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**SECOND NATIONAL  
IMPLEMENTATION PLAN FOR  
THE STOCKHOLM CONVENTION  
ON PERSISTENT ORGANIC POLLUTANTS  
IN THE REPUBLIC OF CROATIA**



**Zagreb, November 2016**

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# **SECOND NATIONAL IMPLEMENTATION PLAN FOR THE STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS IN THE REPUBLIC OF CROATIA**

## **1. INTRODUCTION**

The Stockholm Convention on Persistent Organic Pollutants (hereinafter: the Stockholm Convention) was adopted in May 2001 within the framework of UNEP with the aim of reducing or preventing emission of these pollutants into the environment.

Through the Act on Ratification of the Stockholm Convention on Persistent Organic Pollutants (OG-IT No. 11/06) the Republic of Croatia became a Party to the Stockholm Convention on 30 April 2007 (OG-IT No. 2/07). The Republic of Croatia developed the National Implementation Plan (hereinafter: NIP) in accordance with obligations under Article 7 of the Stockholm Convention. NIP was adopted by the Croatian Government through the Decision on the adoption of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (OG No. 145/08). As a Party to the Stockholm Convention the Republic of Croatia delivered NIP to the Stockholm Convention Secretariat in April 2009.

The Stockholm Convention originally covered 12 persistent organic pollutants (hereinafter: POPs), however through adoption of the Decisions on Amendments to Annexes A, B and C of the Stockholm Convention in 2009, 2011 and 2013 at the fourth, fifth and sixth Conference of the Parties, the Stockholm Convention was supplemented with 11 new POPs. The Amendments to Annexes A, B and C entered into force in August 2010 for 9 POPs (alfa and beta hexachlorocyclohexane, chlordecone, hexabromobiphenyl, lindane, pentachlorobenzene, perfluorooctanesulfonic acid and its salts and perfluorooctane sulphonile fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether). Additional Amendments to Annex A, along with inclusion of technical endosulfan, entered into force in October 2012 in line with Article 22, paragraph 3(c) of the Stockholm Convention. Amendments to Annex A of 2013, along with inclusion of hexachlorocyclohexane, for majority of the Parties entered into force in November 2014. In accordance with the indicated adopted Decisions Parties to the Stockholm Convention are required to develop a new revised NIP that includes all the aforementioned amendments.

The indicated Decisions are contained in the Regulation on the publication of Annex G of 6 May 2005, Amendments to Annexes A, B and C of May 2009, Amendment to Annex A of April 2011 and Amendments to Annex A of May 2013 of the Stockholm Convention on persistent organic pollutants (OG-IT No. 8/15).

The Republic of Croatia developed the Proposal of the first NIP with the financial assistance from GEF with the support of UNIDO as the implementing agency, and is grateful that the NIP revision process and the development of the Proposal of second NIP is once again made possible by financial assistance from GEF, but this time with the assistance of UNEP as the implementing agency.

## LIST OF ABBREVIATIONS:

ALA	– Agricultural Land Agency
BaP	– Benzo(a)pyrene
BAT	– Best Available Technique
BEP	– Best Environmental Practice
BREF	– Best Available Techniques Reference Document
BTEX	– Benzene, toluene, ethylbenzene, xylene
CAEN	– Croatian Agency for Environment and Nature
CBS	– Croatian Bureau of Statistics
CCE	– Croatian Chamber of Economy
CCTC	– Croatian Chamber of Trades and Crafts
CEA	– Croatian Employers' Association
CEI	– Central European Initiative
CEIP	– Centre for Emissions and Projections
CIOSI	– Croatian Institute for Occupational Safety Improvement
CITA	– Croatian Institute for Toxicology and Antidoping
COP	– Conference of Parties
CRT	– Cathode ray tube
DDD, DDE	– Metabolites of DDT
DDT	– Dichloro-diphenyl-trichloroethane
DEHP	– Diethylhexyl Phthalate
ECHA	– European Chemical Agency
EDI	– Estimated Daily Intake
EEA	– European Environment Agency
EEE	– Electrical and electronic equipment
EFFIS	– European Forest Fire Information System
EMEP	– European Monitoring and Evaluation Programme
EPR	– Environmental Pollution Register
EPS	– Expanded polystyrene
GDP	– Gross domestic product
GEF	– Global Environment Facility
HBB	– Hexabromobiphenyl

HBCDD	– Hexabromocyclododecane
HCB	– Hexachlorbenzene
HCH	– Hexachlorocyclohexane
HIPS	– High-impact polystyrene
IPCC	– Intergovernmental Panel on Climate Change
LSU	– Local Self-government Units
MA	– Ministry of Agriculture
MDRC	– Ministry of Defence of the Republic of Croatia
MENP	– Ministry of Environmental and Nature Protection
MH	– Ministry of Health
MLPS	– Ministry of Labour and Pension System
MRL	– Maximum residue level
PAH	– Polycyclic aromatic hydrocarbons
PBDE	– Polybrominated diphenyl ether
PBT	– Persistent, bioaccumulative and toxic properties
PCB	– Polychlorinated biphenyls
PCDD	– Polychlorinated dibenzo-p-dioxin
PCDF	– Polychlorinated dibenzofuran
PCT	– Polychlorinated terphenyls
PeCB	– Pentachlorobenzene
PFOS	– Perfluorooctane sulfonic acid
PFOSF	– Perfluorooctane sulfonyl fluoride
PIC	– Prior Informed Consent
POPRC	– Persistent Organic Pollutants Reviewing Committee
PPP	– Plant protection products
PUR	– Polyurethane foam
RIDSP/RRMA	– Register of installations in which dangerous substances are present/ Register of reported major accidents
SCCP	– Short-chain chlorinated paraffin
TDI	– Tolerable daily intake
TEQ	– Toxic equivalent
UNECE	– United Nations Economic Commission for Europe

UNEP	– United Nations Environment Programme
UNIDO	– United Nations Industrial Development Organization
UNITAR	– United Nations Institute for Training and research
vPvB	– Very persistent and very bioaccumulative
WEEE	– Waste electrical and electronic equipment
WHO	– World Health Organisation
XPS	– Extruded polystyrene



## 1.1 GOALS AND REQUIREMENTS OF THE STOCKHOLM CONVENTION

POPs are organic compounds resistant to photolytic, chemical or biological decomposition. They are characterised by low solubility in water and high solubility in fat as a result of which they accumulate in tissues of living organisms. Although these compounds are found in the environment in small concentrations, they can travel long distances by air and water and are thus widely spread.

In accordance with the aforementioned amendments to the Stockholm Convention, the list of compounds currently encompassed by the Stockholm Convention, divided into groups according to the mechanism of their origin and level of restriction, is presented in table 1.1-1.

*Table 1.1-1: POPs listed in annexes to the Stockholm Convention*

Annex	Compound	Pesticides	Industrial chemical	Unintentional production
<b>Annex A: Elimination</b>	Aldrin	x		
	Chlordane	x		
	Dieldrin	x		
	Endrin	x		
	Heptachlor	x		
	Hexachlorobenzene	x	x	
	Mirex	x		
	Polychlorinated biphenyls		x	
	Toxaphene	x		
	Chlordecone*	x		
	Hexabromobiphenyl*		x	
	Hexabromodiphenyl ether and heptabromodiphenyl ether*		x	
	Alfa hexachlorocyclohexane*	x		
	Beta hexachlorocyclohexane*	x		
	Lindane*	x		
	Pentachlorobenzene*	x	x	
	Tetrabromodiphenyl ether and pentabromodiphenyl ether*		x	
Technical endosulfan and its isomers**	x			
Heksabromocyclododecane***			x	
<b>Annex B: Restriction</b>	Dichlorodiphenyltrichloroethane	x		
	Perfluorooctanesulfonic acid, its salts and perfluorooctane sulphonile fluoride*		x	
<b>Annex C: Unintentional production</b>	Polychlorinated dibenzo-p-dioxin			x
	Polychlorinated dibenzofurans			x
	Hexachlorobenzene			x
	Polychlorinated biphenyls			x
	Pentachlorobenzene*			x

\* Added in 2009

\*\* Added in 2011

\*\*\* Added in 2013

At the Seventh Conference of the Parties to the Stockholm Convention (COP – 7, Geneva, May 2015), the Decisions of the inclusion of three additional chemicals/POPs was adopted ((C.N.681.2015.TREATIES-XXVII.15; entry into force for the majority of the Parties on 15December 2016):

- Polychlorinated naphthalenes (PCNs) in Annexes A and C of the Stockholm Convention, SC-7/14
- Hexachlorobutadiene (HCBd) in Annexes A and C of the Stockholm Convention, SC-7/12

- Pentachlorophenol, its salts and esters (PCP) in Annex A of the Stockholm Convention with the exceptions specified for the production and use, SC-7/13.

In addition, POPRC is currently evaluating proposals for listing the following chemicals in the Stockholm Convention:

- Decabromodiphenyl ether (commercial mixture, c-decaBDE)
- Dicofol
- Short-chain chlorinated paraffins (SCCP)
- Perfluorooctani acid (PFOA) and its compounds.

The main objective of the Stockholm Convention is to ban/eliminate/restrict the production, use, export and import of POPs, i.e. compounds/chemicals listed in Annexes A, B and C to the Stockholm Convention, at the global level. This would result in significant reduction or complete elimination of POPs release into the environment.

The Stockholm Convention also prescribes measures for their disposal in environmentally sound manner. Annex D prescribes conditions and criteria for inclusion of new chemicals in the Stockholm Convention Annex list.

The Parties to the Stockholm Convention shall:

- prohibit the production, use, import and export of POPs contained in Annex A, as well as restrict the production and use of POPs from Annex B. However, the Stockholm Convention allows numerous exemptions and acceptable purposes. The Party is required to report the need for exemptions to the Stockholm Convention Secretariat which maintains the Register of specific exemptions and acceptable purposes.
- in addition to the mentioned restrictions, implementation of measures for reduction of releases/occurrence (and where possible complete elimination) of emissions from anthropogenic sources included in Annex C are required.
- develop strategies for identification of stockpiles, products and articles in use, as well as identify the stockpiles that consist of or contain POPs listed in Annex A or B, as well as products and articles in use and wastes consisting of, containing or contaminated with POPs listed in Annex A, B or C; manage stockpiles in a safe, efficient and environmentally sound manner.
- take appropriate measures so that PCB waste is handled, transported and stored in an environmentally sound manner, including products and articles upon becoming wastes,
- prevent recycling or recovery of POPs from waste.
- develop strategies for identification of contaminated sites and their remediation.

## 1.2 NIP REVISION PROCESS MECHANISM AND INVOLVEMENT OF ALL STAKEHOLDERS

The Stockholm Convention Parties are required, among other, to develop a new revised NIP that includes all the aforementioned amendments, i.e. information on new POPs, make their inventories which include previous production, use and stockpiles, taken/planned measures, monitoring thereof, adverse effects on health and the environment.

Due to the multidisciplinary approach to POPs management/regulation, the Government of the Republic of Croatia charged the Ministry responsible for environmental protection to, in cooperation with other state administration bodies responsible for the implementation of the Stockholm Convention, submit a biennial report on the implementation of the first NIP. Also, the same ministry is responsible for the delivery of NIP to the Stockholm Convention Secretariat. Implementation of the legal framework regulating the field of management/handling of POPs falls under the competence of several state administration bodies: the ministries responsible for agriculture, water management, forestry, health, labour, entrepreneurship and environmental protection.

Given the above and the Draft Guidance for Developing a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants, 2012, UNEP, UNITAR, UNIDO, the existing mechanism applied during the process of development of the first NIP was used, i.e. the same stakeholders were involved with additional involvement of a greater number of stakeholders in the process of developing the Second NIP.

Following the above mentioned, in July 2014 a Committee for monitoring the implementation of the NIP revision process was formed. The Committee includes representatives of business and non-governmental organizations dealing with environmental protection, along with the representatives of the authorities responsible for monitoring the implementation of NIP and the management of POPs at the national level.

## 2. GENERAL INFORMATION ON THE STATE

### 2.1 STATE PROFILE

#### 2.1.1 *Geography and Population*

The Republic of Croatia is an Adriatic and Central European country. The mainland surface covers 56,594 km<sup>2</sup> and the surface area of the territorial sea is 31,067 km<sup>2</sup>. Numerous internationally significant routes pass through the Republic of Croatia. The importance of its geographical position is increased by the Adriatic Sea as a part of the Mediterranean Sea, which penetrates the deepest and furthest to the north of the central part of the European continent. The most important traffic routes run along the river Sava valley and the Adriatic, as well as river Drava valley and there are several transversal routes extending from Austrian and Hungarian borders to the Adriatic (Rijeka and Split).

The territory of the Republic of Croatia is divided into three major natural and geographic regions:

- **Pannonian and Peri-panonian area** covers the lowlands and rolling hills of the eastern and north-western Croatia. Most of the area is used for agriculture and livestock production. Slavonia and Baranja in the east are the most suitable for cereal growing, moist lowlands and mountain regions are rich in woods, while the north-western part, which distinctly gravitates towards Zagreb, is the most industrially developed part.
- **Mountain region**, which mainly separates the Pannonian Croatia from its coastal area, is a less developed region. Its future development is based on the important traffic routes,

further development of wood industry, still insufficiently exploited possibilities for the production of healthy food and development of winter and rural tourism.

- **Adriatic region** covers the narrow coastal zone, separated from the hinterland by high mountains. This is (mostly) a karst region with exceedingly dry summers. Few water streams run through narrow gorges towards the sea. Croatian coastline is divided into northern (Istria and Kvarner) and southern (Dalmatia) regions, with a distinctive longitudinal division to island zone, coastline zone and hinterland. Croatian Adriatic coast is one of the most indented coasts in Europe; it has 1,185 islands, cliffs and reefs. The largest island is Krk (410 km<sup>2</sup>) and prominent for their size are also the islands of Cres (404 km<sup>2</sup>), Brač (395 km<sup>2</sup>), Hvar (300 km<sup>2</sup>), Pag (285 km<sup>2</sup>) and Korčula (276 km<sup>2</sup>). The largest peninsulas are Istria and Pelješac, and the largest bay is the maritime zone of Kvarner.

According to the last population census from 2011, the Republic of Croatia has 4,284,889 inhabitants. Zagreb is the largest city and the capital of the Republic of Croatia, with approximately 790,000 inhabitants. More than 400,000 inhabitants live in three cities, Split, Rijeka and Osijek (Source: CBS).

### *2.1.2 Socio-political structure*

Croatia became an independent state in 1991. According to the Constitution of the Republic of Croatia (OG No. 56/90, 135/97, 8/98, 113/00, 124/00, 28/01, 41/01, 55/01, 76/10, 85/10 and 5/14), the Republic of Croatia is a unitary and indivisible, democratic welfare state.

It became a member state of the United Nations on 22 May 1992.

On 1 July 2013, the Republic of Croatia became a full member of the European Union with all the rights and obligations arising from this membership, and certain powers have been transferred to the European Union institutions in line with the provisions of the Treaty on the European Union and Treaty on the Functioning of the European Union, as well as the provision of the Constitution of the Republic of Croatia under Chapter VIII.

In the Republic of Croatia, the state authority is organised on the principle of the division of power into legislative (Croatian Parliament), executive (the Government and the President) and judicial branches. The principle of division of powers includes mutual cooperation and reciprocal control of authority carrier prescribed by the Constitution and laws. In the Republic of Croatia, laws have to comply with the Constitution, and other regulations have to comply with the Constitution and laws. Everyone must abide by the Constitution and law and respect the legal order of the Republic of Croatia.

