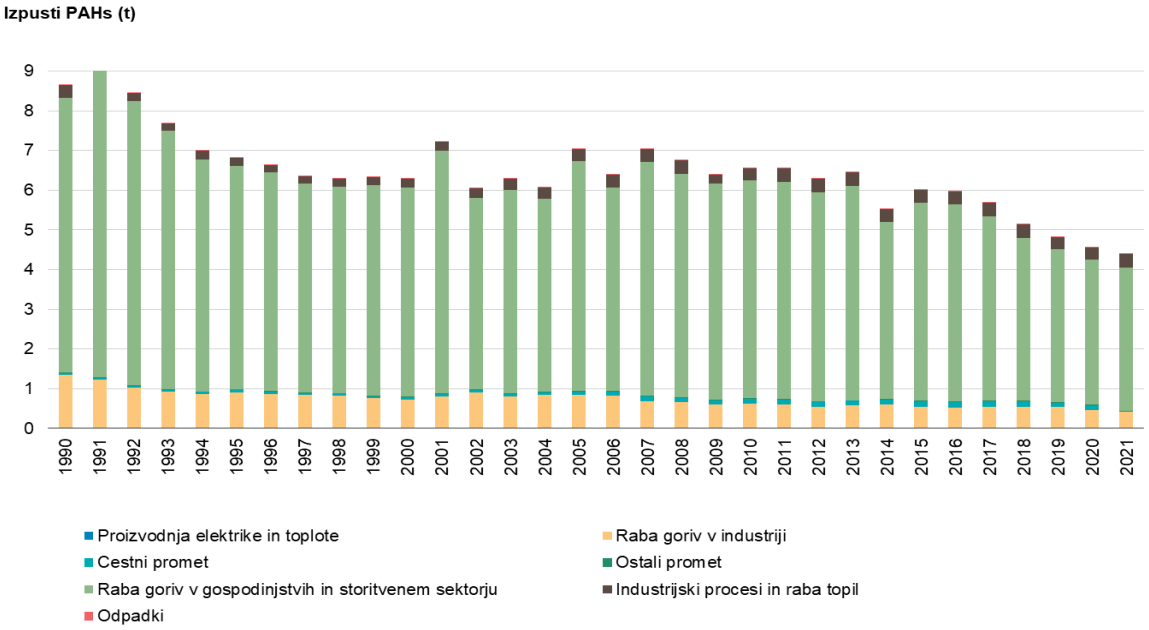

Figure 9: Releases of PAH to air in Slovenia in the period 1990–2021

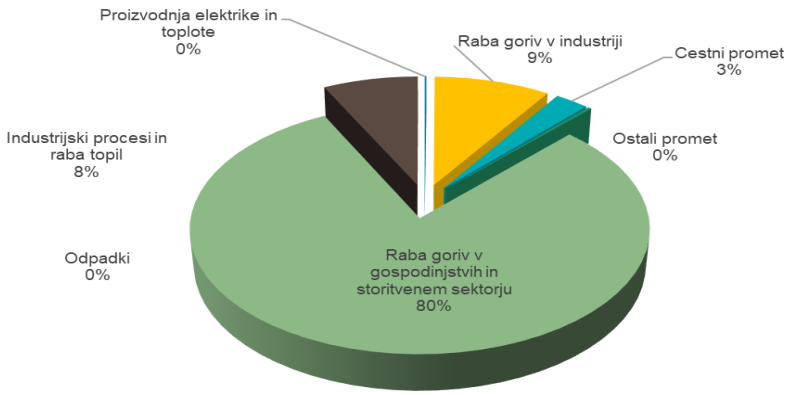

Figure 10: Contribution of individual sources to PAH releases in 2021

2.3.1.2 Releases to air, water and land

Data on releases of unintentionally produced chemicals are collected in the national pollutant release and transfer register (PRTR). The register is designed to monitor emissions from industrial installations. It contains data on the releases of pollutants to air, water and land that industrial facilities in the following sectors are obliged to report annually: energy sector, production and processing of metals, mineral industry, chemical industry, waste and wastewater management, paper and wood production and processing, intensive livestock production and aquaculture. The country reports data from the national

register to the European Pollutant Release and Transfer Register (E-PRTR). The E-PRTR was introduced by Regulation (EC) No 166/2006.

Unintentionally produced POPs registered in the E-PRTR:

- hexachlorobenzene (HCB),
- polychlorinated biphenyls (PCB),
- dioxins and furans (PCDD/PCDF),
- hexachlorobutadiene (HCBD),
- pentachlorobenzene (PeCB),
- polycyclic aromatic hydrocarbons (PAHs).

Operators of the facilities carrying out activities listed in Annex I to Regulation (EC) No 166/2006 are required to report releases to air, water and land of any pollutant specified in Annex II for which the applicable threshold value specified in Annex II is exceeded. Reporting is not required if the release values are below the threshold values (Table 22).

E-PRTR data are not suitable for determining trends as reporting data may vary from year to year depending on which facilities are reporting. The E-PRTR uses thresholds for reporting, which means that the number of facilities subject to reporting may vary from year to year. Table 23 shows the emissions reported to the E-PRTR for the period 2007–2017.

Table 22: Thresholds for releases of POPs specified in the E-PRTR

Pollutant	Thresholds for releases		
	to the air (kg/year)	to water (kg/year)	to land (kg/year)
hexachlorobenzene (HCB)	10	1	1
polychlorinated biphenyls (PCB)	0.1	0.1	0.1
dioxins/furans	0.0001	0.0001	0.0001
polycyclic aromatic hydrocarbons (PAH)	50	5	5
pentachlorobenzene (PeCB),	1	1	1
hexachlorobutadiene (HCBD)	-	1	1

Table 23: Releases of unintentionally produced POPs reported to the E-PRTR for the period 2007–2017

hexachlorobenzene (HCB)	Air	Water	Land	Release source
2007–2009	0	0	0	waste and wastewater management
2010	20.5 kg	0	0	
2011	21.9 kg	0	0	
2012–2017	0	0	0	
polychlorinated biphenyls (PCB)	Air	Water	Land	Release source
2007	0	4.60 kg	0	

2008	0	0.31 kg	0	waste and wastewater management
2009	0	0.11 kg	0	
2010–2017	0	0	0	
dioxins/furans	Air	Water	Land	Release source
2007	6.650 g I-TEQ	0	0	production and processing of metals
2008	0.528 g I-TEQ	0	0	
2009	0.300 g I-TEQ	0	0	
2010	0.434 g I-TEQ	0	0	
2011	0.398 g I-TEQ	0	0	
2012	0.150 g I-TEQ	0	0	
2013–2017	0	0	0	
polycyclic aromatic hydrocarbons (PAH)	Air	Water	Land	Release source
2007	0	54.8 kg	0	energy sector
2008	62.3 kg	0	0	waste and wastewater management
2009	76.0 kg	0	0	
2010–2017	0	0	0	
pentachlorobenzene (PeCB),	Air	Water	Land	Release source
2007–2017	0	0	0	
hexachlorobutadiene (HCBD)	Air	Water	Land	Release source
2007–2017	0	0	0	

2.3.1.2.1 HCB emissions

The E-PRTR shows that HCB emissions to air were reported for the period 2010–2011. Waste and wastewater management was reported as the source. Operators are required to report to the competent authority if annual HCB emissions exceed 10 kg to air and 1 kg to water.

2.3.1.2.2 PCB emissions

PCB emissions to water were reported to the E-PRTR for the period 2007–2009. The source of the emissions was the waste and wastewater management sector. Operators are required to report to the competent authority if annual PCB emissions to air, water or land exceed 0.1 kg.

2.3.1.2.3 Emissions of dioxins and furans

The main sources of dioxin and furan emissions were the production and processing of metals. The E-PRTR shows that emissions were reported for the period 2007–2012. Emissions from small combustion installations are not included in the E-PRTR, despite the fact that dioxins and furans are mainly released from domestic wood burning. Reporting to the competent authority is mandatory when the emission value of 0.0001 kg/year to air, water or land is exceeded.