The Croatian Parliament is the representative body of the people and is vested with legislative power in the Republic of Croatia. The Parliament performs the function of control over the executive power, decides on the adoption of and amendments to the Constitution, adopts laws, adopts the state budget, and supervise the work of the Government of the Republic of Croatia and other holders of public offices reporting to the Croatian Parliament, etc. The Croatian Parliament has a President and one or more Vice-Presidents.

The President of the Republic of Croatia represents and acts on behalf of the Republic of Croatia at home and abroad. The President of the Republic ensures regular and balanced functioning and stability of government. The President is responsible for the defence of the independence and territorial integrity of the Republic of Croatia. The President is elected on the basis of universal and equal suffrage in direct elections by secret ballot for a term of five years. No one can be elected President of the Republic more than two times.

The Government of the Republic of Croatia exercises executive power in compliance with the Constitution and law, and its organisation, operation and decision making is regulated by the Act on the Government of the Republic of Croatia and its rules of procedures. The Government of the Republic of Croatia proposes laws and other acts to the Croatian Parliament, proposes the state budget and annual accounts, executes laws and other decisions of the Croatian Parliament, adopts regulations for the implementation of laws, conducts foreign and domestic politics, directs and controls the work of state administration, works on the economic development of the country, directs the activities and development of public services, carries out other tasks determined by the Constitution and law. The Government is accountable to the Croatian Parliament. The Government consists of the Prime Minister, Deputy Prime Ministers and Ministers.

Judicial power is exercised by the courts. Judicial power is autonomous and independent. Courts administer justice according to the Constitution and law. The Supreme Court of the Republic of Croatia, as the highest court of law, ensures uniform application of laws and equality of all before the law. The Constitutional Court of the Republic of Croatia consists of thirteen judges, elected by the Croatian Parliament for a term of eight years.

Local self-government units in the Republic of Croatia are towns and municipalities that administer affairs of local significance, that were not assigned to state bodies. Units of regional self-government, which administer affairs of regional significance, are Counties (21 of them).

### 2.1.3 Economic indicators

According to CBS data from June 2015 the Gross Domestic Product (GDP), the annual calculation for the period from 2005 to 2013 is presented in Table 2.1-1.

*Table 2.1-1: Gross domestic product, annual calculation, 2005-2013*

	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Gross domestic product per capita, EUR</b>	8,468	9,322	10,187	11,166	10,471	10,479	10,446	10,297	10,228
<b>Average annual exchange rate HRK/EUR</b>	7.400047	7.322849	7.336019	7.223178	7.339554	7.286230	7.434204	7.517340	7.573548

### 2.1.3.1 Characteristics of Economic Sectors

#### *Agriculture, Fishery, Forestry and Food Industry*

Croatia is divided into three geographic and climate zones: the lowland zone in the north of the country, which has a continental climate, the Mediterranean coastal zone in the south, and the mountainous zone stretching across the central part of the country. Various types of climate, landforms and soils are favourable for the production of a wide range of agricultural products, from field and industrial crops to vineyards, continental and Mediterranean fruits and vegetables. Livestock breeding has always been important in these parts, while fishing and fish processing have traditionally been the most important activities along the coastal part of the Republic of Croatia and on the islands.

Table 2.1-2 below shows the utilized agricultural area by categories.

*Table 2.1-2 Utilised agricultural area by categories in ha for the period from 2010 to 2014*

	Utilised agricultural area	Arable land and gardens	Kitchen gardens	Permanent grassland (meadows and pastures)	Orchards	Vineyards	Olive groves	Nurseries	Osier willows and Christmas trees
2010	1,333,835	899,594	4,902	345,389	32,889	32,709	17,096	429	827
2011	1,326,083	892,221	4,233	346,403	32,560	32,485	17,200	389	592
2012	1,330,973	903,508	2,933	345,561	20,846	29,237	18,100	248	540
2013	1,568,881*	874,863*	2,250	618,070*	28,392	26,100*	18,590	212	404
2014	1,508,885	811,067	2,150	618,070	31,724	26,164	19,082	221	407

\*It is estimated that this area is larger due to the fact that state-owned land is jointly used by more than one family farm for pasture. (Source: Statistical Yearbook 2015, CBS)

Table 2.1-3 below shows data for 2013 and 2014 on forests and forest land area.

*Table 2.1-3 Data on forests and forest land area in ha for 2013 and 2014*

	2013				2014			
	Total	Forests	Other forest land	Arid land	Total	Forests	Other forest land	Arid land
Total	2,751,100	2,465,366	243,773	41,961	2,753,510	2,471,077	240,920	41,513
State-owned forests	2,128,756	1,849,985	237,014	41,757	2,131,242	1,855,772	234,161	41,309
Privately-owned forests	622,344	615,381	6,759	204	622,268	615,305	6,759	204

#### *Industry, Energy and Construction*

Industrial production in the Republic of Croatia has occupied a significant place in total production until the recession. The most significant were processing and petrochemical industry and shipbuilding. Certain companies were shut down in the process of transition or destroyed during the war. These were mostly textile, leather, metal and wood industry factories. The

production was significant in construction and energy sectors as well. Certain industries are still achieving positive results and participate in foreign trade. According to total income, the leading industries are production of food, beverages and tobacco, followed by chemical, oil and mineral industries.

The energy sector is mostly based on electricity, gas and oil. Approximately half of electricity generation comes from hydropower plants, while the rest comes mainly from thermal power plants. A part of generated power is occasionally exported. Production of natural gas and oil is not sufficient for domestic needs.

Construction has been one of the most propulsive sectors until the recession, particularly in road building, residential and office building; however, after 2008, construction projects were significantly reduced.

#### *Tourism*

As one of the most significant tourist destinations in the Mediterranean, the Republic of Croatia has a long tradition in tourism and favourable developmental opportunities. Revenues from tourism amounted to EUR 7.5 billion in 2014.

The advantages of Croatian tourist offer are primarily well-preserved natural resources, cultural and historical heritage, a mild Mediterranean climate, its vicinity to European markets and an opportunity for active holidays in protected areas.

#### *Transport*

Croatia's advantageous geographical position in terms of transport enables the development of transport infrastructure and transport activities as one of the most important factors of the overall economic and social development of the Republic of Croatia. The share of combined transport in the overall transportation of cargo is insufficient. This type of transport, as one of the most modern and environmentally friendly, needs to be developed as soon as possible in order to enable integration into the already developed European routes of combined transport. Road and railway infrastructures are not equally developed in all parts of the Republic of Croatia. Even though over the last several years' great efforts have been put into the construction of new roads, substantial investments are still necessary both in terms of the existing as well as new infrastructure (especially regarding the development of railway transport and its greater representation).

### 2.1.3.2 State of the environment

#### *Air Protection*

In the Republic of Croatia, measuring of pollutants in the air is carried out in the state network for continuous air quality monitoring (managed by the Meteorological and Hydrological Service) and in local networks (under the responsibility of counties, the City of Zagreb, cities and municipalities). Moreover, in the vicinity of sources of significant air pollution, polluters are required to ensure air quality monitoring according to the decision on the environmental acceptability of the project or the decision on integrated environmental protection requirements,

that is the environmental permit and these special purpose measurements are an integral part of local networks for air quality monitoring.

The values of particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) are high in industrial centres and in larger cities in continental Croatia, where increased values are related to transport and industry. Increased values of nitrogen dioxide (NO<sub>2</sub>) are registered near public roads in the cities from which it can be concluded that the dominant source of NO<sub>2</sub> pollution is fuel combustion in road traffic. Exceeding of the values of hydrogen sulfide (H<sub>2</sub>S) and ammonia (NH<sub>3</sub>), caused by pollution that could potentially impair the quality of life, is related to large industrial centres.

The aim of preventive measures and air quality preservation instruments, such as well thought out project planning, foreseeing potential impacts on air quality, prescription of adequate air protection requirements, monitoring and reporting on air quality, compliance and improvement of regulatory framework and development and strengthening of institutional, organizational and expert/scientific capacities, is to prevent pollution and improve air quality. Preventive measures include existing intersectoral environmental protection measures and instruments, as well as additional measures the purpose of which is to improve the integral air quality management system in the Republic of Croatia.

#### *Soil protection*

In order to protect agricultural land from pollution and damage, testing and permanent monitoring of the condition of contamination of agricultural land in terms of inventory and monitoring is conducted established and maintained by the Agricultural Land Agency, as a reference center, while analysis may be carried out by laboratories authorized by the ministry responsible for agriculture.

Since there exists no clear legal framework in the Republic of Croatia in the form of comprehensive soil and land protection as environmental components, and soil and land are the basic substrate and a foundation for the performance of a number of main activities, the ministry responsible for environmental protection, based on the Strategy for Sustainable Development of the Republic of Croatia (OG No. 30/09) and the Environmental Protection Act (OG No. 80/13, 153/13 and 78/15) plans to develop the "Action Plan for implementation of soil and land protection policy in the Republic of Croatia" until the end of 2016, as a basis for future regulatory framework for the soil protection.

#### *Inland waters*

Croatia is fairly rich in water resources, with relatively large rivers and karst area that is especially interesting for the water regime. Volume of water is estimated at 6,000 m<sup>3</sup> annually per capita, while taking into account the border and cross-border waters, not including the Danube and Neretva rivers, it is approx. 26,000 m<sup>3</sup>. Drinking water reserves are relatively large and 84% of water for the water supply system is obtained from groundwater reserves.

Due to increased population and industrial development pollution pressures are more present in the Danube river basin than the Adriatic one.



Industrial waste waters are discharged with or without treatment into public sewage systems or a natural recipient. At the level of the Republic of Croatia around 30% of the total quantity of industrial waste water is discharged into the sewage system and the natural recipient without undergoing treatment. Chemical and petrochemical industries as well as food industry discharge the majority of waste waters, while wood processing industry and food industry have the greatest estimated level of pollution load. Agriculture and transport are major diffuse pollution sources, however, systematic monitoring of their impact does not exist. Transboundary impacts of pollution sources are addressed within concluded bilateral and multilateral agreements in the field of water management (Source: Water Management Strategy from 2008).

#### *Waste Management*

According to data for 2014, a total of around 3.5 million tons of waste is produced in the Republic of Croatia, of which 1.6 million tons of municipal waste. Out of the total amount of waste, around 96% is non-hazardous waste, while about 4% represents various types of hazardous waste. Municipal waste mostly consists of mixed municipal waste, paper and cardboard, bulky waste, bio waste and other less represented components. Around 270,000 tonnes of municipal waste are handed in for recovery, i.e. 17% of the total quantity of municipal waste, out of which around 33,000 tonnes are composted and 3,000 tonnes are incinerated with energy recovery. At the landfills 1.3 million tonnes is disposed or 80% of the total quantity of generated municipal waste. The remaining 3% are temporarily stored quantities of municipal waste and estimated amounts for the portion of the population that is not covered. Organized collection of municipal waste in 2014 did not cover one municipality, while the organized collection included 99% of the population (Source: CAEN).

#### *Nature protection*

Owing to its geographical position and relief diversity, in proportion to its size, the Republic of Croatia abounds in a great number of various types of habitats and ecosystems, with the karst region being the most prominent. Out of a total of 431 protected areas (with surface area of 7,183.5 km<sup>2</sup>-6,570.8 km<sup>2</sup> on land and 612.7 km<sup>2</sup> at sea), 8 are national parks, 11 nature parks, 2 strict nature reserves, 80 special reserves, etc.

#### *Land use*

The total continental area of the Republic of Croatia consists of approximately 48% of agricultural land (around 27% of cropland and 21% of grassland), 41% of forest and forest land, 1.3% of wetland and 4.5% of populated areas (data for 2012). According to available data for 2012, the most significant changes in land use as compared to 1990 were recorded in the populated areas which increased by 43,040 ha or 16.2%, and croplands-decrease by 77,460 ha or 5.2% (Source: Croatian greenhouse gas inventory for the period 1990-2012, CAEN).

#### *State of the coastal and island area*

A large part of the Croatian part of the Adriatic Sea is still oligotrophic and clean. Major issues related to environmental protection and therefore also sustainable development of the coastal area and the sea is excessive construction in the coastal zone. One of the main pressures on marine environment is wastewater which is insufficiently treated, and often without any treatment discharged into the water. Navigation, i.e. transport of passengers and goods represents

a significant economic branch in the Republic of Croatia. The main burdens related to this activity are unconscious and illegal dumping of waste into the marine environment, transfer of invasive organisms from other areas and physical mixing of water masses in shallow ports. Available data on heavy metals discharge into the marine environment are related to disposal through point sources (process and municipal waste waters) and through watercourses. According to the document Initial Assessment of the State and Impacts on the Marine Environment of the Croatian Part of the Adriatic (Institute for Oceanography and Fisheries, Split, 2012), quantities of heavy metals which reach transitional and coastal waters by rivers range from 801 kg (cadmium, Cd) to 33,817 kg (zinc, Zn). Introduction of nutrient salts into the marine environment takes place through deposition from the atmosphere, diffusely from soil wash off (more prominent in the southern part of Dalmatia due to the location of agricultural land near the coast), with riverflows and submarine fresh water springs, and point sources of wastewater discharges. The greater part of total nitrogen (around 77%) enters the coastal sea through the watercourses, while most of total phosphorus enters through wastewater (around 66%). The bathing water quality along the Croatian coast is generally very high, in 2015 the quality of the sea was assessed as excellent at 95.37% sampling points. Bathing water quality assessment, in addition to the concentration of microorganisms, also points to the potential pollution risk. To improve the quality of sea water at the points which tested as worse-satisfactory (1.21%) or unsatisfactory (0.22%) it is necessary to take measures such as connection to the public sewage system, more appropriate drainage of rainwater, etc. Over the last two decades the presence of non-native organisms, including algae, invertebrates and fish was recorded in the Croatian Adriatic. All invasive marine algae species recorded to date indicate a significant negative impact on the natural communities and habitats in the Adriatic Sea. Unlike algae, no invasive fish species have been recorded.

## 2.2 INSTITUTIONAL, POLITICAL AND REGULATORY FRAMEWORK

### 2.2.1 *International Treaties*

The Republic of Croatia is a party to a number of international environmental agreements. The list of international treaties to which the Republic of Croatia is a party and related to the POPs management is shown below:

- Stockholm Convention on Persistent Organic Pollutants (OG-IT No. 11/06), entered into force with respect to the Republic of Croatia on 30 April 2007 (OG-IT No. 2/07)
- Convention on Long-range Transboundary Air Pollution, pursuant to the notification on succession, the Republic of Croatia became a party to the Convention on 8 October 1991 (OG-IT No. 12/93)
- Protocol on Persistent Organic Pollutants to the 1979 Convention on Long-range Transboundary Air Pollution (OG-IT No. 5/07), entered into force with respect to the Republic of Croatia on 5 December 2007 (OG-IT No. 9/07)
- Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (OG-IT No. 3/94) entered into force with respect to the Republic of Croatia on 7 August
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (OG-IT No. 4/07), entered into force with respect to the Republic of Croatia on 14 February 2008 (OG-IT No. 1/08)

- Convention on the Transboundary Effects of Industrial Accidents (OG-IT No. 7/99), entered into force with respect to the Republic of Croatia on 19 April 2000 (OG-IT No. 10/01)
- Convention for the Protection of The Mediterranean Sea Against Pollution, pursuant to the notification on succession, the Republic of Croatia became a party to the Convention on 8 October 1991 (OG-IT No. 12/93)
- Convention on Co-operation for the Protection and Sustainable Use of the River Danube (OG-IT No. 2/96).

#### 2.2.1.1 Protocol on Persistent Organic Pollutants to the 1979 Convention on Long-range Transboundary Air Pollution

The 1979 Convention on Long-Range Transboundary Air Pollution (hereinafter: the LRTAP Convention) concluded under the auspices of the UN Economic Commission for Europe (UNECE) is the main international legal framework for cooperation and measures to limit and gradually reduce and prevent air pollution and its adverse effects upon human health and the environment in the UNECE region, with a specific focus on long-range transboundary air pollution.

To date, the LRTAP Convention has been extended by eight Protocols, with Croatia being a party to seven of them, including the 1998 Aarhus Protocol on Persistent Organic Pollutants (hereinafter: the POPs Protocol).

The objective of the POPs Protocol is to control, reduce or eliminate discharges, emissions of POPs, requires parties to (i) eliminate the production and use of substances, including aldrin, dieldrin and toxaphene, in accordance with the defined implementation requirements, (ii) restrict the use of DDT, HCH and PCBs and (iii) reduce its total annual emissions of PAH/PAHs, PCDD/PCDF and HCB, to the emission levels in 1990 (or other reference year between 1985 and 1995). In this regard, the Parties shall ensure (i) that the operators/polluters from major stationary sources of PCDD/PCDF, PAH/PAHs and HCB, including combustion plants, plants for the production of coke, iron, steel and aluminium, and plants for wood preservation, apply BAT, (ii) that certain waste incinerators operate and are in accordance with the defined emission limit values applied for PCDD/PCDF, (iii) take effective measures to control emissions of POPs from mobile sources, and (iv) that POPs are transported and disposed of in an environmentally sound manner when they become waste. Parties have to develop and update the calculation of emissions/inventories for PCDD/PCDF's, PAH/PAHs and HCB while maintaining emission levels below those in the reference year (for the Republic of Croatia this is 1990), and collect information relating to the production and sales of other POPs covered by the POPs Protocol. The Parties shall develop strategies, policies and programmes aimed at planning of measures and initiatives to meet all their obligations.

On 18 December 2009, in Geneva at the 27th session of the Executive Body of the LRTAP Convention the Parties adopted decisions 2009/1 and 2009/2 on inclusion of 7 new POPs into the text of the Protocol on POPs: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, pentabromodiphenyl ether, perfluorooctane sulfonic acid, polychlorinated

naphthalenes and short-chain chlorinated paraffins. In addition, the Parties adopted revised obligations for DDT, heptachlor, HCB and PCBs as well as emission limit values for waste incineration.

Furthermore, decision 2009/3 amending Annexes V and VII and decision 2009/4 updating the guidance document on BAT to control emissions of POPs were adopted. The amendments to Annexes V and VII entered into force for most Parties on 13 December 2010.

In line with Article 14, Paragraph 3 of the POPs Protocol the entry into force of the amendments to the POPs Protocol and its Annexes I, II, III, IV, VI and VIII requires ratification by two thirds of the Parties in order to become effective. The mentioned amendments or newly adopted decisions have not yet entered into force. Those amendments have not yet entered into force. The Republic of Croatia plans to initiate the process of ratifying the above mentioned amendments.

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

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (hereinafter: The Rotterdam Convention) is an international treaty designed to facilitate informed decision-making by countries with regard to trade in hazardous chemicals. The Rotterdam Convention was adopted in September 1998 and entered into force with respect to the Republic of Croatia on 14 February 2008.

Parties to the Rotterdam Convention commit to respect the so-called PIC procedure regulating the obligations of the participants in the international trade of prohibited substances/chemicals. The purpose of this procedure is to ensure that every purchase of substances or products containing a substance on the PIC list should be notified to the competent authority for the implementation of the Rotterdam Convention in the country of the buyer, also the appropriate authority of the country of origin (headquarters) of producers. This means that the reason for using the substance on the PIC list must be known.

The objectives of the Rotterdam Convention are:

- to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm;
- to contribute to the environmentally sound use of hazardous chemicals, by facilitating information exchange about their characteristics, by providing informed decisions for a national decision-making process on their import and export.

To achieve its objectives, the Rotterdam Convention includes two key provisions:

- PIC—a mechanism for formally obtaining and disseminating the decisions on the import of future shipments of hazardous substances listed in Annex III of the Rotterdam Convention and for ensuring compliance with these decisions by Parties
- Information Exchange—the Rotterdam Convention facilitates information exchange among Parties for a very broad range of potentially hazardous chemicals, it requires each Party to notify the Secretariat when taking a domestic regulatory action to ban or severely restrict specific hazardous substance.

The Rotterdam Convention covers pesticides and industrial chemicals. Hazardous substances are subject to the PIC procedure if they are included in Annex III of the Rotterdam Convention.

### 2.2.1.3 Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Basel Convention

Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (hereinafter: The Basel Convention) is an international treaty on hazardous waste which entered into force in 1992.

Parties commit themselves to ensure that the generation of hazardous wastes and other wastes is reduced to a minimum, that treatment and disposal of hazardous wastes and other wastes is carried out as closely as possible to the place of generation, and to minimize transboundary movements of wastes. The Basel Convention sets up an international control framework for 45 general categories of wastes to be controlled (waste streams Y1-Y18 and wastes containing dangerous constituents Y19-Y45) that together cover hundreds of types of waste. It also sets up the foundations of sustainable waste management at the national level.

The principal aims of the Basel Convention are:

- to ensure that the transboundary movement of hazardous wastes is reduced to the minimum consistent with the environmentally sound management of such wastes,
- to treat and dispose of hazardous wastes as close as possible to their place of generation, and
- to minimize the generation of hazardous wastes at source.

The Basel Convention covers hazardous wastes that are explosive, flammable, poisonous, infectious, corrosive, toxic, or eco-toxic. The categories of wastes and the hazardous characteristics are set out in Annexes I to III of the Basel Convention. Lists of special categories of wastes characterized as hazardous or non-hazardous, so-called yellow and green waste list, are contained in Annexes VIII and IX. Waste containing POPs is listed in the Basel Convention because of their hazardous properties.

In May 2015 at COP-12 a Decision relating to a number of technical guidelines on the environmentally sound management of wastes containing persistent organic pollutants (UNEP CHW-COP.12-BC-12/3) and their disposal was adopted by the parties to the Basel Convention, and published at the Basel Convention website.

### 2.2.2 *Legislation related to POPs management at the European Union level*

The European Union has adopted a number of legislative acts that directly or indirectly impact POPs management.

#### 2.2.2.1 Regulation (EC) No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants (OJ L 158, 30 April 2004)

The main legal instrument for implementing the Stockholm Convention and the POPs Protocol is Regulation (EC) No 850/2004 on persistent organic pollutants (hereafter: the POPs Regulation).

The POPs Regulation entered into force on 20 May 2004 and is directly applicable in all Member States, including those which are not yet Parties to the Stockholm Convention or the POPs Protocol.

The POPs Regulation prohibits/limits the production, use and placing on the market of the POPs listed in the Annexes of both the Stockholm Convention and the POPs Protocol, and contains provisions on stockpiles and wastes.

General and specific exemptions to these prohibitions are limited to a minimum. Furthermore, the POPs Regulation contains provisions requiring the setting up of emission/inventories budgets for unintentionally produced POPs, national and European Union plans and mechanisms for the implementation of plans, and monitoring and information exchange regarding POPs. To a certain extent the POPs Regulation goes a step further than the international agreement in terms of ambition.

As noted, there are some differences in the provisions of the POPs Regulation and the Stockholm Convention itself, given that the European Union legislation is much more ambitious, and the POPs Regulation is regularly aligned with other EU legislation.

The POPs Regulation is accompanied by five Annexes:

Annex I – A list of chemicals that are included in the Annexes to the Stockholm Convention and the Protocol on POPs to the LRTAP Convention, the provisions relating to the prohibition of production and placing on the market (Part A – relates to the prohibition and Part B – special exemptions, which represent certain restrictions of use)

Annex II – List of substances subject to restrictions

Annex III – List of substances subject to release reduction provisions (unintentional production)

Annex IV – Waste management-prescribed concentration limits content in the waste

Annex V – Waste management-disposal and recovery operations, and waste types and operations, the maximum concentration limits, permitted methods of recovery and disposal.

POPs Regulation has been amended as follows:

- Council Regulation (EC) No 1195/2006 of 18 July 2006 amending Annex IV to Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants (OJ L 217, 8.8.2006) and Council Regulation (EC) No 172/2007 of 16 February 2007 amending Annex V to Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants (OJ L 55, 23.2.2007) establish concentration limits in Annex IV and V for substances subject to the requirements of Article 7 of the POPs Regulation
- Commission Regulation (EC) No 323/2007 of 26 March 2007 amending Annex V to Regulation (EC) No 850/2004 of the European Parliament and of the Council on

- persistent organic pollutants and amending Directive 79/117/EEC (OJ L 85, 27.3.2007) further complements Annex V in order to allow pre-treatment operations prior to permanent storage of wastes containing POPs
- Regulation (EC) No 219/2009 of the European Parliament and of the Council of 11 March 2009 adapting a number of instruments subject to the procedure referred to in Article 251 of the Treaty to Council Decision 1999/468/EC with regard to the regulatory procedure with scrutiny Adaptation to the regulatory procedure with scrutiny — Part Two (OJ L 87, 31.3. 2009) empowered the Commission to establish concentration limits in the Annexes, to amend Annexes whenever a substance is listed in the Stockholm Convention or the POPs Protocol, to modify the existing entries and to adapt annexes to take account of scientific and technical progress
  - Commission Regulation (EC) No 304/2009 of 14 April 2009 amending Annexes IV and V to Regulation (EC) No 850/2004 of the European Parliament and of the Council as regards the treatment of waste containing persistent organic pollutants in thermal and metallurgical production processes (OJ L 96, 15.4.2009) transposed the Decision of the Conference of the Parties to the Basel Convention on the updated general technical guidelines for the environmentally sound management of wastes from thermal and metallurgical production processes containing or contaminated with POPs
  - Commission Regulation (EU) No 757/2010 of 24 August 2010 amending Annexes I and III of Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants (OJ L 223, 25.8.2010) transposed the decisions of the fourth meeting of the Conference of the Parties (COP-4) to the Stockholm Convention from May 2009, to supplement Annex I and III with new POPs
  - Commission Regulation (EU) No 756/2010 of 24 August 2010 amending Annexes IV and V of Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants (OJ L 223, 25.8.2010) further amended Annexes IV and V of POPs Regulation, in line with the decisions of the fourth meeting of the Conference of the Parties (COP-4) to the Stockholm Convention
  - Commission Regulation (EU) No 519/2012 of 19 June 2012 amending Annex I of Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants (OJ L 159, 20.6.2012) transposed the decisions of the fifth meeting of the Conference of the Parties (COP-5) to the Stockholm Convention from May 2011 which listed endosulfan, and of the 27th Session of the Executive Body of the LRTAP Convention regarding the amendments to the POPs Protocol which listed hexachlorobenzene, polychlorinated naphthalene and short-chain polychlorinated paraffins
  - Commission Regulation (EU) No 1342/2014 of 17 December 2014 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annexes IV and V (OJ L 363, 18.12.2014)
  - Commission Regulation (EU) No. 2015/2030 of 13 November 2015 amending Regulation (EC) No. 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I (OJ L 298, 14.11.2015)
  - Commission Regulation (EU) No. 2016/293 of 1 March 2016 amending Regulation (EC) No. 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I (OJ L 55/4, 3.2.2016) transposed the decision of the sixth

meeting of the Conference of Parties (COP-6) to the Stockholm Convention from May 2013 related to the inclusion of HBCD/HBCDD.

In accordance with the Act on the Implementation of Regulation (EC) No. 850/2004 on persistent organic pollutants (OG No. 148/13, hereinafter: the Act on POPs Regulation Implementation), central state administration bodies responsible for environmental protection, health, agriculture, economy, water management, forestry and veterinary medicine were designated as the competent authorities for the implementation of POPs Regulation in the Republic of Croatia.

For the purpose of implementation of legally binding acts of the European Union adopted pursuant to the POPs Regulation, the minister responsible for environmental protection adopts ordinances, orders or instructions where necessary.

The Act on POPs Regulation Implementation stipulates a one-year mandatory reporting pursuant to Article 12 (2) of POPs Regulation on production/placing on the market carried out by the ministry responsible for health in cooperation with the Croatian Institute for Toxicology and Antidoping and submission to the European Commission.

CAEN (Croatian Environment Agency until 15 September 2015) which represents the central environmental information system has an obligation to collect data, prepare and submit a three-year report pursuant to Article 8 of the Act on POPs Regulation Implementation and Article 12 (1) and (3) of the POPs Regulation. The three-year report includes information about stocks, result of releases into all environmental components, monitoring, information on penalties, preparation of NIP.

#### 2.2.2.2 Chemicals management at the European Union level

Besides the POPs Regulation which ensures implementation of the obligations under the Stockholm Convention and the POPs Protocol, the relevant EU legislation related to chemicals management is presented below.

Direct implementation of 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) and establishing a European Chemicals Agency and amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 of 18 December 2006 and Commission Regulation (EC) No. 1488/94 as well as Council Directive 76/769/EEC and Directive 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (hereinafter: the REACH Regulation) is enabled by the Act on the Implementation of Regulation (EC) No. 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (OG No. 53/08 and 18/13).

The REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) Regulation represents the legal framework of the European Union for chemicals. The REACH Regulation entered into force in the Republic of Croatia on 1 July 2013 and replaced numerous previous regulations and directives which regulated the area of chemicals with a unified system. This is another legal instrument that limits production and use of substances with POPs characteristics.



By evaluating the former legal framework for the field of chemicals, a number of issues related to implementation of EU legislation were identified, which resulted in differences in laws and other regulations of Member States that directly affect the functioning of the internal market, and thus the need to take additional efforts has been recognized for the following purposes:

- protection of human health and the environment
- ensuring all preconditions for achieving complete and effective chemical safety at the European Union level
- free movement of substances on their own, in mixtures and articles
- enhancement of competitiveness and innovation
- promotion of development of alternative methods for the assessment of hazards of substances.

For this purpose, the key obligations of manufacturers and importers in the European Union were given, such as the identification and the properties of substances (all physicochemical, toxicological and ecotoxicological properties envisaged by the REACH system, and dependent on the annual quantities of the chemical placed on the market), predictions of human and environmental exposure to substance from its planned application, the intended annual production, the proposal for classification and labelling of substances, the safety data sheet, the previous risk assessments for the intended use, the proposed measures for the safe management of substances.

Annexes to REACH Regulation are as follows:

- ANNEX I – General provisions for assessing substances and preparing chemical safety reports
- ANNEX II – Requirements for the compilation of safety data sheets
- ANNEX III – Criteria for substances registered in quantities between 1 and 10 tonnes
- ANNEX IV – Exemptions from the obligation to register in accordance with Article 2(7)(a)
- ANNEX V – Exemptions from the obligation to register in accordance with Article 2(7)(b)
- ANNEX VI – Information requirements referred to in Article 10
- ANNEX VII – Standard information requirements for substances manufactured or imported in quantities of one tonne or more
- ANNEX VIII – Standard information requirements for substances manufactured or imported in quantities of 10 tonnes or more
- ANNEX IX – Standard information requirements for substances manufactured or imported in quantities of 100 tonnes or more
- ANNEX X – Standard information requirements for substances manufactured or imported in quantities of 1 000 tonnes or more
- ANNEX XI – General rules for adaptation of the standard testing regime set out in Annexes VII to X
- ANNEX XII – General provisions for downstream users to assess substances and prepare chemical safety reports
- ANNEX XIII – Criteria for the identification of persistent, bioaccumulative and toxic substances, and very bioaccumulative substances

- ANNEX XIV – List of substances subject to authorisation
- ANNEX XV – Dossiers
- ANNEX XVI – Socio-economic analysis
- ANNEX XVII – Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

For substances with PBT or vPvB characteristics in accordance with Annex XIII of the REACH Regulation, exposure assessment and risk characterisation must be included in the Chemical Safety Report. For certain applications of some of the substances identified as PBT or vPvB, the approval of the Commission is required. This is the case when a substance that meets the criteria for substances of very high concern is included in Annex XIV of the REACH Regulation. The identification of a substance as a substance of very high concern (SVHC) and its inclusion on the so-called Candidate List of substances also creates certain legal obligations for importers, manufacturers and suppliers of articles containing such substances.