2.3.1.2.4 PAH emissions

PAH emissions to air and water were reported to the E-PRTR for the period 2007–2009. The source of the emissions to air was the waste and wastewater management sector. The source of the emissions to water was the energy sector. Operators are required to report to the competent authority if annual PAH emissions exceed 50 kg to air and 5 kg to water or land.

2.3.1.2.5 Emissions of pentachlorobenzene

Pentachlorobenzene is not intentionally produced in Slovenia. In the past, it was present as an impurity in the pesticide quintozene. Today, its most important sources are the processes of incineration and combustion of various wastes and fuels, and the metalworking sector. Pentachlorobenzene is mainly released to air, with only minor amounts released to land.

No PeCB emissions were reported to the E-PRTR in the period 2007–2017, which means that they did not exceed the threshold value (1 kg/year) for each operator of the facility recorded in the E-PRTR. PeCB emissions are assumed to be due to the use of wood and coal in households, but this is not included in the activities in Annex I to Regulation (EC) No 166/2006.

2.3.1.2.6 Emissions of hexachlorobutadiene (HCBD)

Information on HCBD is not available. No -943246267 HCBD emissions to water or land were reported to the E-PRTR in the period 2007–2017, which means that they did not exceed the threshold value (1 kg/year).

2.3.1.2.7 Emissions of polychlorinated naphthalenes (PCN)

Similar to dioxins and furans, PCNs can be produced unintentionally in various thermal processes, such as waste incineration and domestic combustion, or in various metal processing processes.

Only naphthalene (total) is listed in the E-PRTR, so data on releases of individual PCN-compounds to air, water and land are not available. As can be seen from the E-PRTR, there have been no reported emissions of naphthalene to air, water or land in the period 2007–2017. Operators are required to report to the competent authority if annual emissions of naphthalene exceed 100 kg to air and 10 kg to water or land.

2.3.1.3 Releases to air, water, land, products and residues

A standardised tool for the identification and measurement of releases of dioxins, furans and other unintentional POPs developed by UNEP (Toolkit) was used to estimate emissions to air, water, land, products and residues for the specific chemicals listed in Annex C.

The tool provides a methodology for estimating emissions of:

- dioxins and furans (PCDD/PCDF),
- hexachlorobenzene (HCB),

- polychlorinated biphenyls (PCBs),
- pentachlorobenzene (PeCB).

The methodology of the latest version (revised in 2013) of the Toolkit and the corresponding emission factors were used to calculate emissions. The activity data used in the Toolkit were identical to data used for the estimates of emissions to air under CLRTAP. Estimates of releases to air, water, soil, products and residues were made for 2018. The estimates of releases of dioxins and furans, HCB, PCBs and PeCBs for 2018 are shown in Tables 24, 25, 26 and 27. The corresponding releases to air, water, land, products and residues are arranged by source group as prescribed in the corresponding Toolkit.

Table 24: Releases of dioxins and furans in 2018

Source		Annual releases of dioxins and furans (g TEQ)				
		Air	**Water**	**Land**	**Products**	**Residues**
1	waste incineration	0.01	0.00	0.00	0.00	0.29
2	production of steel and non-ferrous metals	0.16	0.00	0.00	0.00	0.47
3	electricity and heat production	3.00	0.00	0.00	0.00	0.72
4	mineral industry	0.06	0.00	0.00	0.00	0.12
5	transport	0.16	0.00	0.00	0.00	0.00
6	open burning	0.91	0.00	0.87	0.00	0.00
7	production of chemicals and consumer products	0.00	0.00	0.00	0.00	0.00
8	other	0.01	0.00	0.00	0.00	0.04
9	disposal	0.00	0.01	0.00	0.53	0.73
10	identification of potential hot spots				0.00	0.00
1–10	total	4.30	0.00	0.90	0.50	2.40
	total releases	8				

Table 25: HCB releases in 2018

Release source		Annual HCB releases (g)				
		Air	Water	Land	Products	residues
1	waste incineration	4.28	0.00	0.00	0.00	0.08
2	production of steel and non-ferrous metals	16.57	0.00	0.00	0.00	0.00
3	electricity and heat production	346.96	0.00	0.00	0.00	0.00
4	mineral industry	250.14	0.00	0.00	0.00	0.00
5	transport	150.10	0.00	0.00	0.00	0.00
6	open burning	0.00	0.00	0.00	0.00	0.00
7	production of chemicals and consumer products	0.00	0.00	0.00	0.00	0.00
8	other	0.00	0.00	0.00	0.00	0.00
9	disposal	0.00	0.00	0.00	0.00	0.00
10	identification of potential hot spots				0.00	0.00

1–10	total	768.07	0.00	0.00	0.00	0.08
	total releases	768				

Table 26: PCB releases in 2018

Release source		Annual PCB releases (g TEQ)				
		Air	Water	Land	Products	Residues
1	waste incineration	0.00	0.00	0.00	0.00	0.00
2	production of steel and non-ferrous metals	0.01	0.00	0.00	0.00	0.07
3	electricity and heat production	0.46	0.00	0.00	0.00	0.00
4	mineral industry	0.01	0.00	0.00	0.00	0.00
5	transport	0.00	0.00	0.00	0.00	0.00
6	open burning	0.00	0.00	0.00	0.00	0.00
7	production of chemicals and consumer products	0.00	0.00	0.00	0.00	0.00
8	other	0.00	0.00	0.00	0.00	0.00
9	disposal	0.00	0.00	0.00	0.00	0.00
10	identification of potential hot spots				0.00	0.00
1–10	total	0.48	0.00	0.00	0.00	0.07
	total releases	1				

Table 27: Releases of pentachlorobenzene in 2018

Release source		Annual PeCB releases (g)				
		Air	Water	Land	Products	Residues
1	waste incineration	0.02	0.00	0.00	0.00	0.00
2	production of steel and non-ferrous metals	21.71	0.00	0.00	0.00	0.00
3	electricity and heat production	8.78	0.00	0.00	0.00	0.00
4	mineral industry	1048.18	0.00	0.00	0.00	0.00
5	transport	0.00	0.00	0.00	0.00	0.00
6	open burning	0.00	0.00	0.00	0.00	0.00
7	production of chemicals and consumer products	0.00	0.00	0.00	0.00	0.00
8	other	0.00	0.00	0.00	0.00	0.00
9	disposal	0.00	0.00	0.00	0.00	0.00

10	identification of potential hot spots				0.00	0.00
1–10	total	1078.70	0.00	0.00	0.00	0.00
	total releases	1079				

Releases of unintentionally produced chemicals were estimated using three different approaches. Due to the use of different methodologies, emission factors and activity data, the estimates of annual emissions obtained under these approaches cannot be directly compared.

2.4 Information on the level of knowledge of stockpiles, contaminated sites and waste and remediation procedures

Slovenia does not yet have a management system for contaminated sites in place, i.e. a system of comprehensive treatment involving the identification of contaminated sites, preliminary investigations, detailed site-specific investigations and the implementation of measures to reduce the risks of contamination. The MOPE is responsible for the establishment of an inventory of potentially contaminated sites as a result of binding regulations on waste and the protection of water (in particular drinking water sources).

In 2020, the MOPE started to register potentially contaminated sites due to illegal dumping of waste or sites that have been contaminated in the past due to illegal waste management, which also includes contaminated sites with risks to soil and water that could be contaminated with POPs. The inventory is continuously updated and now includes around 750 potentially contaminated sites. A methodology has also been developed to prioritise areas for urgent remediation. The remediation of contaminated sites is the responsibility of the polluter and/or the land owner. Where the remediation cannot be imposed on the polluter or the land owner, the legal provision of subsidiary responsibility of the state is applied. Where the remediation is the subsidiary responsibility of the state, the costs of the remediation are covered by the state budget.