The REACH Regulation further includes the possibility to restrict the use, placing on the market or production of substances from Annex XVII. With the abovementioned, the REACH Regulation gives greater responsibility to industry and legal entities to manage the risks related to chemicals and provides information on safety properties of the substances.

The competent authority for implementation in the Republic of Croatia is the ministry responsible for health, and professional institution is the Croatian Institute for Toxicology and Antidoping.

Direct implementation of Regulation (EC) No. 1272/2008 of the European Parliament and the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (OJ L 353, 31.12.2008) (hereinafter: the CLP Regulation) is enabled by the Act on the Implementation of Regulation (EC) No. 1272/2008 of the European Parliament and the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending, supplementing and repealing Directive 67/548/EEC and Directive 1999/45/EC and amending Regulation (EC) No. 1907/06 (OG No. 50/12 and 18/13).

The CLP Regulation relates to the classification, labelling and packaging of substances and mixtures to increase the level of protection of human health and the environment, and throughout the European Union the same criteria for identification of chemical hazards and the same labels for their description must be applied.

The competent authority for implementation in the Republic of Croatia is the ministry responsible for health, and professional institution is the Croatian Institute for Toxicology and Antidoping.

Direct implementation of 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 (OJ L 309, 24.11.2009) (hereinafter: the Regulation (EC) No. 1107/2009) is enabled by the Act on the Implementation of

Regulation (EC) No. 1107/2009 on the placing of plant protection products on the market (OG No. 80/13).

The Regulation on the placing of plant protection products on the market prevents the use of plant protection products that contain POPs. The approved plant protection product must not have POPs, PBT or vPvB characteristics. In addition, a substance shall be approved as a candidate for substitution if it meets two of the PBT criteria.

The competent authority for implementation in the Republic of Croatia is the ministry responsible for agriculture.

Direct implementation of 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 (OJ L 167, 27.6.2012) (hereinafter: the Regulation (EU) No. 528/2012) is enabled by the Act on the Implementation of Regulation (EU) No. 528/2012 of the European Parliament and the Council concerning the making available on the market and use of biocidal products (OG No. 39/13 and 47/14).

Regulation (EU) No. 528/2012 promotes substitution of active substances exhibiting POPs or PBT characteristics in biocidal products for less hazardous ones and permits the use of POPs or PBT substances in biocidal products only if there are no alternatives available. An active substance that meets two of the PBT criteria as set out in Annex XIII of the REACH Regulation shall be considered a candidate for prohibition of use and shall be replaced with a new active substance. Regulation (EU) No. 528/2012 prescribes that for certain types of biocidal products there is a possibility to request authorization from ECHA and in that case such authorization is valid in all EU Member States.

In the Republic of Croatia, the competent authority is the ministry responsible for health which carries out the authorisation of biocidal products that are placed on the Croatian market, namely, for those biocidal products with active substances that are still under EU revision or that have already been authorized or are included in the List of Approved Active Substances of the European Union (Regulation (EU) No. 528/2012).

The competent authority in the Republic of Croatia began with the mutual recognition of biocidal products containing approved active substances, in accordance with Article 32 of the Regulation (EU) No. 528/2012.

Since the entry into force of Regulation (EU) No. 528/2012, new active substances permitted in biocidal products have been published in the Commission's Implementing Regulations.

The aforementioned Regulation (EU) No. 528/2012 foresees that each EU Member State shall establish a Helpdesk the primary task of which is to help enterprises to understand and implement the aforementioned Regulation (EU) No. 528/2012. The Regulation (EU) No. 528/2012 has been in force since 1 September 2013.

Direct implementation of 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 Text with EEA

relevance (OJ L 201, 27.7.2012) (hereinafter: the Regulation (EU) No. 649/2012) is enabled by the Act on the Implementation of Regulation (EU) No. 649/2012 concerning the export and import of hazardous chemicals (OG No. 41/14).

The export of POPs or products containing POPs is regulated by Regulation (EU) No 649/2012. Regulation (EU) No 649/2012, among other things, implements provisions of the Rotterdam Convention (so-called PIC Procedure). Procedure for certain hazardous chemicals and pesticides in international trade predicts a ban on export of POPs listed in Annexes A and B of the Stockholm Convention.

### *Other legislation relevant to POPs*

In addition to the chemicals legislation, regulations relating to the protection of individual environmental components, particularly those focused on water protection and waste management, also contribute to POPs management. Table 2.2-1 provides an overview of the legislation relevant to POPs.

*Table 2.2-1: Other regulations in the field of environment protection relevant for limiting the use and disposal of POPs*

Name of regulation	Area of application
Environmental Protection Act (OG No. 80/13, 153/13 and 78/15) aligned with the provisions of Regulation (EC) No. 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel (OJ L 27/1, 30.1.2010)o	Different product categories
Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 103/14) aligned with the provisions of Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT), which was implemented by Commission Decision 2001/68/EC	Waste
Ordinance on restricting the use of certain hazardous substances in electrical and electronic equipment (OG No. 131/13, 16/14, 90/14, 142/14 and 128/15) aligned with the provisions of Directive 2011/65/EU of the European Parliament and the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (OJ L 174/88, 1.7.2011)	Production and import of electrical and electronic equipment
Act on Sustainable Waste Management (OG No. 94/13) aligned with the provisions of Directive 2008/98/EC of the European Parliament and the Council of 19 November 2008 on waste and repealing certain Directives (OJ L 312/3, 22.11.2008), Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L 182, 16.7. 1999), Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24.7. 2012) and Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste (OJ L 190, 12.7.2006)	Waste
Regulation on the limitation of emissions of air pollutants from stationary sources (OG No. 117/12 and 90/14) and Act on Sustainable Waste Management aligned with the provisions of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste, as amended by Directive 2010/75/EC of the European Parliament and the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12. 2010)	Waste, industrial pollution
Ordinance on management of waste electrical and electronic equipment (OG No. 42/14, 48/14 and 107/14) aligned with the provisions of Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24.7.2012)	Treatment of waste electrical and electronic equipment
Regulation on water quality standards (OG No. 73/13, 151/14 and 78/15) aligned with the provisions of the Directive 2006/11/EC of the European Parliament and of the Council of 15 February 2006 on pollution caused by certain dangerous substances discharged into the	Protection of surface waters, including coastal waters and groundwater. Pollution as a result of discharges of

Name of regulation	Area of application
aquatic environment of the Community (Codified version) (Water Framework Directive) (OJ L 64, 4.3.2006)	individual hazardous substances into the aquatic environment
Ordinance on the management of end-of-life vehicles (OG No. 136/06, 31/09, 156/09, 53/12, 86/13 and 91/13) Note: ceased to be valid upon entry into force of the Ordinance on management of end-of-life vehicles (OG No. 125/15), except for the provisions of Article 21 and Article 28, paragraphs 1, 2, 3, 4 and 5 and Article 29, paragraph 2 and 3, which remain valid until the conclusion of the contract for carrying out services of end-of-life vehicle collection managed by the Fund and adoption of the decision under Article 16, paragraph 5 of the Ordinance on management of end-of-life vehicles (OG No. 125/15), aligned with the provisions of Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles and Commission Directive 2013/28/EU of 17 May 2013 on amending Annex II to Directive 2000/53/EC of the European Parliament and of the Council on end-of-life vehicles (OJ L 135, 22.5. 2013)	Collection, treatment, recovery and disposal of end-of-life vehicles.
Act on Water Intended for Human Consumption (OG No. 56/13 and 64/15) aligned with the provisions of Council Directive 1998/83/EC of 3 November 1998 on the quality of water intended for human consumption (OJ L 330, 5.12. 1998)	Quality of water intended for human consumption
Regulation on the development and implementation of the documents under the Strategy for marine environment and coastal zone management (OG No. 112/14) aligned with the provisions of Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) Text with EEA relevance (OJ L 164/19, 25.6. 2008)	Protection of marine waters
Regulation on the prevention of major accidents involving dangerous substances (OG No. 44/14) aligned with the provisions of Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (OJ L 197/1, 24.7. 2012)	Prevention, preparedness and response in case of major accidents involving dangerous substances, sudden and avoided accidents

### *Legislation covering unintentionally produced/released POPs*

An overview of legislation regulating the unintentionally produced/released POPs is presented concisely in table 2.2-2.

Directive 2010/75/EC of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010.) (hereinafter: IED) provides a high level protection of the environment through integration of measures into the industrial processes themselves. IED was transposed into national legislation and the implementation of its provisions was ensured by a large number of regulations, of which we would like to point out the umbrella acts, such as the Environmental Protection Act, the Air Protection Act (OG No. 130/11 and 47/14) and the Act on Sustainable Waste Management with a number of implementing regulations for these acts, of which we would particularly like to emphasize the Regulation on limit values for pollutant emissions from stationary sources into the air and the Regulation on environmental permit (OG No. 8/14). Industrial installations in which activities covered by Annex I of IED are carried out are required to obtain an environmental permit. Emissions of all relevant pollutants (including POPs), which are likely to be emitted in greater/significant quantities, have to be regulated by the environmental permit. The conditions set out in the environmental permit, in particular emission limits, have to be based on the application/implementation of BAT.

The European Commission enabled the exchange of information on BATs for different industrial sectors, using the so-called BREF which are available at the web site <http://eippcb.jrc.ec.europa.eu/reference/>.

Special emission limit values associated with BAT have been elaborated for POPs. The BAT conclusions are binding documents, that is emission limit values for certain pollutants, and are applied when issuing requirements and limit values for individual emissions in environmental permits.

*Table 2.2-2: Legislation overview covering the releases of unintentionally produced/released POPs*

Name of regulation	POPs regulated/POPs reference
Regulation on limit values for pollutant emissions from stationary sources into the air which is aligned with the provisions of IED	PCDD and PCDF among pollutants that are released into the air, as well as persistent hydrocarbons and persistent bioaccumulative toxic organic substances released into the water should be considered when issuing permits.
Regulation on levels of pollutants in ambient air (OG No. 117/12) aligned with the provisions of Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (OJ L 23, 26.1.2005)	Limit values for BaP as a marker for PAH in ambient air.
Regulation on water quality standards aligned with the provisions of Directive 2000/60/EC Water Framework Directive	PAHs, HCB, HCBd, PeCB (PHS) are listed in Annex X. Environmental quality standards are set with the aim of gradual reduction of emissions.
Act on the Implementation of Regulation (EC) No 850/2004 on persistent organic pollutants enables direct implementation of POPs Regulation	Measures to reduce unintentional releases of POPs. Basis for emission inventories for unintentionally produced/released POPs.

### *Regulations in the field of food and feed*

Act on Contaminants (OG No. 39/13) determines competent authorities, the tasks of the competent authorities, official controls and manner of proceeding and reporting to competent authorities and the European Commission, as well as the obligations of official laboratories and companies in the food business, for implementation of:

- Council Regulation (EEC) No 315/93 of 8 February 1993 laying down Community procedures for contaminants in food (OJ L 37, 13.2.1993), with all its amendments
- Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Text with EEA relevance) (OJ L 364, 20.12.2006.) with all its amendments (hereafter: the Regulation (EC) No 1881/2006)
- Commission Regulation (EC) No 401/2006 of 23 February 2006 laying down the methods of sampling and analysis for the official control of the levels of mycotoxins in foodstuffs (Text with EEA relevance) (OJ L 70, 9.3.2006.), with all its amendments
- Commission Regulation (EU) No. 252/2012 of 21 March 2012 laying down methods of sampling and analysis for the official control of levels of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in certain foodstuffs and repealing Regulation (EC) No. 1883/2006 (Text with

EEA relevance) (OJ L 84, 23.3.2012.), with all its amendments (hereafter: the Regulation (EC) No 252/2012)

– Commission Regulation (EC) No 333/2007 of 28 March 2007 laying down the methods of sampling and analysis for the official control of the levels of lead, cadmium, mercury, inorganic tin, 3-MCPD and benzo(a)pyrene in foodstuffs (Text with EEA relevance) (OJ L 88, 29.3.2007.), with all its amendments

– Commission Regulation (EC) No. 1882/2006 of 19 December 2006 laying down methods of sampling and analysis for the official control of the levels of nitrates in certain foodstuffs (Text with EEA relevance) (OJ L 364, 20.12.2006.), with all its amendments. However, the provisions of this Act do not apply to pesticides as contaminants in food.

Act on the Implementation of Regulation (EC) No. 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin (OG No. 80/13) enables direct implementation of Regulation (EC) No. 396/2005 (hereafter: the Regulation (EC) No. 396/2005).

Furthermore, Ordinance on undesirable substances in animal feed (OG No. 80/10, 111/10 and 124/12) transposes, among other things, Commission Regulation (EU) No 277/2012 of 28 March 2012 amending Annexes I and II to Directive 2002/32/EC of the European Parliament and of the Council as regards maximum levels and action thresholds for dioxins and polychlorinated biphenyls, while Directive 2002/32/EC of the European Parliament and of the Council of 7 May 2002 on undesirable substances in animal feed (OJ L 140, 30.5.2002) (hereafter: the Directive 2002/32/EC) defines undesirable substances in animal feed. Commission Regulation (EU) No 589/2014 of 2 June 2014 laying down methods of sampling and analysis for the control of levels of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in certain foodstuffs and repealing Regulation (EU) No 252/2012 (OJ L 164, 3.6.2014) is directly applicable at the national level.

*Table 2.2-3: Relevant regulations on food and feed with regard to POPs*

	<b>Regulation</b>	<b>POPs regulated/POP reference</b>
Maximum allowed concentrations of individual contaminants in foodstuffs	Act on Contaminants which is aligned with the provisions of Regulation (EC) No 1881/2006	– sum of PCDD/PCDF and PCDD-like PCBs and indicator PCBs – BaP and the sum of BaP, benzo(a)anthracene, benzo(b)fluoranthene and chrysene as a marker of carcinogenic PAH in certain foodstuffs
Sampling and analytical methods in specific food	Regulation (EC) No 589/2014	PCDD and PCDD-like PCBs and non-dioxin-like PCBs
Maximum allowed concentrations of POPs pesticides in foodstuffs	Act on Implementation of Regulation (EC) No. 396/2005 enables direct implementation of Regulation (EC) No. 396/2005	- pesticide residues in and on food and feed of plant and animal origin
Undesirable substances in animal feed	Ordinance on undesirable substances in animal feed aligned with the provisions of Commission Regulation (EC) No. 277/2012 of 28 March 2012 amending Annexes I and II to Directive 2002/32/EC of the European Parliament and of the Council as regards maximum levels and action thresholds for dioxins and polychlorinated biphenyls and Directive 2002/32/EC	Aldrin, dieldrin, toxaphene, chlordecone, DDT, endosulfan, endrin, heptachlor, HCB, HCH (including lindane), PCDD, PCDF and PCB

### 2.2.3 Legislation in the Republic of Croatia

On 1 July 2013, the Republic of Croatia became a full member of the European Union, with all of the rights and obligations stemming from the membership. In the EU accession process, the environmental legislation was fully transposed into the national legislation. Since the adoption of NIP in 2008, there were numerous amendments to the national legislation in the field of POPs management. The list of regulations and documents currently in force is presented below.

#### 1) PLANT HEALTH – PLANT PROTECTION PRODUCTS AND PESTICIDE RESIDUES

- Act on the Implementation of Regulation (EC) No. 1107/2009 concerning the placing of plant protection products on the market (OG No. 80/13)
- Act on Sustainable Use of Pesticides (OG No. 14/14)
- Ordinance on establishing an action framework to achieve sustainable use of pesticides (OG No. 142/12)
- Act on the Implementation of Regulation (EC) No. 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin (OG No. 80/13)
- Ordinance on methods of sampling for the official control of pesticide residues in and on products of plant and animal origin (OG No. 77/08)
- The Decision on banning free movement of PPPs containing certain active substances: acifluorfen, amitraz, atrazine, bromopropylate, cycloate, difethialone, dichlofluanid, dichlorprop (racemate), endosulfan, eptc, fenpropathrin, flocoumafen (racemate), fomesafen, hexaflumuron, heptenophos, 8-hydroxyquinoline sulfate, imazamethabenzmethyl, imazapyr, coumatetralyl, metalaxyl (racemate), metobromuron, metolachlor (racemate), nonylphenol ethoxylates, ofurace, omethoate, prometryn, sethoxydim, simazine, terbufos, tetradifon, triadimefon, triforine and vernolate, Class: UP/I 320-20/07-01/34; Reg.No.: 525-02-07-1 of 28 May 2007
- The Decision on banning free movement of PPPs containing certain active substancesalachlor, diazinon, dichlorvos, diuron, phosalone, haloxyfop-r, hexaconazole, carbofuran, carbosulfan, malathion, oxydemetonmethyl and trichlorfon, Class: UP/I-320-20/07-01/39; Reg.No.: 525-02-07-1 of 19 July 2007.

#### 2) CHEMICALS

- Act on Ratification of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (OG-IT, No. 4/07)
- Act on Ratification of the Stockholm Convention on Persistent Organic Pollutants (OG-IT, No. 11/06)
- Chemicals Act (OG No.18/13)
- Act on Implementation of Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of chemical substances and mixtures, amending and abolishing Directive 67/548/EEC and Directive 1999/45/EC and amending Regulation (EC) No. 1907/2006 (OG No. 50/12 and 18/13)
- Act on the Implementation of Regulation (EC) No 1907/2006 of the European Parliament and the Council concerning the registration, evaluation, authorisation and restriction of chemicals (OG No. 53/08 and 18/13)
- The National Chemical Safety Strategy (OG No. 143/08)



- Act on the Implementation of Regulation (EU) No. 528/2012 of the European Parliament and the Council in respect of making available on the market and use of biocidal products (OG No. 39/13 and 47/14)
- Act on the Implementation of Regulation (EU) No. 649/2012 considering the export and import of hazardous chemicals (OG No. 14/14)
- Regulation specifying goods subject to import and export licences (OG No. 40/13)
- List of biocidal products which have been granted approval for placing on the market (OG No. 15/14)
- Ordinance on the costs associated with making available on the market of biocidal products (OG No. 55/14)
- Ordinance on the implementation of the procedure for approval of biocidal products (OG No. 55/14)
- Ordinance on the manner of keeping the chemicals register and the manner and deadlines for submission of data from the register (OG No. 99/13 and 157/13)
- Ordinance on the storage of hazardous chemicals that act in the form of gas (OG No. 91/13)
- Ordinance on the requirements for carrying out activities of production, placing on the market and use of hazardous chemicals (OG No. 99/13, 157/13 and 122/14)
- Ordinance on good laboratory practice (OG No. 73/12)
- Ordinance on the requirements for legal and natural persons providing services or intermediary services with no direct contact with hazardous chemicals (OG No. 73/09)
- Ordinance on the requirements and the manner of acquiring and testing knowledge related to protection from hazardous chemicals (OG No. 99/13)
- Ordinance on limit values for exposure to hazardous substances at work and on biological limit values (OG No. 13/09 and 75/13)

### 3) WATER

- Water Act (OG No. 153/09, 63/11, 130/11, 56/13 and 14/14)
- Regulation on water quality standards (OG No. 73/13, 151/14 and 78/15)
- Ordinance on wastewater emission limit values (OG No. 80/03, 43/14, 27/15 and 3/16)
- Ordinance on special requirements for performing activities of sampling and testing of water (OG No. 13/09 and 75/13)

### 4) VETERINARY MEDICINE

- Act on Veterinary Medicinal Products (OG No. 84/08 and 15/15)
- Act on Official Controls Performed in Accordance with Regulations on Food, Animal Feed, Health and Welfare of Animals (OG No. 81/13, 14/14 and 56/15)
- Act on Contaminants (OG No. 39/13)
- Veterinary Act (OG No. 82/13 and 148/13)
- Ordinance on veterinary medicinal products (OG No. 30/09, 79/09, 14/10, 146/10, 32/11 and 67/13)
- Ordinance establishing principles and guidelines of good manufacturing practice for veterinary-medicinal product (OG No. 120/07)
- Ordinance on medicated animal feed (OG No. 120/11)

- Ordinance on the monitoring of certain substances and residues thereof in live animals and animal products (OG No. 79/08 and 51/13)
- Ordinance on undesirable substances in animal feed (OG No. 80/10, 111/10 and 124/12)

#### 5) ENVIRONMENT

- Act on Ratification of the Stockholm Convention on Persistent Organic Pollutants (OG-IT, No. 11/06)
- Environmental Protection Act (OG No. 80/13, 153/13 and 78/15)
- Act on the Implementation of Regulation (EC) No. 850/2004 on persistent organic pollutants (OG No.148/13)
- Regulation on environmental impact assessment (OG No. 61/14)
- Regulation on environmental permit (OG No. 8/14)
- Regulation on the development and implementation of the documents under the Strategy for marine environment and coastal zone management (OG No. 112/14)
- Regulation on the prevention of major accidents involving dangerous substances (OG No. 44/14)
- Ordinance on the environmental pollution register (OG No. 87/15)
- Ordinance on registry of installations containing hazardous substances and register of reported major accidents (OG No. 139/14)
- Ordinance on the register of use permits establishing integrated environmental requirements and of decisions on integrated environmental requirements for existing installations (OG No. 113/08)

#### 6) ENVIRONMENTAL STRATEGIC PLANNING DOCUMENTS

- National Environmental Action Plan (OG No. 46/02)
- Waste Management Strategy of the Republic of Croatia (OG No. 130/05)
- Waste Management Plan of the Republic of Croatia for 2007-2015 (OG No. 85/07, 126/10, 31/11 and 46/15)
- Environmental protection emergency plan (OG No. 82/99, 86/99 and 12/01)
- Decision on the adoption of the Plan for the protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the 2013-2017 period (OG No. 139/13)
- Contingency plan for accidental marine pollution (OG No. 92/08)
- Strategy for Sustainable Development of the Republic of Croatia (OG No. 30/09)
- Water Management Strategy (OG No. 91/08)

#### 7) WASTE MANAGEMENT

- Act on Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (OG-IT, No. 3/94)
- Act on Sustainable Waste Management (OG No. 94/13)
- Ordinance on waste management (OG No. 23/14, 51/14, 121/15 and 132/15)
- Ordinance on methods and requirements for thermal treatment of waste (OG No. 45/07)
- Ordinance on the methods and conditions for the landfill of waste, categories and operational requirements for waste landfills (OG No. 114/15)
- Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 103/14)

- Ordinance on management of waste electrical and electronic equipment (OG No. 42/14, 48/14, 107/14 and 139/14)
- Ordinance on the management of end-of-life vehicles (OG No. 125/15)
- Ordinance on the waste catalogue (OG No. 90/15)

#### 8) AIR QUALITY

- Air Protection Act (OG No. 130/11 and 47/14)
- Regulation on levels of pollutants in ambient air (OG No. 117/12)
- Regulation on the quality of petroleum-derived liquid fuels (OG No. 113/13, 76/14 and 56/15)
- Regulation on limit values for pollutant emissions from stationary sources into the air (OG No. 117/12 and 90/14)
- Ordinance on monitoring pollutant emissions from stationary sources into the air (OG No. 129/12 and 97/13)
- Ordinance on air quality monitoring (OG No. 3/13)

#### 9) AGRICULTURE

- Act on Agricultural Land (OG No. 39/13 and 48/15)
- Ordinance on the protection of agricultural land against pollution caused by harmful substances (OG No. 9/14)
- Ordinance on the methodology for monitoring the status of agricultural land (OG No. 43/14)
- Ordinance on agrotechnical measures (OG No. 142/13)
- Ordinance on the criteria for determining particularly valuable arable (P1) and valuable cultivable (P2) agricultural land (OG No. 151/13)
- Ordinance on the procedure of registration of plant protection products (OG No. 57/07, 119/09 and 142/12)

#### 2.2.4 *The mechanism for management of POPs in the Republic of Croatia (the division of responsibility and monitoring)*

##### 2.2.4.1 Pesticides

The ministry responsible for health is competent for issuance of decisions approving placement of biocidal products on the market.

Ministry responsible for agriculture is competent for registration, i.e. issuance of permits for movement and placing pest control products in veterinary medicine on the market.

Ministry responsible for agriculture is also competent for implementation of Regulation (EC) No. 1107/2009 and the Act on the Implementation of Regulation (EC) No. 1107/2009 concerning the placing of plant protection products on the market.

Croatian Centre for Agriculture, Food and Rural Affairs-Institute for Plant Protection and the Institute for Medical Research and Occupational Health are authorized professional institutions responsible for scientific and professional activities and tasks related to implementation of the Act on the Implementation of Regulation (EC) No. 1107/2009 concerning the placing of plant protection products on the market and the Regulation (EC) No. 1107/2009 concerning the placing of plant protection products on the market. Croatian Centre for Agriculture, Food and

Rural Affairs-Institute for Plant Protection and the Institute for Medical Research and Occupational Health are responsible for the evaluation of the documentation and risk assessment in the process of approval of plant protection products and auxiliary products, while in the field of veterinary science, research of the effectiveness of pesticides is carried out by the Faculty of Veterinary Medicine of the University of Zagreb.

Setting or changing of MRL is carried out at EU level in accordance with Regulation (EC) No. 396/2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin. Since 1 July 2013 the Republic of Croatia has been directly applying all implementing Regulations related to amendments to the maximum concentration of pesticides in accordance with Regulation (EC) No. 396/2005 with the participation in the working bodies responsible for their adoption, and for the implementation of which the ministry responsible for agriculture and the ministry responsible for health are competent, each within its own area of competence. The ministry responsible for agriculture cooperates with the Croatian Centre for Agriculture, Food and Rural Affairs-Institute for Plant Protection and the Institute for Medical Research and Occupational Health, as professional institutions which carry out scientific and expert activities and tasks in the field of pesticide residues.

Since 1 July 2013, the Act on the Implementation of Regulation (EC) No. 396/2005 has been in force in the Republic of Croatia and all amendments to Regulation (EC) 396/2005 are directly applicable. The Ordinance on methods of sampling for the official control of pesticide residues in and on products of plant and animal origin implements the provisions of Directive 2002/63/EC in Croatian legislation.

Monitoring of pesticide residues in and on food aims to establish the amount of pesticide residues, check whether they comply with the regulations setting MRL of pesticides and if manufacturers adhere to principles of good agricultural practices and thereby protect the health of consumers. National monitoring programme for pesticide residues complies with current legislation and standards for the implementation of monitoring carried out in Member States of the European Union. National monitoring programme for pesticide residues in and on food involves several stages: sampling and shipment of samples to the laboratory, sample processing, identification of present pesticides and determination of the concentration of remains, taking action when MRL is exceeded, possible risk assessment, and writing interim reports (Croatian Institute of Public Health and Ministry of Health) and the annual report on the implementation of the National Programme for monitoring pesticide residues in and/or the products of plant origin (Ministry of Agriculture, Department for sustainable use of pesticides).

After receiving the analysis results from the Croatian Institute of Public Health and the Croatian Veterinary Institute, the Department for sustainable use of pesticides prepares an annual report on national programmes for monitoring pesticide residues in food of plant and animal origin. According to the annual plan of official controls concerning food, the Directorate for Improvement of Health of the Ministry of Health carries out official controls in order to test pesticide residues in and on food of plant origin. The programme for monitoring pesticide residues in imported consignments is carried out by the Directorate for Veterinary and Food Safety in accordance with the annual sampling plan. Sampling of food of animal origin during import is carried out by the border veterinary inspectors.

#### 2.2.4.2 Industrial chemicals

The ministry responsible for health is competent for prohibition/restriction of production, use, import and export of chemicals, and the ministry responsible for environmental protection for monitoring/control and monitoring of discharge into the environment, as well as waste management in an environmentally sound manner.

Croatian Institute for Toxicology and Antidoping collects and maintains data from consolidated registers on chemicals produced and imported or introduces into the territory of the Republic of Croatia.

CAEN, as mentioned earlier, maintains the central environmental information system, which collects all data on discharge into the environment (through various databases), as well as data on environmental pollution monitoring, prepares reports and informs the concerned public about the state of the environment.

For the purpose of monitoring the implementation of obligations by operators/polluters for whom obtaining integrated environmental requirements/environmental permit is mandatory, coordinated inspections are carried out by all competent state administration bodies that stipulated specific environmental protection requirements.

The ministry responsible for environmental protection is competent for the management of equipment and liquids containing PCBs, monitoring the implementation of obligations by equipment owners, disposal of waste containing PCBs and other hazardous waste. Since this waste is hazardous it is necessary to dispose of it in an environmentally sound manner and for this purpose the ministry responsible for environmental protection tasks issues permits to companies that manage hazardous waste. CAEN keeps records of submitted forms, i.e. monitors the fulfilment of obligations.

#### 2.2.4.3 Unintentional production/release (PCDD/PCDF, HCBs, PCBs and PeCBs)

Control of emission/release of POPs listed in Annexes C of the Stockholm Convention PCDD/PCDF, HCBs, PCBs and PeCBs falls under the competence of several state administration bodies with regard to environmental components in which the release occurs, as follows: the ministry responsible for environmental protection, the ministry responsible for the protection of agricultural land, forestry as well as the ministry responsible for water management.

CEAN, among other things, collects data on release into all environment components pursuant to international and national obligations, and prepares annual reports.

In 1991, the Republic of Croatia became a Party to the LRTAP Convention as well as the Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP Protocol). Thereby it

became obliged to prepare annual calculations of emissions/inventory of certain pollutants within its territory and to deliver it to the LRTAP Convention Secretariat or CEIP.

Consequently, CEAN prepares annual reports on calculated pollutant emissions/inventory in the territory of the Republic of Croatia which are available to the interested public at its website <http://www.azo.hr/EmisijaOneciscujucihTvari>.

Calculation of emissions pursuant to the obligations under the LRTAP Convention is carried out in accordance with the EMEP methodology which covers five major sectors and the following pollutants: the main pollutants (sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC), ammonia (NH<sub>3</sub>), particulate matter (total suspended matter, PM<sub>10</sub>, PM<sub>2,5</sub>), heavy metals (cadmium (Cd), lead (Pb), mercury (Hg), arsenic (As), chromium (Cr), copper (Cu), nickel (Ni), selenium (Se) and zinc (Zn) and POPs (PAH, HCH, PCDD/PCDF, PCBs and HCBs).