In previous reviews, areas have been identified where residues of plant protection products with POPs could be present, particularly in the area of Dravsko polje (documents: *Pesticidi v pitni vodi – Dravsko polje 1989* (Pesticides in drinking water – Dravsko polje 1989) and *Analiza trendov onesnaženosti podtalnice, kot virov pitne vode za mariborsko regijo in določitev statusa ogroženega okolja podtalnice*, *2002* (Analysis of trends in the contamination of groundwater as a source of drinking water for the Maribor region and determination of the status of the groundwater environment at risk).

The MKGP has not detected any PPP residues during its activities to date and in its overview of the situation. According to the waste management reports to date, no waste containing DDT or dicofol has been detected.

In accordance with EU-wide bans, PCBs and equipment containing PCBs are no longer manufactured in, imported to or exported from Slovenia. PCB waste can only be exported abroad for disposal purposes. Exports can only be made to EU Member States in accordance with the provisions of Regulation (EC) No 1013/2006 on shipments of waste and to specific legal entities licensed to dispose of PCB waste.

Within the former capacitor factory ISKRA in Semič, 30 tonnes of PCB waste remain permanently stored in a concrete watertight warehouse built in 1986. The company carries out leachate analyses in accordance with the PCB Rules.

For the purpose of the overview of the situation regarding the contamination of food with PCBs and the environmental burden of PCBs, two studies were carried out in 2011 and 2012, respectively, for the area of Semič in Bela Krajina ('The consequences of PCBs on the environment in Bela Krajina with an assessment of the risk to human health from the consumption of home-produced food (eggs, milk,

poultry) and fish from the Krupa River, in terms of PCB content' and 'The overview assessment of the situation regarding the environmental burden of PCBs in Bela Krajina, the associated risks to human health, and a proposal for recommendations and actions for the inhabitants of Bela Krajina and for other stakeholders related to the population's food'). The first study assessed that adverse impact on human health from the consumption of domestic milk, eggs and meat from chickens from the area under consideration cannot be excluded and that fish from the Krupa River and the Lahinja River, given the extremely high levels of toxic equivalents of dioxin-like PCB-isomers, are certainly harmful to health, and that the rivers are not suitable for fishing. The second study assessed that the consumption of food and agricultural products poses an acceptable risk to the health of children and adults, taking into account the foreseeable and usual consumption of these foods, but there are many uncertainties associated with the assessment due to insufficient data. It is advised that diets should follow the principles of healthy eating, using a variety of food choices on a daily basis and including meat in moderate amounts. Only the consumption of fish from the Krupa River and the Lahinja River downstream of Graz can be reasonably discouraged. The study also showed that the PCB levels detected in the sediment of the Krupa River and the Lahinja River, and partly also the Kolpa River, taking into account the reduction of the burden so far, indicate the possibility of a significant reduction of the burden over several decades.

Data from the annual reports on waste generation, collection and treatment (recovery and disposal) are available on the ARSO website.

2.4.1 Inventory of sites potentially contaminated with hexachlorocyclohexane (HCH) in EU Member States

In 2020, the European Parliament funded a project on HCH in the European Union [27] with the aim of identifying lindane-contaminated sites in EU Member States and proposing measures for their remediation.

Under the project, two potential lindane-contaminated sites were identified in Slovenia: the first in the area of the former Pinus Rače factory (now Albaugh) and the Kozoderc gravel pit (now part of a farm) on the outskirts of Rače, where, according to former employees, hazardous waste from the factory was dumped. The waste is said to be untreated waste from the production of plant protection products, which could cause negative impacts, in particular on groundwater. Remediation of the past contamination has not yet been carried out and the MOPE is compiling studies in this area.

2.5 POPs monitoring programme, impacts on the environment and human health

The presence of POPs in the environment is an important part of monitoring for the presence of POPs, as POPs are transported long distances in nature (waterborne, airborne) and persist and accumulate in ecosystems.
Monitoring of immissions and emissions to water and air, as well as soil monitoring, are carried out in Slovenia.

2.5.1 Monitoring of immissions to water

Monitoring programmes are in place to provide a coherent and comprehensive overview of the status of water in each water area. The monitoring programmes implemented by ARSO include the monitoring of:

- the chemical and ecological status of surface waters,
- the chemical status of groundwater,
- the status of water in areas with special requirements.

The chemical status of **surface waters** is determined on the basis of the results of analyses of 45 priority substances and priority hazardous substances in water and organisms (also referred to as "biota") that

pose a significant risk to the aquatic environment. The limit values for the priority substances are set at the EU level. Depending on the results of the analyses of these substances, the chemical status may be good or poor.
To monitor long-term trends, the priority substances in sediment are also monitored but are not the basis for assessing the chemical status.Monitoring in sediment takes place in a fraction smaller than 63 µm. Monitoring is carried out at least every three years and samples are analysed for priority substances that tend to accumulate in sediment and are defined by legislation.

Another group of pollutants in surface waters, 'specific pollutants', for which limit values are not set at the European level but at the national level, are evaluated in the assessment of the ecological status of surface waters. On the basis of specific pollutants, the ecological status of surface waters is classified into three quality classes – high, good and moderate.

The chemical status of **groundwater** is classified into two quality classes – good or poor. The following is taken into account in determining the chemical status:

- the exceedance of the quality standards and threshold values;
- the assessment of the effects of saltwater intrusion or other intrusions into the groundwater body;
- the assessment of the concentrations of pollutants that have been transported from the aquifer via groundwater to surface water and are likely to cause a significant and characteristic deterioration in the ecological and chemical status of the surface water;
- significant and characteristic damage to aquatic and terrestrial ecosystems directly dependent on groundwater;
- groundwater quality in protected areas of drinking water pumping stations where concentrations of pollutants in groundwater may lead to deterioration of the quality of drinking water.

2.5.2 Monitoring of immissions to air

As part of the national network, ARSO measures ambient air quality at various monitoring sites across Slovenia. Measurements of sulphur dioxide, nitric oxides, carbon monoxide, ozone, organic compounds and PM10 and PM2.5 are carried out. Measurements of benzo(a)pyrene, classified as a PAH, are carried out as part of the monitoring of immissions to air. At three monitoring sites, the results are close to the limit value.

2.5.3 Soil quality monitoring

ARSO monitors the levels of pollutants in soil by implementing a soil quality monitoring programme within a network of sampling sites. Soil quality is determined for all areas, which are divided according to land use into:

- agricultural land;
- children's playground;
- residential area and
- industrial site or brownfield site.

The Decree on limit values, alert thresholds and critical levels of dangerous substances in the soil sets limit values, alert thresholds and critical immission levels for individual hazardous substances in soil, which apply irrespective of the soil composition or land use.

2.5.4 Operational monitoring in the water sector

The operational monitoring of wastewater is carried out:

- for municipal and community treatment plants, including small municipal treatment plants with a capacity equal to or greater than 50 and less than 2,000, and
- for installations discharging industrial wastewater.

The purpose of the initial measurements and the operational monitoring of wastewater is to determine the performance of the wastewater treatment plants and the pollutant levels.

The operational monitoring of groundwater and surface water is carried out at landfills and at certain installations where one or more activities giving rise to industrial emissions (IED installations) are carried out.

Operational water monitoring is the responsibility of the polluter and can only be carried out by a person registered in one of the relevant registers kept by the MOPE, namely:

- the register of providers of wastewater operational monitoring,
- the register of providers of groundwater operational monitoring or
- the register of providers of surface water operational monitoring.

All these reports should be submitted to ARSO.

2.5.5 Operational monitoring of emissions to air

Operational monitoring of air is provided by the operators of installations where the following activities are carried out:

- energy and mineral extraction;
- non-metallic mineral extraction, the production of glass, ceramics and building materials;
- production of steel, iron and other metals;
- manufacture of chemical products, plant protection products and refining of mineral oil;
- surface treatment using organic substances, the production of plastic films, and resin and plastic processing;
- wood and pulp production;
- production of food, beer, tobacco and feed, and agricultural products;
- waste processing and disposal;
- storage of chemical compounds and preparations.

Authorised providers of the operational monitoring of emissions of substances to air must estimate the annual emissions of substances to air on the basis of the initial, periodic or continuous measurements of emissions of substances to air and submit it to ARSO.
The initial measurements and the operational monitoring may only be carried out by a person registered in the register of providers of operational monitoring kept by the MOPE.

Measurements of benzo(a)pyrene, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCCDD/PCDF) and hexachlorobutadiene (CAS No 87–68–3) are carried out as part of the monitoring of emissions to air. The latter parameter is measured in the context of the sum of the organic substances of hazard class I listed in Annex 7 of the Decree on the emission of substances into the atmosphere from stationary sources of pollution, so we have information on the sum of all parameters and not on a single substance from the list.

Table 28 shows the inclusion of individual POPs in the monitoring programmes in Slovenia. ARSO and the MKGP carry out various monitoring activities within their respective competences and maintain information systems for this purpose.

Table 28: Monitoring programmes in Slovenia for individual POPs

POPs	Air		Water					Soil	Food			Waste
	emissions	immissions	surface	surface sediment	surface biota	groundwater	waste water	surface	of plant origin	of animal origin	drinking water	
aldrin			x					x	x	x		x
DDT			x					x	x	x		x
dieldrin			x					x	x	x		x
dicofol			x	x				x	x			
endrin			x					x	x	x		

endosulfan			x						x	x		
HBCDD			x	x	x							
hexachlorobenzene			x	x	x				x	x		x
hexachlorobutadiene			x	x	x							
hexachlorocyclohexane			x	x					x	x		
heptachlor			x	x					x	x		x
chlordane									x	x		x
BDE			x	x	x							
pentachlorobenzene			x	x			x					
pentachlorophenol			x									
PFOA			x			x					x	
PFOS			x	x	x	x					x	
dioxins/furans	x	x	x	x	x		x		x	x		
PCB	x	x	x	x		x	x	x	x	x		x
PAH			x	x	x			x	x	x	x	x

2.5.6 Drinking water quality monitoring

Drinking water quality is regulated by the Rules on drinking water, which specify the chemical and microbiological parameters and their limit values against which the compliance and wholesomeness of drinking water are checked, following water treatment processes that ensure that water is appropriately treated before it enters the water supply system. Polycyclic aromatic hydrocarbons are included in the monitoring parameters, but only when there is a reasonable suspicion of possible contamination of water sources. In 2021, perfluorinated compounds (PFOA and PFOS) were included in the national monitoring programme for drinking water in 72 supply areas. They are only exceptionally included in the internal monitoring programme and in only a few of the supply areas.

2.6 Occurrence of POPs in the environment

2.6.1 Surface water

On the basis of the results of analyses [15], the chemical status of water is assessed as good or poor, as is the case for the assessment of the chemical status of organisms. The ecological status of surface waters is assessed on the basis of specific pollutants and classified into three quality classes: high, good and moderate.

2.6.1.1 Watercourses

In the period 2018–2021, the status of watercourses with regard to POPs in water was assessed as good at all monitoring sites. The ecological status of the Krupa River was assessed as moderate in 2018 due to PCBs, and in the period 2019–2021, this water body was assessed as good, with PCB levels not exceeding the limit value.

2.6.1.2 Lakes

In the period 2018–2021, the water status of lakes and detention ponds with regard to POPs in water was assessed as good at all monitoring sites.

2.6.1.3 Sea

Analyses of POPs in water carried out in 2018 and 2021 showed good chemical status of the sea at all monitoring sites.

2.6.1.4 Analyses of aquatic organisms

Environmental quality standards for organisms (EQS for organisms) have been set for substances that accumulate in aquatic organisms (fish). The Decree amending the Decree on surface water status defines EQS for organisms for 11 substances.

In Slovenia, residues of brominated diphenyl ethers (BDEs) in organisms are the most problematic. Analyses of BDE levels measured in fish in the period 2018–2021 showed exceedances of the EQS at all watercourse monitoring sites. Concentrations measured in Slovenian watercourses in recent years range from 0.023 µg/kg in the Soča River, the lower Trenta Valley, in 2017 to 4.29 µg/kg in the Sava River above the Krško Nuclear Power Plant in 2018. In general, lower levels of BDEs are measured in less polluted areas, where there is no industry or major agglomerations, and higher concentrations or levels are measured below major agglomerations. In Europe, data indicate that exceedances of the environmental standard have been measured in fish in all countries where analyses of BDEs in organisms have been performed so far, indicating that it is a ubiquitous pollutant.

The levels of BDEs in fish in lakes and detention ponds have also exceeded the EQS. However, no exceedances of the EQS were found for dicofol, hexachlorobenzene, hexachlorobutadiene, hexabromocyclododecane, PFOS and dioxins and dioxin-like compounds.

The levels of BDEs in the sea were analysed in fish in 2018 and 2021. The measured levels exceeded the regulatory environmental standard for BDEs, while the levels for dicofol, hexachlorobenzene, hexachlorobutadiene, hexabromocyclododecane and PFOS in fish did not exceed the standard.

In 2021, the exceedance of the EQS for dioxins and dioxin-like compounds was found at the Krupa Klošter monitoring site, where exceedances had already been found in 2016 and 2018. The exceedances of the EQS for dioxins and dioxin-like compounds in the Krupa River are due to high levels of dioxin-like PCBs. The levels of dibenzodioxins and polychlorinated dibenzofurans were almost all below the limit of quantification.

2.6.1.5. Wastewater

In the period 2018–2020, the following POPs were measured in the context of operational monitoring of wastewater at only four industrial installations: polychlorinated biphenyls (PCBs), dioxins and furans (PCDDs/PCDFs) and pentachlorobenzene. The measured values of the parameters did not exceed the prescribed limit values, with the exception of the parameter polychlorinated biphenyls (PCBs) in 2019 and the parameter dioxins and furans (PCDDs/PCDFs) in 2018, which were the cause of excessive environmental pollution. POPs are not monitored in the context of operational monitoring of wastewater for municipal treatment plants.

2.6.1.6 Sediment

No limit values or environmental quality standards have been set at either the national or European level for priority substances and priority hazardous substances identified in sediment. The monitoring of the levels of hazardous substances in sediment is necessary to identify long-term trends.

Monitoring in sediments is carried out every three years for certain POPs, namely brominated diphenylethers, hexachlorocyclohexane, pentachlorobenzene, hexachlorobenzene, hexachlorobutadiene, dicofol, perfluorooctanoic acid and its derivatives, dioxins and dioxin-like compounds, hexabromocyclododecanes (HBCDDs), heptachlor and PAHs.

Analyses of POPs in surface water sediments have been carried out since 2016. At present, the number of measurements in sediments in Slovenia is too low to allow an identification of trends with adequate reliability.

2.6.2 Groundwater

There are no set limit values for POPs in groundwater. PFOA and PFOS are included in the investigative monitoring programme.
The results of the investigative monitoring of groundwater in the period 2018–2021 showed that PFOS was detected mainly in water bodies with intergranular porosity, in 31.6% of the samples.

PFOA was detected in 17.8% of the samples, with PFOA levels being lower than PFOS levels, according to the monitoring data. With the exception of four samples, PFOA was detected in the samples where PFOS was also detected.

Most of the monitoring sites where PFOS was detected in the samples were in urban or industrial areas, where PFOS in groundwater was expected.

There is no quality standard for the evaluation of PFOS in groundwater.