The report serves as the document by which the Republic of Croatia proves the fulfilment of its obligations under international treaties or non-compliance, and represents the main indicator of implemented measures which the Republic of Croatia is required to carry out in order to reduce emissions of pollutants into the air.

Hrvatske vode (Croatian Waters) is responsible for monitoring the state of surface water, including coastal water and groundwater in the Republic of Croatia. Monitoring is carried out in accordance with an annual Monitoring Plan. Analyses are carried out in the Central Water Management Laboratory of Croatian Waters and in other laboratories authorised by the ministry responsible for agriculture. Croatian Waters is the competent body for the interpretation of monitoring results, whereon it prepares the Annual Report submitted to the ministry responsible for water management and to CAEN.

Also, in accordance with the Regulation on the prevention of major accidents involving dangerous substances (OG No. 114/08 and 139/14), data collection on specific POPs into the RIDSP database which is managed by CEAN is envisaged.

CEAN also maintains the EPR database which represents a single register on the release and transfer of pollutants into the air, water and/or sea and soil, and the generation, collection and treatment of waste.

Furthermore, the Department of Work and Occupational Safety within the Ministry of Labour and Pension System is responsible for unintentionally produced/released pollutants into the work environment.

#### 2.2.4.4 Competence for POPs control and monitoring

Monitoring of POPs in various matrixes can be observed from two aspects:

- control for the purpose of verification of concentration levels and comparison with prescribed normative and
- monitoring of distribution for research purposes, i.e. for load evaluation on environment and humans.

Environmental monitoring programmes are also carried out in research institutions within the framework of national and international research projects, however the number of analysed samples and sampling frequency are conditioned/restricted primarily by insufficient resources that limit the employment of more researchers and procurement of appropriate equipment.

Given the number of laboratories with proper equipment and competent staff to analyse POPs in various matrices, it is assessed that the Republic of Croatia has sufficient capacities and knowledge for analysis of organochlorine pesticides and PCBs in environmental samples, food and human biological samples. There is very little knowledge about “new” POPs and it is recommended to analyse the possibilities for testing and their analysis in certain matrices, adverse effects on human health and the environment. Depending on the results of those analyses certain new activities/measures could be carried out in the Republic of Croatia.

## 2.3 EVALUATION OF THE CURRENT STATE IN THE REPUBLIC OF CROATIA

### 2.3.1 *Pesticides – Annex A, Part I of the Stockholm Convention*

For the group of pesticides with POPs characteristics listed in Annex A – Part I, there are basic institutional and legal frameworks required for implementation and application of the Stockholm Convention. Production and use of these chemicals is prohibited in the Republic of Croatia.

As regards the production period and application of these chemicals in the Republic of Croatia, POPs can be divided into three groups:

- those that have never been permitted for movement in the Republic of Croatia (mirex)
- those in mass production and use but were prohibited 20-30 years ago (DDT, HCB, chlordane, heptachlor, aldrin, dieldrin, endrin, toxaphene),
- those used until recently (lindane and endosulfan).

The group of pesticides/POPs listed in Annexes A and B to the Stockholm Convention currently includes 15 substances, out of which the production is prohibited for 12 substances, while for 3 of them it is severely restricted, as specified for each Party in the Register of Specific Exemptions. New pesticides listed in Annex A in 2009 and 2011 are: chlordecone, alpha hexachlorocyclohexane, beta hexachlorocyclohexane, lindane, pentachlorobenzene and technical endosulfan and its isomers.

Pesticides with POPs characteristics are distinguished by their persistence in the environment and high potential for bioaccumulation and bioconcentration in the food chain. In organisms, they are usually deposited in fatty tissue and their elimination is very slow. Though they vary in their chemical structure and the mechanism of their toxicity is not always the same, in acute poisoning they generally cause severe cramping that can have a fatal outcome. They can reach the environment after accidents, through release from landfills, use in agriculture and forestry or by long-range atmospheric transport to distant areas where they were never used.

Most pesticides containing POPs (table 2.3-1) listed in Annex A of the Stockholm Convention were prohibited in the Republic of Croatia in the late nineteen sixties and seventies.

The last prohibited pesticide was endosulfan in 2007.

Table 2.3-1: List of active substances from the group of pesticides categorised as POPs and year of their prohibition

Active substances	Permitted since	Prohibited since
Aldrin	1958	1972
DDT	1944	In agriculture 1972
Dieldrin	1958	1972
Endrin	1957 (since 1971 only as rodenticides)	29/5/1989
HCB	1962	11/7/1980
Heptachlor	1956	7/1973
Chlordane	Data before 1955 not available	1971
Mirex	Not permitted for plant protection	
Toxaphene	1957	27/4/1982
Dicophol	1949	2001
HCH ( $\alpha$ and $\beta$ isomeres)	1944	1972
Chelevan	18/12/1969	31/12/1977
Lindane ( $\gamma$ HCH)	1944	1972* 2001
Technical endosulfan	-	1/7/2007**

\* In the regulation from 1972, lindane was prohibited only in certain plant protection substances containing lindane.

\*\* Application and sale of registered stocks was permitted until January 2008. Sale to end users and application by end users was permitted until January 2009.

When reaching a decision on the cessation of usage for some of the aforementioned active substances, consumption of existing stockpiles was permitted in order to prevent stockpiling of these substances. Even though the majority of prohibitions for pesticides containing POPs entered into force several decades ago, during the preparation of the inventory of pesticides containing POPs for the first NIP, data on their residues in environment, in/on food, animals and humans was found. This is a result of their intensive application in the past, as well as long persistence and slow decomposition.

#### 2.3.1.1 Present and future production, use and stockpiles of pesticides containing POPs

Pesticides containing POPs are not produced nor are active substances for production of finished formulations of pesticides imported in the Republic of Croatia. Details regarding past production and use of old POPs are described in the first NIP and the so-called “new” POPs lindane and endosulfan below.

In the Republic of Croatia pesticides are used for the following purposes:

- plant protection
- protection of animals against parasites,
- suppression of harmful insects on humans,
- in public health,
- to repel pest in wood and textile.

Today, there are numerous registered preparations that have gradually replaced the toxicologically unfavourable pesticides, including POPs. Future production is neither planned nor possible since production of pesticides containing POPs is prohibited.

During the process of inventarisation as part of the NIP Revision Project, data of historical use of lindane and endosulfan was collected and is presented below.



In the period from 1957 to 2001 in which the active substance lindane was used, permission for usage was given to different formulations of plant protection products from various manufacturers.

Two products containing the active substance lindane which were in use were Gamacid T50, a preparation produced by Pliva, and Dendroline, produced by Herbos d.o.o. Permission for trade in and application of Dendroline expired in 1998 and Dendroline was replaced with Deltacid, preparation containing the active substance deltamethrin. Afterwards, only Gamacid T50 was used. Last registered use of Gamacid T50 in the amount of 163 litres was registered in 2004 (*Source: Register of records from the Croatian Institute for Toxicology and Antidoping*).

Gamacid T50 was also on the List of finished Veterinary Medicines, Medicinal Supplements and Veterinary Medicinal Products Approved for Use (OG No. 75/99, 118/99, 21/00, 73/00 and 114/07). Registration was valid until 17 August 2005.

The distribution of PPP containing endosulfan as active substance was banned by the Decision of the Ministry of Agriculture, Forestry and Water Management (Class: UP/I-320-20/07-01/34, Reg.No. 525-02-07-1) of 28 May 2007. The producers and distributors of plant protection products were required to register remaining stocks until the end of June 2007.

Application and sale of registered stocks were permitted until January 2006. Sale to end users and application were permitted until January 2009.

In 2006, there were five registered plant protection products containing the active substance endosulfan (table 2.3-2). Stocks of plant protection product Thionex E 35 from 2001 to 2008 are shown in table 2.3-3.

*Table 2.3-2: Registered plant protection products containing the active substance endosulfan in 2006*

Product	Active substance	Producer	Agent	Permission valid	
				from	to
ENDOSULFAN 35 EC	endosulfan	Sinochem	AgroChem MAKS	15/12/2005	01/07/2007
GLOBAL E-35	endosulfan	Chromos Agro		19/06/2006	01/07/2007
ROCKY	endosulfan	Arysta	Hed	09/03/2006	01/07/2007
THIODAN E-35	endosulfan	Bayer CropScience	Bayer d.o.o.	28/02/2006	01/07/2007
THIONEX E 35	endosulfan	Makhteshim	Danon	23/05/1997	18/03/2007

*Table 2.3-3: Stocks of plant protection product Thionex E 35 from 2001 to 2008*

Thionex E 35 (L)				
Year	Initial stocks	Input	Output	Remaining stocks
2001	19	57	75	1
2002	1	167	61	107
2003	107	62	43	126
2004	126	2,976	1,230	1,872
2005	1,872	5,040	5,006	1,906
2006	1,906	924	2,401	429

Thionex E 35 (L)				
Year	Initial stocks	Input	Output	Remaining stocks
2007	429	2,328	2,750	7
2008	7	0	7	0

Company AgroChem MAKs distributed plant protection product ENDOSULFAN 35 EC, only in 2006 and 2007. At the end of 2007, according to the findings, there were no stocks of this product left.

Bayer d.o.o. possessed a decision on registration of a product on the basis of active substance endosulfan called Thiodan E 35. This product contained 350 g L<sup>-1</sup> of active substance. The decision for this registered product was valid until 1 July 2007, which was also the last year in which the product was sold, and the amount of 8,374 L was placed on the market.

During the NIP revision process the Croatian Centre for Agriculture, Food and Rural Affairs, Institute for Plant Protection, prepared a report on the use of lindane and endosulfan in the territory of the Republic of Croatia.

### Lindane

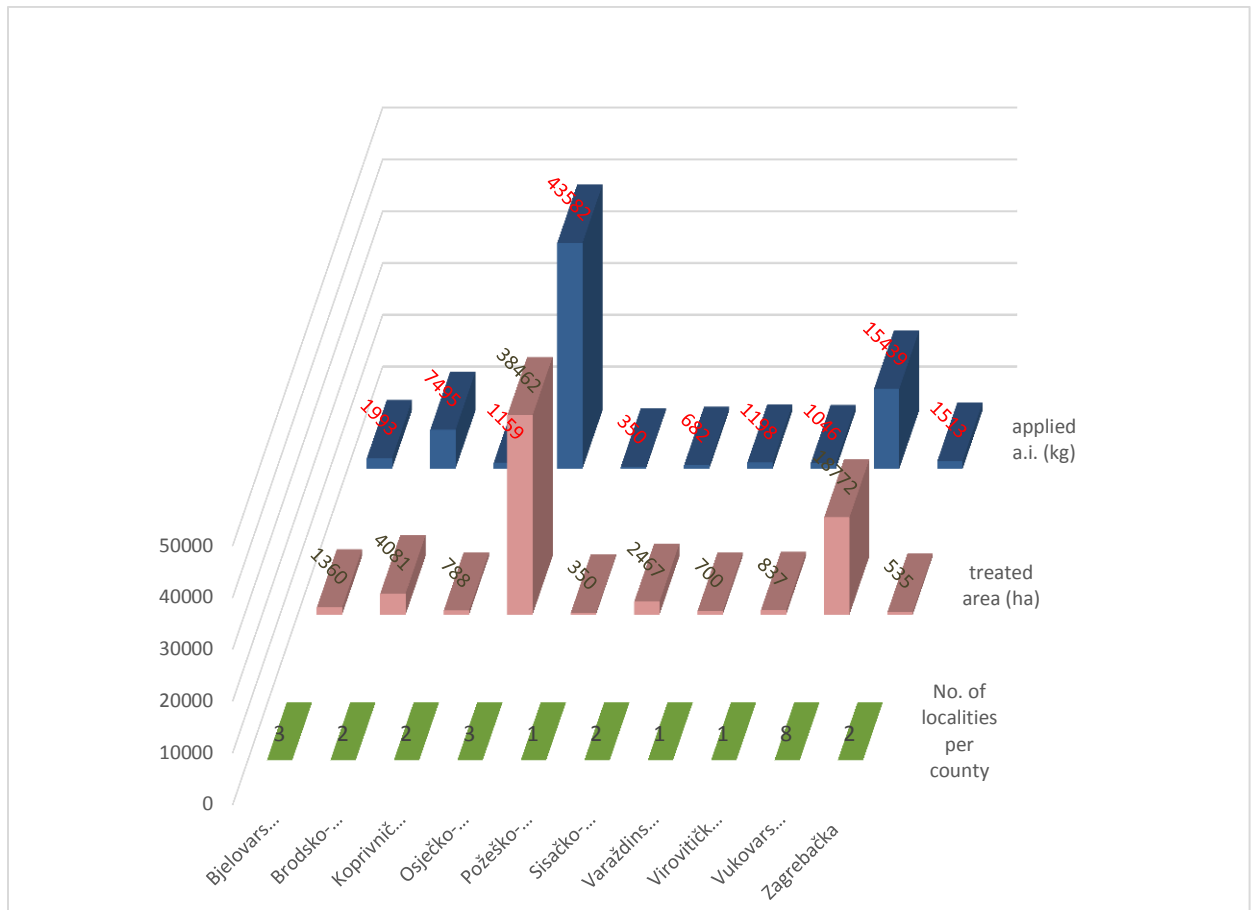
Lindane belongs to a group of dangerous insecticides and has a contact, gastrointestinal and fumigation effects. It was used to control biting pests and pests in the soil. Products that contained lindane were not permitted to be used on vegetables, tobacco, fodder crops, medicinal plants and grapevines. The use on oilseed rape was allowed only before flowering. Its use was not permitted in greenhouses, cultivation under plastic covering and warehouses. Plant protection products that contained lindane were permitted to be used only once every year on the same field, with the exception of forest plantations with two applications per year. In all cultivated plants the waiting period amounted to 42 days. Powder formulas were not permitted to be used from aircrafts.

Different organisms were suppressed with various amounts of plant protection products containing different amounts of lindane as the active substance (*Tanymericus* spp.-leaf weevil, *Zabrus tenebrioides*-wheat ground beetle, *Psaldium maxillosum*-black weevil, *Lixus scabricollis*, *Gryllus* spp.-field cricket, *Agriotes* spp.-click beetles, Melolonthinae-may beetles, *Euproctis chrysorrhoea*-brown tail (caterpillar), *Melolontha* spp.-cockchafer, *Melolontha melolontha*-cockchafer, *Agrotis* spp.-cut worm, Lepidoptera-moth (caterpillar) (Source: *Handbook on plant protection products in the Republic of Croatia, 1993.*).

Lindane was for many years used as a plant protection product for controlling a variety of pests on barley, oats, corn, sugar beet, oilseed rape, as well as for suppressing corn and sugar beet soil pests.

Graph 2.3-1 shows the amount of lindane applied for soil pests control according to the data collected by reporters as part of the reporting and forecasting activities in the period from 1978 to 1989 (Anon, 1979-1990).