2.6.3 Soil

Between 2016 and 2019, soil sampling was carried out on certain agricultural land fertilised with digestate, including for contaminants such as PCBs, heavy metals and PAHs. No PCBs were detected on any of the agricultural land investigated. In 2018, PAHs were detected in one case, but below the permissible concentration limit.

In the context of soil quality monitoring, at the Jesenice sample site (M00053), PCB levels in 2020 were well above the critical immission value (8.2 mg/kg dw). PAHs were also detected at that sampling point, their levels exceeding the immission limit value (4.949 mg/kg DM).

2.6.4 Drinking water

The purpose of the monitoring of drinking water [25] is to verify that drinking water complies with the requirements to be met by drinking water at the point of use in order to protect human health from adverse effects of any contamination of drinking water. PAHs, benzo(a)pyrene and mercury are included in the periodic tests under the drinking water monitoring programme. Since 2013, their presence has not been detected or the levels were low and at the limit of detection of the method used. In the period 2017–2021, these compounds were omitted from the testing programme or included only on the basis of a risk assessment. As part of internal controls, some operators check the parameters listed above, but the limit values were not exceeded in the samples. The presence of perfluorinated compounds (PFOA and PFOS) included in the national drinking water monitoring programme in 2021 was low, below the proposed limit value for total PFOS of 0.1 µg/l or below the limit of detection of the method used.

2.6.5 Residues

The Inspectorate of the Republic of Slovenia for Agriculture, Forestry, Hunting and Fisheries carries out annual monitoring of residues of PPP and contaminants in soil in water protection areas as part of its regular work. Annual reports are available on its website. As part of its regular annual monitoring in water protection areas, the Inspectorate carries out soil sampling for PPP residues, nitrates and heavy metals in water protection areas and for contaminants in soil fertilised with digestate.

The UVHVVR monitors PPP residues and POPs in food and agricultural products as part of its regular work. Annual reports are available on its website. The monitoring programme for PPP residues and

contaminants in food and feed also includes standard operating procedures. In 2012, the MKGP compiled a study for the review and assessment of the environmental burden of PCBs in Bela Krajina and the assessment of the risks to human health and the environment, which was presented to the general public.

2.6.6 Human biomonitoring

Human biomonitoring (HBM) is the measurement and monitoring of changes – resulting from exposure to a chemical substance – in tissues, fluids, cells or biochemical processes in humans.

The main purpose of the HBM programme is to obtain data on the exposure of the population of Slovenia to selected chemicals and to assess the health risks. Its aim is to use this data to support internal policies on chemicals, the environment and health.

Human biomonitoring became more prominent in Slovenia after 2000, mainly through individual studies on specific population groups and participation in the international ESBIO, DEMOCHOPHES and CHOPES projects. The URSK has a key role in ensuring the continuity of work in the field of human biomonitoring, having defined chemical biomonitoring in the Chemicals Act in 2003, thus enabling the implementation of the national biomonitoring programme. Both the joint European efforts and the actual needs in Slovenia were the impetus for the implementation of the first national HBM programme in Slovenia, the pilot period of which was from 2007 to 2009, and between 2011 and 2014 monitoring of chemicals and their residues in humans was carried out, covering subjects from eight of the twelve statistical regions. This programme was aligned with the working methods defined at the EU level within the framework of the above-mentioned projects, and the data obtained in this programme are therefore comparable to those of other countries participating in the above-mentioned European projects. Under this programme, the basic financial, organisational and professional methodological foundations have been laid for the implementation of the national HBM programme.

Between 2011 and 2014 [24], the URSK carried out biomonitoring of chemicals to determine the exposure of the Slovenian population to chemicals by identifying sources and trends by geographic area and defining baseline (reference) values. The monitoring programme included selected chemicals that contribute significantly to the contamination of the environment and organisms (including human) with hazardous substances as pollutants in particular habitats in Slovenia, including persistent organic pollutants (POPs): dioxins, furans (PCDDs and PCDFs), dioxin-like PCBs, PBDEs (polybrominated diphenyl ethers) and organochlorine pesticides. The experimental part was completed in 2015 and the data obtained were submitted to the National Institute of Public Health for consideration and statistical analysis.

In 2014, Slovenia joined an EU initiative to establish a common European platform on HBM. A joint proposal from 26 countries was accepted in an open call for proposals by the European Commission. In the period from 2017 to mid-2022, by participating in the project, named HBM4EU, we contributed to the creation of new knowledge needed to inform about safe handling of chemicals and to further protect the health of Europe's population and environment. As part of HBM4EU, we actively coordinated and promoted HBM in Europe to provide sound evidence on the actual exposure of the population to chemicals and the potential impacts on their health (https://www.hbm4eu.eu/).

The second national HBM programme, running from 2018 until the end of 2023, is aligned with the content of this European project. Under the new, more comprehensive programme, the presence of 33 chemicals and chemical groups, as well as biochemical indicators of exposure, health effects and susceptibility to the development of these effects are monitored in the body fluids and tissues of the subjects. The criteria for including individual chemicals in human biomonitoring are their harmfulness to health, their distribution in the environment and the likelihood of long-term exposure of the population to these chemicals. When conducting HBM, information on the lifestyle habits of the subjects and their

past exposure to chemicals in the environment (e.g. hobbies, personal habits, dietary habits, occupation) should be obtained, as this information is useful in identifying sources and routes of exposure. The use of HBM data as elements for risk assessment and decision-making in managing health risks of chemicals will also be progressively incorporated into European legislation on health and environmental protection, safety at work and sustainable development as a basis for these efforts.

On organic pollutants, data have been obtained for the following groups of substances:

- organochlorine pesticides (aldrin, dieldrin, endrin, hexachlorocyclohexane (HCH), DDT and derivatives of DDD and DDE, endosulfan, hexachlorobenzene (HCB), heptachlor/heptachlor epoxide, chlordane),
- tetra- to octa-chlorinated dioxins and furans and dioxin-like PCBs,
- polybrominated diphenyl ethers (PBDE).

Analyses were carried out on breast milk, serum and blood plasma samples.

The presence of p,p'-DDE was detected in the breast milk samples of the female subjects, but the measured levels for the whole population did not exceed the reference value for the sum of DDT (6 mg/kg milk fat) typical of unpolluted environments. β-HCH was present in a small proportion of the samples, but in none of these samples did the sum of HCH exceed the reference value (0.08 mg/kg milk fat) for unpolluted environments. Traces of HCB were present in breast milk samples in the whole population observed, and in one tenth of the samples the measured HCB levels exceeded the reference value (0.010 mg/kg milk fat) for unpolluted environments. Dieldrin was detected in only two samples.

Similar results were obtained from analyses of serum samples. In a small proportion of samples, the measured levels of p,p'-DDE exceeded the reference value (0.7 µg/kg) for unpolluted environments, but otherwise the results indicate a uniform burden in the whole population. The measured levels of gamma-HCH were on average at the limit of quantification (0.20 µg/kg) in the whole population observed. Only in three serum samples in the area of Bela Krajina were the measured levels significantly higher than the prevailing level (<0.20 µg/kg). The highest measured level was 1.00 µg/kg.
HCB was only detected in a few individual serum samples and did not exceed the reference values (0.3 µg/kg) for unpolluted environments.

Traces of PCB were present in breast milk samples in the whole population observed. The measured levels in the samples examined did not exceed the reference value (1.43 mg/kg milk fat) for unpolluted environments for the sum of PCBs. With regard to PCB levels detected in breast milk samples, the area of Bela Krajina stood out, where the highest value of the sum of PCBs was found to be 0.513 mg/kg milk fat. The highest PCB level in serum was also measured in Bela Krajina, but did not exceed the reference values for unpolluted environments (3.3 µg/kg – PCB 153, 2.4 µg/kg – PCB 180, 2.2 – PCB 138).

The measured PBDE levels in the composite samples of breast milk of the female subjects did not exceed the reference values for unpolluted environments for the individual compound as well as for the sum of PBDEs (3210 pg/g). The same applies to the measured PBDE levels in the composite samples of blood plasma of the subjects, with the highest levels measured in the composite samples from the Zasavje region.

Table 29: Human exposure to organic pollutants in Slovenia in the period 2007–2014

	Breast milk		Serum	
	Reference value	Value determined	Reference value	Value determined
p,p'-DDE	6 mg/kg milk fat	<ref. value	0.7 µg/kg	<ref. value
β-HCH	0.08 mg/kg milk fat (sum of HCH)	<ref. value	/	

γ-HCH	/		0.20 µg/kg (limit of quantification)	3 samples > 0.20 µg/kg
HCB	0.01 mg/kg milk fat	10% of samples > ref. value	0.3 µg/kg	<ref. value
dieldrin	/	present in two samples	/	
PCB	1.43 mg/kg milk fat	<ref. value	3.3 µg/kg – PCB 153 2.4 µg/kg – PCB 180 2.2 µg/kg – PCB 138	<ref. value
PBDE	3210 pg/g (sum of PCBs)	<ref. value	/	

The second phase of human biomonitoring, carried out between 2018 and 2023, was aimed at identifying the levels of contaminants in the biological material of children and adolescents living in potentially more polluted areas. This involved identifying the burden of certain pollutants on individuals: metals and semi-metals, phthalates, DINCH, flame retardants, bisphenols, pesticides (organophosphorus, glyphosphate) and PFAS.

The analyses of polycyclic aromatic hydrocarbons (PAHs) were part of the study entitled Exposure of children and adolescents to selected chemicals through their habitat environment (10/2016-9/2019) under the "CRP 2016" targeted research programme.

The study included children (6–9 years) and adolescents (12–15 years) from the Prekmurje region. In addition to pyrene metabolites, urinary metabolite concentrations of some other low molecular weight PAHs, namely phenanthrene, naphthalene and fluorene, were also determined.

The study showed that the urinary PAH metabolites in the study population did not show any significant deviation from the values in comparable studies or from the available reference values or guideline values set in the EU. The presence of PAH metabolites in urine suggested an association with exposure to passive smoking. The main findings of the study are summarised in the table below.

Table 30: Exposure of children and adolescents to PAHs

	1-OH pyrene	2-OH naphthalene	Hydroxy-phenanthrenes	Fluorenes
Population reference value	0.5 pg/L	20 µg/L	1.5 µg/L	/
Whole population	<ref. value	7.5% of results > ref. value	<ref. value	
6–9 years 12–15 years	Higher values in the younger group	Differences are not statistically significant		Higher values in the younger group
Girls Boys		Differences are not statistically significant	Differences are not statistically significant	Differences are not statistically significant

2.7 Chemical poisoning

The electronic version of the Slovenian Register of Intoxications, which is maintained by the Centre for Clinical Toxicology and Pharmacology at the University Medical Centre Ljubljana, records 10,210 poisonings or exposures to poisons from 2013 to 2019 (4,430 poisoning reports and 5,780 calls to the Centre's 24-hour toxicology service). No data are available on whether there has been a case of poisoning by a product containing POPs.

2.8 Overview of the situation regarding access to information, provision of information, awareness-raising, participation and training

Awareness-raising and information sharing are the responsibility of different ministries according to their competences and tasks and have not undergone any significant changes. All ministries have a public relations service which regularly publishes all relevant information related to POPs in their respective areas of work. Basic information on POPs is published on the government, URSK and ARSO websites. The focal points for the implementation of the Stockholm Convention and the POPs Protocol are the URSK and the Ministry of Environment, Climate and Energy of the Republic of Slovenia. The European Commission, DG Environment and the European Chemicals Agency (ECHA) are important in the development and implementation of EU legislation on POPs.

Capacities in the area of information exchange on POPs in Slovenia are mainly related to the implementation of legislation on monitoring of emissions to different environmental compartments and to human biomonitoring. With regard to specific awareness-raising on POPs in Slovenia, these institutions have not issued specific educational, information and awareness-raising publications or other materials on POPs substances, but information on POPs is included in the regular training programme for chemical advisors. The current situation shows that the current system in the field of POPs is working satisfactorily in terms of the scale of the issue and the broader regulation of the field.

The first NIP POPs foresaw the establishment of a central information centre for POPs and the collection of POPs data as one of its actions. Since in the period up to 2019 there was no need demonstrated and no staff capacity for this, this information centre was not established. Nevertheless, the URSK and ARSO regularly update relevant information on POPs on their websites.

2.9 Relevant activities of non-governmental stakeholders

NGOs in Slovenia and their activities in the field of POPs are listed in Table 31.

Table 31: NGOs active in the field of POPs in Slovenia

NGO	Activities
Alpe Adria Green	– civil supervision at contaminated sites – involvement in the process of obtaining environmental consent and environmental permits (storage, treatment and incineration/co-incineration of waste) – waste management – illegal waste dumps – legislation (submission of comments and proposals) – public information, awareness-raising and education
Ecologists Without Borders Association	– plastics
Proteus Association – the Bela Krajina environmental movement	– PCB (lectures on the issue)
Eco Circle	– waste incineration and co-incineration plants – education – environmental legislation
Rače Ecological Initiative	– research on lindane landfills in Slovenia

Association of Ecological Movements of Slovenia (ZEG)	– chemical safety

2.10 Implementation of the first NIP POPs

In the period up to 2016, most of the priority areas of the first NIP were implemented within the available funding and, in particular, the staffing constraints of the ministries responsible for health, environment and agriculture.

The first NIP POPs, based on a situation analysis, identified 13 priority areas (action plans) with envisaged actions, which were not supported by clearly defined targets and indicators. The Report on the implementation of the National Implementation Plan for the Management of Persistent Organic Pollutants in the period 2009−2013 therefore contains the identified priority areas, with a presentation of the current situation and progress. The priority areas are:

1. strengthening the institutional and legislative capacity in the field of PPP;
2. production, transport, use, stockpiles and waste of PPP with POPs properties;
3. production, import, export, use, identification, labelling, disposal, storage and removal of PCBs and the equipment containing PCBs;
4. production, transport, use, stockpiles and waste of DDT;
5. generation and inventories of unintentionally produced PCDD/PCDF, HCB and PCBs;
6. identification of stockpiles, products in use and waste of DDT, HCB (Annexes A, B, C of the Stockholm Convention);
7. identification of contaminated sites and appropriate action;
8. data exchange strategy;
9. public awareness-raising, information and training;
10. monitoring;
11. monitoring and studying the effects of POPs on human health in Slovenia;
12. reporting;
13. strategy for research and development.

Summary of the main findings of the implementation period of the first NIP for 12 POPs substances (pesticides: aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene, chlordane, mirex, toxaphene, DDT), two industrial chemicals (hexachlorobenzene and polychlorinated biphenyls) and unintentionally produced substances (polychlorinated biphenyls, polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) and hexachlorobenzene) [9] by 2016:

- POPs are not produced or placed on the market in the EU; the use of POPs is also banned;
- there have been no POPs stockpiles and no POPs waste since 2013;
- potential historical sites where POPs contamination has been or could be detected have been identified;
- PCB-containing waste must be systematically monitored by ARSO, stored safely and disposed of appropriately;
- unintentionally produced POPs (PCBs, dioxins/furans, HCB) are generated in the following sectors: household, transport, electricity and heat generation, industry, agriculture, waste; their emissions are decreasing markedly;
- the generation and atmospheric emissions of unintentionally produced POPs are monitored and recorded on a systematic basis;
- POPs are included in the set of parameters for which regular and exceptional environmental monitoring is carried out;

– POPs are included in the set of substances monitored in the national human biomonitoring programme; data on population exposure throughout the territory of the Republic of Slovenia are also obtained;
– systematic monitoring of POPs in the environment will need to be continued in the areas of Semič and Dravsko polje to monitor the decline in immission levels in water, fauna and flora and soil.