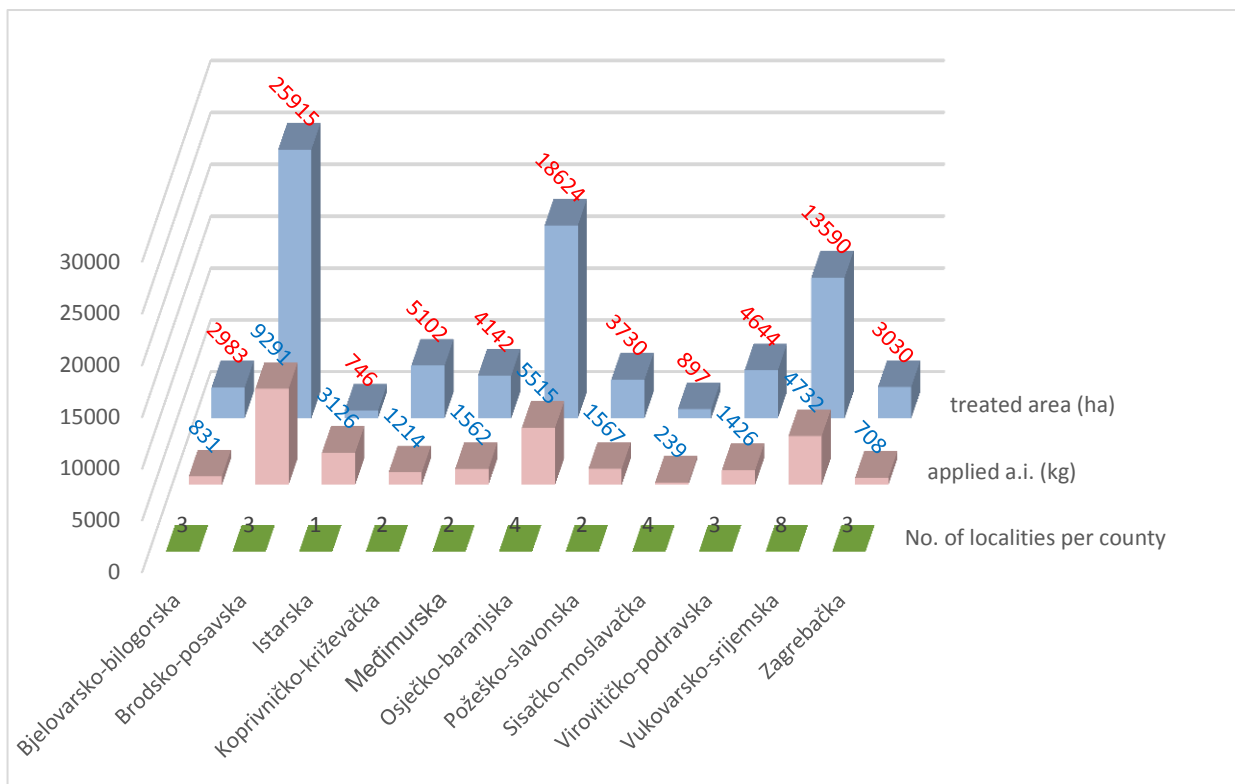
According to available data, the greatest quantities applied and the largest area of application of active substance lindane were in the Osijek-Baranja and Vukovar-Srijem County during soil pests control. Amounts of used substances ranged from 0.28 to 2.83 kg ha<sup>-1</sup>. The applied amount depended on the type of suppressed organism and accordingly the minimum application per hectare was in Sisak-Moslavina County and the highest in the Zagreb County (Graph 2.3-1).



Graph 2.3-1. Overview of chemical measures for control of disease, pests and weeds in the crops of the social sector in the Federal Republic of Croatia 1979-1989

Source: Applied quantities of lindane in soil pests control in the period from 1978 to 1989

The greatest quantities applied and the largest area of application of active substance lindane for suppression of pests on agricultural crops were in the Brod-Posavina, Osijek-Baranja and Vukovar-Srijem County. Amounts of used substances ranged from 0.23 to 4.19 kg ha<sup>-1</sup>. The applied amount depended on the type of suppressed organism and accordingly the minimum application per hectare was in Koprivnica-Križevci and the highest in Istria County (Graph 2.3-2).



Graph 2.3-2. Overview of chemical measures for control of disease, pests and weeds in the crops of the social sector in the Federal Republic of Croatia 1979-1989

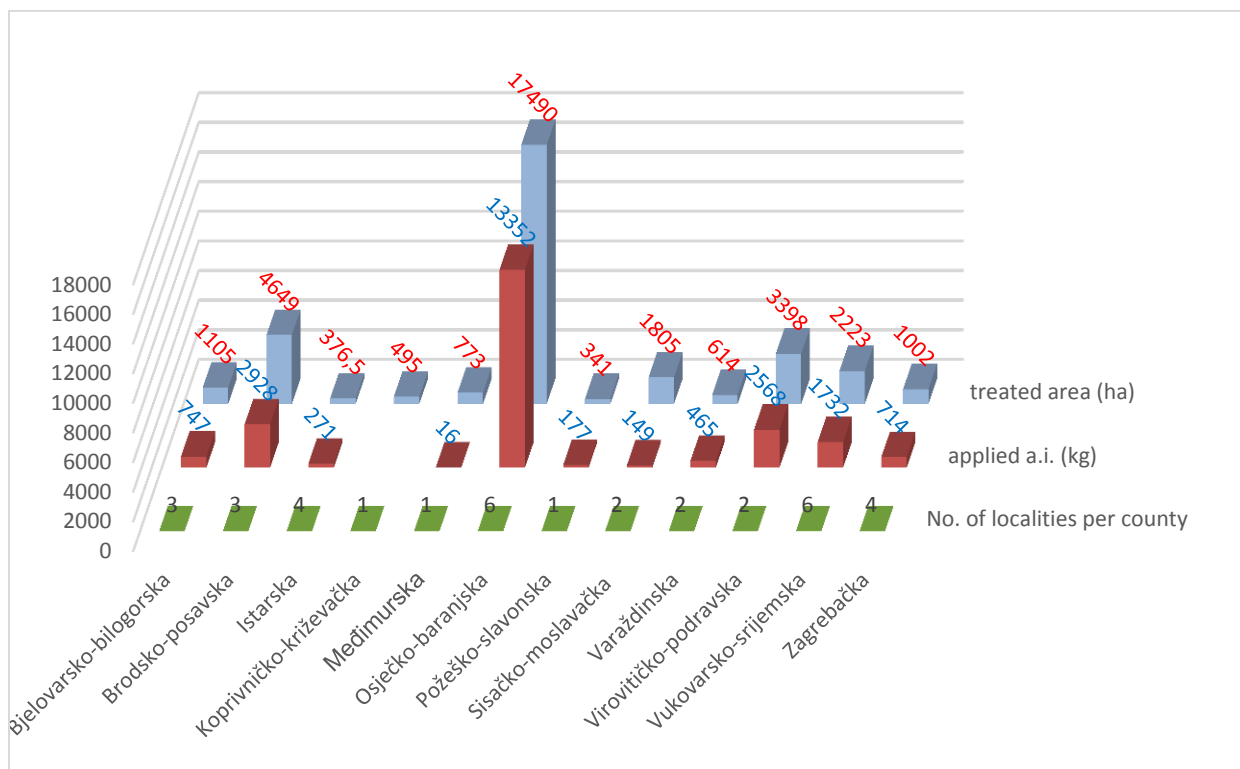
Source: Applied quantities of lindane in the pests control on agricultural crops in the period from 1978 to 1989

### Endosulfan

Endosulfan belongs to a group of very hazardous plant protection products (insecticides), with a contact and gastrointestinal effects. It is slightly dangerous for bees and very dangerous for fish. It was used to control biting pests and numerous sucking pests. It was used for treatment of fruit with core and fruit with stones, berries, grapevine before flowering, and industrial crops with the exception of tobacco. Application was forbidden in areas with danger of water pollution and wildlife poisoning, and for use on vegetables, medicinal plants and fodder crops. Plant protection products based on endosulfan were permitted to be used twice every year on the same field. Waiting period was 35 days for fruit trees and vines, and 49 days for oilseed rape, sugar and fodder beet. Application from aircrafts was allowed.

Different organisms were suppressed with various amounts of plant protection products based on endosulfan. The formulations of plant protection products contained the same amount of active substance, which is different from pesticides with lindane as the active substance (Aphididae-aphid, *Eriosoma lanigerum*-woolly apple aphid, *Hoplocampa* spp.-sawfly, *Anthonomus pomorum*-apple blossom weevil, *Hyphantria cunea*-fall webworm, *Phyllobius oblongus*-brown leaf weevil, *Meligethes aeneus*-pollen beetle, *Ceutorhynchus obstrictus*-cabbage seedpod weevil, *Ceutorhynchus pallidactylus*-cabbage stem weevil, *Calepitrimerus vitis*-grape leaf rust mite, *Eryophyes vitis*-grape leaf blister mite, *Eryophyes piri*-pear-leaf blister-mite).

Period of application for endosulfan was shorter than for lindane, and its application was not through direct contact with the ground, i.e. it was not used for soil pests control.



Graph 2.3-3. Overview of chemical measures for control of disease, pests and weeds in the crops of the social sector in the Federal Republic of Croatia 1979-1989, per county and surface area in ha

Source: Applied quantities of endosulfan on crops in the period from 1978 to 1989

The greatest quantities applied and the largest area of application of active substance endosulfan were in the Osijek-Baranja County for control of agricultural crops pests. Amounts of used substances ranged from 0.02 kg ha<sup>-1</sup> in the Međimurje County to 0.78 kg ha<sup>-1</sup> in the Vukovar-Srijem County depending on the type of suppressed organism (Graph 2.3-3).

Comparing data on the finding of pests which could be controlled with endosulfan until it was banned, it is evident that pests were found in more sites than there is data for the number of sites where endosulfan was used in the previous period. It can therefore be assumed that in other sites different active substances were used (Graph 2.3-4). This is consistent with the available data (Anon, 1979-1990) where other substances for pest control were listed.

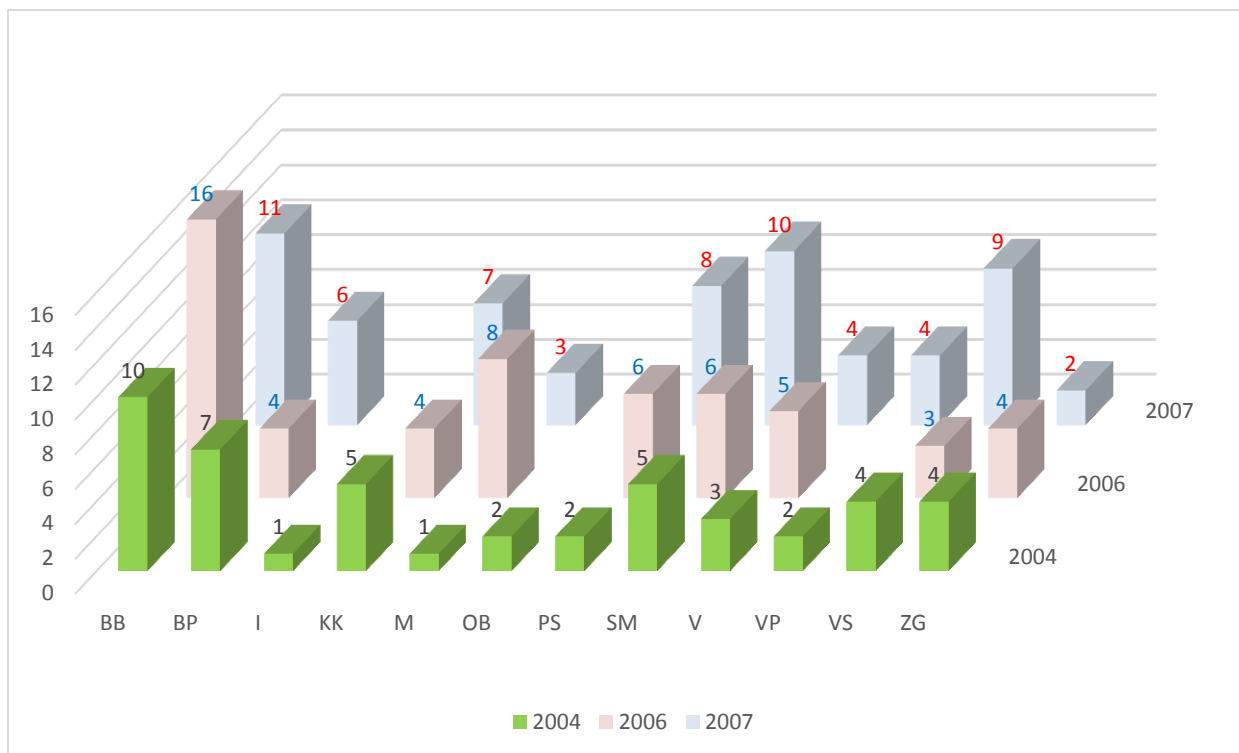


Figure 2.3-4. Report – Reporting and forecasting activities – Institute for Plant Protection in Agriculture and Forestry of the Republic of Croatia in 2004, 2006 and 2007

Source: Number of locations by Counties where the harmful organisms were found, and which could be controlled with endosulfan

The data shows that the largest quantities of lindane were applied in Osijek-Baranja and Vukovar-Srijem County for soil pests control. It would therefore be advantageous to carry out further research by which residues in the soil might be found, this being highly dependent on the quality of soil and cultures that were later grown. Considerably less residue can be expected if the lindane was applied for pests control in crops, since significantly smaller amounts reach the soil after application on plants. Lindane was the most widely used insecticide and was used for years on a variety of agricultural crops.

Endosulfan could be used on agricultural crops until 2007, and it might be possible to find residues in the soil or on evergreen plants in the vicinity of the treatment location. Insecticides based on endosulfan were frequently used in viticulture for controlling grapevine blister mite due to their good effectiveness. The application in viticulture was mainly once a year, inspring during the time of the buds swelling and the appearance of first leaves, and for this reason we can expect possible residues in the wine-growing areas of the Republic of Croatia. In fruit-growing, mainly in apple orchards, the application of endosulfan was limited mostly to suppress apple weevil.

### 2.3.1.2 Export and import of pesticides containing POPs

During the preparation of the Inventory, data provided by the Ministry of Finance, the Customs Administration was not used for the analysis of imported and exported quantities of pesticides

containing POPs. Namely, available tariff codes for pesticides include a large group of pesticides (3808 91 20 – insecticides based on chlorinated hydrocarbons) and it is therefore not possible to distinguish data at the level of active substances.

The Customs Administration introduced a new programming system for tariff codes in 2013. Before that, data was kept in the old system and given that tariff codes are changed every year, the time-consuming research and analysis of historical data has not been performed during the last inventory preparation. According to available data it can be concluded that pesticides containing POPs are not manufactured, used, exported or imported in/to the Republic of Croatia. With the aim of more effective monitoring of chemical flows, detailed analysis and alignment of requirements for different needs/purposes is necessary.

#### 2.3.1.3 Waste containing pesticides from Annex A, disposal locations and contaminated locations

Products, including pesticides, which are in use today, do not contain POPs and there is no possibility to generate waste containing them. Special landfills at which pesticides containing POPs were located did not exist. It can be assumed that certain amounts of waste with pesticides containing POPs were deposited at one of the municipal waste landfills and covered with layers of waste during the last thirty or more years, but they are hard to find at such locations. Empty packaging of old pesticides could be an exception. According to available data, which is often insufficient and unevenly displayed, so far no contaminated locations have been found.

Based on data related to the use of pesticides containing POPs in certain areas in the Republic of Croatia, several areas should be defined in which the presence, particularly of pesticides containing the so-called “new” POPs, would be analysed. By knowing the doses or concentrations of use, and understanding that pesticides were used in accordance with recommendations provided by the permit, there is very little prospect of finding locations significantly contaminated by pesticides. To confirm this, analysis is recommended.