3. IMPLEMENTATION PLAN

3.1 Revision of the National Implementation Plan for POPs

By signing and ratifying the Stockholm Convention, the Republic of Slovenia committed itself to banning the production, use, import and export of POPs, to reducing emissions of unintentionally produced POPs, to using alternative chemicals and techniques and best environmental practices, and to planning the management of POPs stockpiles and waste. The measures are based on the precautionary principle. On the basis of Article 7 of the Convention, Slovenia has also committed itself to drawing up and implementing a national implementation plan for the management of POPs and carrying out its revisions on a regular basis.

As part of this first update of the NIP, data were collected on the past intentional and unintentional production, placing on the market, use, import and export of POPs which were not included in the first NIP and were added by the Conference of the Parties to the Annexes of the Convention from 2009 to 2019. The data on the contamination of the environment with POPs are the starting point for planning further activities to protect the environment and the health of the citizens of the Republic of Slovenia.

3.2 General objectives of the NIP POPs for the period 2023–2028

The main objective of the NIP is to protect human health and the environment from POPs. To this end, Slovenia has a duty to develop a plan to meet its obligations under the Stockholm Convention and to work towards its implementation. The long-term objectives and the tasks of the first NIP that have not been implemented are also included in the first update of the NIP for the period 2023–2028.

Based on the situation in 2021 and 2022, the priorities of the Republic of Slovenia for the protection of human health and the environment from POPs are as follows:

1. Relevant stakeholders are responsible for reducing the risks related to the historical use of POPs.
2. Newer POPs (such as polybrominated direnyl ethers, PFOS) are included in environmental monitoring, as appropriate, due to the historical use of products and articles to which they have been added as a component or as a contaminant.
3. The safe disposal, storage and environmentally sound disposal of PCBs and PCB-containing equipment is continued.
4. Monitoring of the risks to human and animal health from the historical use of POPs is continued.
5. It is necessary to carry out the environmentally sound remediation of identified POPs-contaminated sites (e.g. the site of the former Pinus factory in Rače and the Kozoderc gravel pit, the PCB special waste storage site in ISKRI Semič).
6. Scientific research on the impacts of POPs on human health and the environment.
7. Informing the public of new findings on POPs, raising awareness of decision-makers and the public and educating them on POPs.

3.3 Planned measures

The implementation of the measures planned in the action plans has been ongoing since 2009, when the first NIP was adopted. With this document, the measures from the first NIP that have not been implemented are continued in parallel with the ongoing measures for the new POPs, for which an overview of the situation is provided in the document. The measures under the first NIP whose implementation has not yet been completed are discussed in Sections 3.3.1, 3.3.2 and 3.3.3.

3.3.1 Short- and medium-term measures

Short- and medium-term measures whose implementation has not yet been completed:

1. To provide an overview of the existing situation and further regular monitoring of the levels of POPs (monitoring of POPs in humans and organisms), with a focus on PCBs and dioxins in breast milk and blood and in the fatty tissues of organisms.
2. To provide an overview of the existing situation and further regular monitoring of PCB and dioxin levels in tissues of the population.
3. To monitor PCB and dioxin levels in body tissues and breast milk of the population living in the area of former contamination in Semič.
4. To join international movements to assess the transboundary transport of POPs and identify the Slovenian contribution to long-range pollution.
5. Activities related to new compounds with POPs properties:
    a. To investigate new substances with POPs properties – basic scientific research on chemical and physical properties and on health effects on living beings.
    b. To draw up a list of new compounds with POPs properties for inclusion in the SC list and a list of suitable substitutes for the new compounds.
    c. To carry out a review of the socio-economic implications of the listing of new compounds on the list of the Convention and the introduction of their substitutes.
    d. To define Slovenia's position in the process of inclusion of new substances in the SC list.
    e. To update the training programme for sellers and end-users of new substances included in the SC list.
6. To review the proposals for new compounds to be included in the SC list.
7. To draw up a list of suitable substitutes for the new compounds on the SC list.
8. To initiate research on the properties and impacts of possible new POPs for the SC list.
9. To define positions in the process of inclusion of new substances in the SC list.
10. To exchange information for the update of the POPs website.
11. To take into account the proposed reporting and notification system in the context of the comprehensive regulation of control of emissions of unintentionally produced POPs: PCCD/PCDF, PCB, HCB and PAH, which is ongoing during the preparation of the NIP report.

3.3.2 Long-term measures

Long-term measures whose implementation has not yet been completed:

1. research on the relationship between exposure to POPs and health of different populations and age groups;

2. research on the impact of maternal exposure to POPs before and during pregnancy on the healthy development of the foetus and the child;

3. toxicological research – the use of new scientific information and methods (genomics, proteomics) to understand the mechanisms of toxicity of POPs;

4. development of appropriate indicators of exposure to individual POPs in the environment and use of these indicators to monitor the effectiveness of measures to protect human health from POPs in the environment.

3.3.3. Combined planned objectives

Combined objectives – from the first NIP and from this document – are listed in Table 32 and cover the period from 2023 to 2028. The authorities responsible are listed by their responsibilities.

Table 32: Combined objectives of the first NIP with its update, including the responsible authorities for the period 2023–2028

Priority areas	Combined objectives	Authority responsible
1. Strengthening the institutional and legislative capacity	ratification of the Stockholm Convention with updates to the annexes from 2009 onwards	URSK, Ministry of Foreign Affairs
	preparation and coordination of POPs legislation	URSK, MOPE
	– drafting a regulation on air emissions from crematoria and incinerators for animal carcasses* – setting the minimum fuel quality requirements for small and medium combustion plants* – increasing control of the prohibition of private burning of waste in households and open burning of waste* – preparing an operational programme for hazardous waste management* – updating the operational programme for the management of PCB and PCT* – updating the operational programme for waste oil management* – increasing control of and increasing penalties for discharges into the sea and inadequately equipped ships* – establishing personal liability of the marina manager for breaches of environmental requirements and issuing a licence* – increasing control of waste incineration operators, chemical production*, metal production, power plants and cement production plants**	MOPE
	– identification or precise location of old PPP containing POPs*	MOPE

2. Stockpiles and waste of plant protection products (PPPs) containing POPs	– organising more frequent collection of hazardous waste at the local level	MOPE, local community
	– carrying out the remediation of illegal waste dumps and other unregulated landfills for PPP waste containing POPs*	MOPE, local community
	– preparation of site-specific assessments of environmental contamination by PPP containing POPs and site-specific remediation plans*	MOPE
3. Production, import, export, use, identification, labelling, disposal, storage and removal of PCBs and equipment containing PCBs	– keeping inventories	MOPE, ARSO
	– making an inventory of and carrying out remediation of diffuse sources of PCBs under the operational programmes of the MOPE	MOPE, ARSO
4. Reducing emissions of unintentionally produced POPs	– making an inventory of emissions and control of unintentionally produced POPs such as PCDD/PCDF, HCB and PCBs	MOPE, ARSO
	– establishing control to identify and make an inventory of new sources and releases of POPs into the environment	MOPE
	Identifying sources of releases: – in incineration plants; – in cement production plants when hazardous waste is co-incinerated; – in thermal processes in the metallurgical industry; – in pulp production, during the technological processes of chlorine bleaching of pulp; – analysing sewage sludge and assessing POPs emissions from sewage sludge;* – determining POPs emissions from household combustion units;* – determining POPs emissions from open burning of waste;* – determining annual POPs emissions from natural and other disasters;* – preparation of questionnaires for the inventory of unintentionally produced POPs;* – conducting a survey on unintentionally produced POPs.*	MOPE, ARSO, URSK
	Reducing emissions of unintentionally produced POPs: – preparing incentives to improve internal monitoring of POPs; – improving internal monitoring of POPs pollutants in the production of pulp and paper; – improving internal monitoring of POPs pollutants in the metallurgical industry; – improving internal monitoring of POPs pollutants in the chemical industry; – improving internal monitoring of POPs pollutants in waste incineration and co-incineration;	MOPE/ARSO

	– improving internal monitoring of POPs pollutants in the area of biofuel combustion*.	
	Improving knowledge and information on emissions, dispersion sources and exposure and possible pathways of unintentionally produced POPs: – a survey on unintentionally released POPs from thermal processes in large and small installations; – identifying other sources of POPs and necessary measures.*	MOPE
	Introducing changes and strategies in technological processes to reduce POPs emissions in all environmental compartments, waste and products.*	MOPE, Ministry of the Economy, Tourism and Sport
5. Identification of stockpiles, products in use and waste of relevant POPs – Plan for the evaluation and prevention of releases from stockpiles and waste	– establishing or updating as appropriate a database on the state of the environment with regard to contamination with PPP containing old and new POPs	MOPE, ARSO
	– reviewing, where necessary, the contamination of watercourses and landfills of municipal and hazardous waste	MOPE
	– designing a standard procedure for action, including specifying responsibilities and the method of financing	MOPE
6. Identifying contaminated sites and taking appropriate action	– regular monitoring of PPP containing POPs in environmental compartments and food*	MOPE, ARSO, UVHVVR
	– long-term environmental monitoring in the area of the Semič municipality with measurements of PCBs and dioxins/furans*	MZ, MOPE
	– a comprehensive overview of POPs-contaminated sites and a preliminary assessment of risk to human health and the environment*	MZ, MOPE, MKGP
	– inclusion of guidance on how to deal with the presence of residues of PPP containing POPs in standard operating procedures*	MKGP, MOPE
	– remediation of POPs landfills, such as the proposal for remediation put forward by the contractor of the project entitled: Inventory of sites potentially contaminated with lindane (HCH) in EU Member States	MOPE, ARSO, local community
7. Public awareness-raising, information and education	– preparation of leaflets, brochures – updating POPs websites – designing training courses – exchange of information	URSK, MOPE, UVHVVR
8. Monitoring	– updating monitoring with new POPs which are included in the update of the NIP POPs	MOPE, ARSO

	– establishing and continuing biomonitoring of POPs in humans and organisms	URSK, MZ
	– establishing biomonitoring of POPs in marinas*	MOPE
	– conducting regular monitoring of POPs in all environmental compartments, waste and food*	MOPE, ARSO, MZ, UVHVVR
	– identifying air contamination as a possible source of indirect pollution by statistical processing and expert analysis of the collected data, as well as their display and publication on the website*	MOPE/ARSO
	– additional air monitoring during military exercises*	MORS, MOPE
9. Monitoring and studying the effects of POPs on human health in Slovenia	– obtaining data on contamination with POPs for the population	MZ, URSK
	– monitoring the population's health	NIJZ
	– assessment of the impacts on the health of employees in companies where equipment containing PCBs is still in use or in storage	MZ/URSK
	– monitoring the dynamics of the contamination (evaluating the success of protection of the population) and providing information to the public (recommendations); setting the values for the concentrations of D/F in toxic equivalents per gram of fat for the Slovenian population; setting the values for the daily dietary intake of D/F in Slovenia	MZ/URSK
10. Reporting	– in accordance with the Stockholm Convention, the POPs Regulation and the POPs Protocol	URSK, MOPE, ARSO
11. Research and development	– facilitating scientific research on the effects of POPs on human, animal or environmental health	URSK, MOPE, MKGP
	– participation in international activities in the field of research on the effects of POPs on human health	MZ, URSK,
	– participation in international research on the protection of the environment from POPs	MOPE, MKGP
	– an overview of the existing situation and further regular monitoring of the levels of POPs (monitoring of POPs in humans and organisms), with a focus on PCBs and dioxins in breast milk and blood and in the fatty tissues of organisms*	URSK, MZ
	– an overview of the existing situation and further regular monitoring of PCB and dioxin levels in tissues of the population*	URSK, MZ
	– monitoring PCB and dioxin levels in body tissues and breast milk of the population living in the area of former contamination in Semič*	URSK, MZ

	– research activities related to new compounds with POPs properties*	MOPE, MKGP, MZ/URSK
	– drawing up a list of alternatives to POPs*	URSK, MOPE, MKGP

*Tasks from the first NIP

Priority area 4 (DDT production, transport, use, stockpiles and waste) and priority area 8 (data exchange strategy) from the first NIP are no longer included in this document. The objectives of priority area 4 have been achieved, but the objectives of priority area 8 have been omitted as it has been decided not to establish a central POPs information system or a specific web portal for POPs. The URSK, the MOPE and ARSO regularly publish all information on POPs on their websites.

3.4 Priorities and proposals for capacity development

According to the available data, POPs do not pose a significant direct risk to human health and the environment in Slovenia. The priority areas for POPs management in Slovenia are in line with the priorities of the Stockholm Convention and the EU POPs Regulation.

Slovenia does not have comprehensive information on the health of the population with regard to contamination with POPs. In order to implement this task, specified in the NIP, appropriate surveys should be carried out to show potential contamination with POPs, with a focus on vulnerable inhabitants and those living in formerly heavily contaminated areas, such as the area of Semič, which was formerly contaminated with PCBs. There is also a need to keep inventories of already identified and new POPs, to establish comprehensive monitoring where it does not yet exist, to make an inventory (determining the location and performing an analysis) of the situation regarding contamination and to develop a programme for remediation of illegal POPs dumps. Due to the new tasks, it is necessary to increase the capacity of the administrative authorities responsible for this area (MZ – URSK, MOPE in MKGP) and the capacity of the administrative and professional bodies working in the fields of education and information dissemination.

The objectives should be pursued in accordance with the plans and capacities of each ministry (MZ, MOPE, MKGP) or administrative body concerned.

3.5. Financing

Adequate financial support must be provided for the objectives set out in this NIP to ensure the effective reduction of the risks of POPs to human health and the environment.

The measures foreseen to achieve the objectives set out in the first NIP POPs have been financed from the regular budgets of the competent ministries, in particular the MZ – URSK and the MOPE, which are responsible for the legislation in the field of POPs.

The tasks that have not been implemented and the measures foreseen in this document will be financed in a similar way to that under the first NIP: within the regular budgets of the authorities responsible for the measures, unless additional funding from the European Union becomes available. Many of the planned measures entail legally binding tasks for each authority, as laid down in the POPs Regulation.

The combined objectives in Table 32 are an outline of the tasks required set out in the first NIP and this update, which will be evaluated each year in terms of their possible scope of implementation, depending on the staffing and financial capacities of each responsible authority. Table 33 of this NIP shows an estimate of the funds to be provided by the relevant ministries in their financial plans in 2023 and 2024 to achieve the objectives set.

Table 33: Estimated financial resources for the period of implementation of the NIP in 2023 and 2024

Authority responsible	Estimated financial resources in euros	Budget item code number
Ministry of Health of the Republic of Slovenia, Chemicals Office of the Republic of Slovenia	561,406.00	6348
Ministry of the Environment, Climate and Energy of the Republic of Slovenia	10,000.00	231329
Administration of the Republic of Slovenia for Food Safety, Veterinary Sector and Plant Protection	60,000.00	130047
Ministry of Defence of the Republic of Slovenia	100,000.00	5802
TOTAL	**731,406.00**	

Before the end of the 2024 budget period, and thereafter following the adoption of subsequent budgets, the Office, as the NIP administrator, will carry out a review of the current year's implementation in cooperation with all stakeholders involved and, on the basis of the proposals made by the authorities responsible for the measures, will prepare a time-bound, substantive, financially viable and sustainable annual implementation plan for the following financial year.

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