#### 2.3.2 PCBs, Annex A, Part II of the Stockholm Convention

PCBs are toxic to fish, fatal in higher doses. Research also links PCBs to reproductive difficulties and suppression of the immune system in various wild animals. A large numbers of people have been exposed to PCBs through contaminated food. Due to the persistence of PCBs in human bodies, they are especially dangerous in prenatal exposure. PCBs also suppress the human immune system and are listed as probable human carcinogens.

PCBs were used as heat exchange fluids in industry, in electric transformers and capacitors, and as additives in paint, paper, sealants and plastics.

According to the Basel Convention, “waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCT) and/or polybrominated biphenyls (PBBs)” (code Y10) are classified as wastes to be controlled, i.e. as hazardous waste (Annex I).

### 2.3.2.1 Present, current and future production, use, stocks and disposal of PCBs

Past production and use of PCBs or equipment containing PCBs were described in detail in the first NIP.

In accordance with the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 105/08), equipment with PCB volumes of more than 5 dm<sup>3</sup> had to be decontaminated until 31 December 2010. Other equipment containing PCBs needs to be collected separately and delivered to the authorized person for decontamination and/or disposal as soon as possible, in accordance with the provisions of the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 103/14, hereinafter: the Ordinance) and the Act on Sustainable Waste Management, and no later than the deadline set by the Act on Ratification of the Stockholm Convention on Persistent Organic Pollutants.

The holder of equipment with PCB volumes greater than 5 dm<sup>3</sup> is required to record and to report this equipment to CAEN on the prescribed forms contained in the Annex to the Ordinance. In electrical capacitors, the threshold of 5 dm<sup>3</sup> refers to the total volume of all the individual elements that contain PCBs and form a part of the unit. For equipment that can reasonably be assumed to contain PCBs in the percentage of 0.05% to 0.005% of the total weight of liquid, the holder of equipment must also submit the results of measurements that prove the above, and the equipment must be decontaminated and/or disposed of in accordance with the requirements laid down in Article 9 of the aforesaid Ordinance.

Pursuant to the same Ordinance, CAEN is obliged to keep records of the submitted forms on equipment containing PCBs and PCB equipment that is decontaminated/disposed of. The Ordinance also prescribes that persons who possess a permit for management of waste PCB have to submit the Annual Report on decontaminated/disposed PCB to CAEN by 31 March of the current year for the previous year. Also, data on the management of this type of waste is submitted to the EPR which is also maintained by CAEN in accordance with the Regulation on the Environmental Pollution Register (OG No. 87/15).

Reporting to the European Commission on the implementation of the Ordinance is carried out by CAEN in accordance with the provisions of Directive 96/59/EZ and POPs Regulation. Every five years the ministry responsible for environmental protection and exchange of information with the Stockholm Convention Secretariat also submits a Report on the progress of the removal of PCBs, as well as within the regular Reporting pursuant to Article 15 of the Stockholm Convention.

First PCB Inventory was prepared by the Croatian Cleaner Production Centre in cooperation with the MENP in 2009. Analysis of the state of equipment containing PCB is an integral part of the First report on the implementation of the Stockholm Convention on Persistent Organic Pollutants for the period January 2009-December 2010.



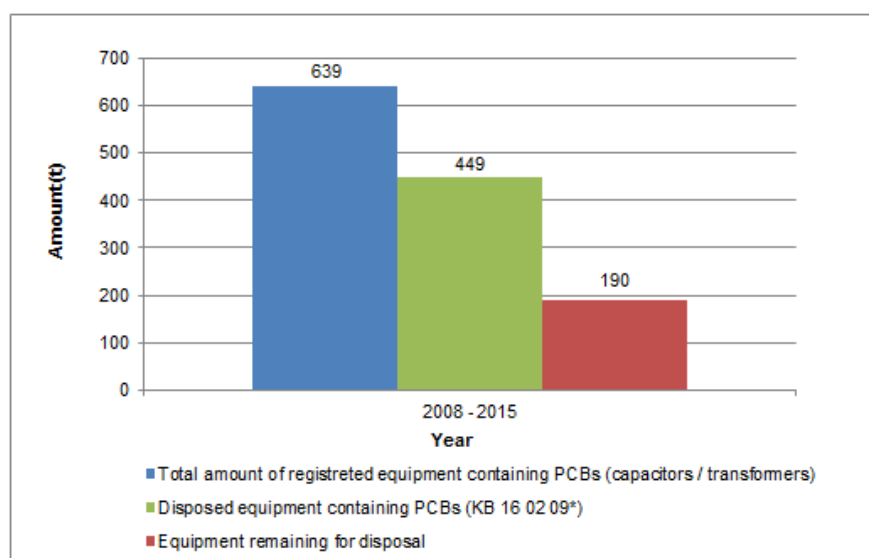
Corrections and updates of the 2009 Inventory are contained in the Review of data on the execution of obligations in accordance with the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (hereinafter: the Review), which covers the period from January 2008 to December 2015 and which CAEN has developed on the basis of the Ordinance and published in 2016 (<http://www.azo.hr/Izvjesca25>).

The Review was prepared using multiple data sources: EPR database, Annual report on decontaminated/disposed PCBs in 2014, reports on transboundary movement of waste (2009-2014) and data that CAEN collected from registered holders of equipment containing PCBs by the end of December 2015.

*The latest results of data analysis, until December 2015*

Equipment containing PCBs-capacitors and transformers, from 2008 to 2015;

- the total number of registered holders of equipment containing PCBs is 132 (40 of them own the remaining equipment to be disposed, of which 9 delivered a part of the equipment for disposal, and 92 delivered all of the equipment to be disposed)
- total amount of registered equipment containing PCBs is 639 tonnes (190 tonnes remain to be disposed while 449 tonnes have been disposed – KB 16 02 09\*) (Graph 2.3-5).



*Figure 2.3-5. The amount of equipment containing PCBs – total registered, disposed and remaining for disposal (tonnes (t)), January 2008-December 2015*

*Source: CAEN, 2016*

### *Conclusion*

Since the entry into force of the Ordinance in 2008, until December 2015 in the Republic of Croatia a constant increase of the amount of disposed equipment containing PCBs was recorded.

In the observed period (2008-2015) 132 holders who own a total of 639 tonnes of equipment containing PCBs (capacitors and transformers) were recorded.

In December 2015, it was established that 92 holders disposed all of the equipment (430 tonnes; 67%), while 40 holders are in possession of equipment that remains to be disposed (190 tonnes; 30%) of which 9 partially disposed of their equipment (19 tonnes, 3%).

Failure of to meet obligations by the holders who recognized their responsibilities is mostly caused by the economic situation and lack of funds for replacement and disposal of equipment containing PCBs.

It is assumed that there is a certain number of companies that did not recognize their own responsibilities and obligations in accordance with the Regulation and are therefore still not on the list of holders.

### 2.3.2.2 Legislation in the field of waste containing PCB

Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) was transposed into national legislation by the Ordinance on management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 103/14), so that they could be completely recycled and/or disposed due to the hazard they represent for the environment and human health.

Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls replaced the Ordinance on the management of polychlorinated biphenyls and polychlorinated terphenyls (OG No. 105/08).

### 2.3.2.3 PCB import and export

PCBs were never produced in the territory of the Republic of Croatia but there existed production of equipment in which liquids (oils) containing PCBs were used and which were imported for these purposes.

Equipment containing PCBs and liquids with PCBs are incinerated solely in incinerators for hazardous waste. Since there are no adequate incineration plants for this type of waste in the Republic of Croatia, all waste containing PCB has to be transported for disposal outside Croatia. The provisions of Regulation (EC) No. 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste, the Act on Sustainable Waste Management and the Basel Convention are applied to the transboundary movement of waste. Since this is hazardous waste, transboundary movement is conducted using the procedure of prior written notification and consent, so-called notification procedure. Consent for the transboundary movement of waste is issued by the ministry responsible for environmental protection.

#### 2.3.2.4 Locations for storage and decontamination of PCBs

The Republic of Croatia has in place a legal basis which sets the conditions for equipping locations used for storage and decontamination or treatment of hazardous waste, and thus also for PCB containing wastes.

Temporary storage of PCBs, waste PCBs or equipment containing PCBs for a period longer than 12 months prior to decontamination or disposal is prohibited. Places where waste is temporarily stored are the areas within plants throughout the Republic of Croatia, or warehouses of companies handling waste containing PCB.

#### 2.3.2.5 Locations contaminated with PCBs

A more detailed overview of locations contaminated with PCBs identified to date, as well as the experiences of remediation of PCBs-contaminated facilities are presented in the first NIP.

In order to acquire a full picture of the state of soil contamination in the Republic of Croatia, a systematic analysis should be carried out for all areas suspected to be contaminated with PCBs.

Based on the research conducted so far, a significant contamination with PCBs is suspected at two karst areas (Bilice and Zadar) (*Source: first NIP*). In these locations it is necessary to carry out an assessment of the real threat to water sources and recipients, of sorptive properties of land and of possibilities for removal of PCBs from land and water.

#### 2.3.3 *Estimate of POPs-PBDEs and preliminary inventory of PDBEs and HBB, Annex A of the Stockholm Convention*

In May 2009, the Conference of the Parties adopted a decision to add certain brominated flame retardants to Annex A of the Stockholm Convention:

- HBB
- two PBDEs:
  - c-octaBDE commercial octabromodiphenyl ether (hexaBDE and heptaBDE)
  - c-pentaBDE commercial pentabromodiphenyl ether (tetraBDE and pentaBDE).

Like all POPs, these chemicals have toxic properties, they are resistant to degradation and have a bioaccumulation potential. They spread through air, water and by migratory species across international boundaries and deposit far from their release points, where they accumulate in terrestrial and aquatic ecosystems. They are classified as substances with possible carcinogenic effect on the human organism and possess other chronic toxic effects.

The Stockholm Convention prohibits production, import and export of c-octaBDE and c-pentaBDE. Import and export are only permitted for environmentally-sound disposal/recovery. A specific exemption is provided for their use in products complying with the requirements of Part IV and V of Annex A. Parties to the Stockholm Convention, for which the amendments entered into force, have to meet the obligations leading to the removal or elimination of the listed brominated flame retardants. For HBB, listed in Annex A of the Stockholm Convention, there are no specific exemptions for production or use.

PBDE are a group of industrial aromatic organobromine compounds that have been in use since the 1970s as flame retardants in a wide range of products and articles. Since production of HBB stopped in 1970s, the majority of products and articles that contained HBB were disposed/deposited a long time ago. Thus, this chemical is not considered significant for the preparation of a preliminary inventory.

### 2.3.3.1 Preliminary inventory of PDBEs and HBB

The inventory was developed according to the guidelines provided in the *Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants, draft, 2014, UNEP* (hereinafter: the PDBE Guidance). The PDBE Guidance provides detailed guidelines for the development of the inventory, including methods of calculation. The first step included general assessment of the use of c-pentaBDE and c-octaBDE and collection of data on past and current imported quantities of products that contain or could contain c-pentaBDE and c-octaBDE.

- 1) According to the PDBE Guidance initial assessment of c-octaBDE and the related homologues (hepta-BDE, hexa-BDE and octaBDE) included estimations of the amount of equipment containing cathode ray tubes (monitors and TVs) per capita. It was prepared on the basis of available data, comparison with other countries in the region.

The goal of the initial assessment was to calculate the concentration of c-octaBDE in TVs and monitors with cathode ray tubes (CRT TVs and monitors) and thereby obtain data on the share of c-octaBDE (expressed in % of EEE weight).

- 2) For the purpose of preparing c-pentaBDE inventory, according to the PDBE Guidance, the calculated share of c-pentaBDE content in PUR foam in vehicles is used.

Since PBDEs were produced and used between 1975 and 2004 only those vehicles that are currently in use and were manufactured before 2004 were considered. It is estimated that the average life cycle of vehicles in the Republic of Croatia amounts to 11.8 years (*Source: Report on end-of-life vehicles, Croatian Environment Agency, 2013*). Vehicles at the end of their life cycle mostly remain in the Republic of Croatia and are recovered and recycled, therefore a revision of inventory is needed.

#### *Preliminary inventory of PBDEs in EEE based on the number of CRT devices per capita (TIER 1)*

The most important input data for the calculation of the quantities of PBDEs in EEE and WEEE are the population of the Republic of Croatia, average weight of CRT casings, and average content of c-octaBDE used in polymers to improve their flame retardant properties. For a detailed analysis data on the polymer fraction content in each device and c-octaBDE concentration in polymer fraction was used.

Preliminary assessment for c-octaBDE homologue (hepta-, hexa- and octa-BDE) in EEE in use in the Republic of Croatia (based on CRT/per capita calculation) is presented in table 2.3-4.

*Table 2.3-4: Preliminary assessment for c-octaBDE homologue (hepta-, hexa- and octa-BDE) in EEE in use in the Republic of Croatia*

Homologue	Distribution of homologues c-octaBDE	Stockpiled PBDEs in 2013
		Σ c-octaBDE (range) (kg)
hexaBDE	11%	953-2,763
heptaBDE	43%	3,726-10,804
octaBDE	35%	3,033-8,794

*Preliminary inventory of POP-PBDEs in CRT casings (TIER 2)*

Over 50% of the total quantity of PBDEs present in EEE are found in CRT casings (CRT TVs and computer monitors). The aim of this estimate was to establish the total quantity of PBDEs in CRT TVs and monitors.

HexaBDE and heptaBDE contained in EEE and WEEE are presented in table 2.3-5.

*Table 2.3-5: HexaBDE and heptaBDE in EEE and WEEE*

Homologues	Distribution of homologues c-octaBDE	POPs-PBDE in import for 2013 (kg)	POPs-PBDE in stocks for 2013 (kg)	POPs-PBDE in the waste stream in 2013 (kg)
Inventoried c-octaBDE		Σ c-octaBDE 5,822	Σ c-octaBDE 18,973	Σ c-octaBDE 4,018
HexaBDE	11%	0,640	2,087	441.9
HeptaBDE	43%	2,503	8,158	1,727.74

*Preliminary inventory of c-pentaBDEs in the transport sector*

The transport sector is one of the largest material flows of goods in the Republic of Croatia, which is becoming a significant waste and recycling flow as well. C-pentaBDE was within the transport sector mostly used for treatment of PUR foams for automotive seating, head rests and in vehicle parts made of plastics. Since POPs-PBDEs were produced and used until 2004, only data on vehicles manufactured before 2004 was used for the inventory. Calculation of homologues tetraBDE, pentaBDE, hexaBDE and heptaBDE according to life cycle stages is shown in table 2.3-6.

*Table 2.3-6: Calculation of homologues tetraBDE, pentaBDE, hexaBDE and heptaBDE according to life cycle stages*

	Distribution of homologues c-pentaBDE	POPs-PBDE in vehicles in use in 2013 (kg)	POPs-PBDE in imported used vehicles in 2013 (kg)	POPs-PBDE in end-of-life vehicles in 2013 (kg)
Estimated POPs-PBDE		Σ pentaBDE 7,950.813	Σ pentaBDE 20	Σ pentaBDE 230.528
tetraBDE	33%	2,623.76	6.6	76.07
pentaBDE	58%	4,611.47	11.6	133.70
hexaBDE	8%	636.06	1.6	18.44
heptaBDE	0.5%	39.75	0.1	1.15

### *Final inventory calculation for 2013 by congeners*

The final calculation of the total quantities of POPs-PBDEs commercial mixtures relevant for the Stockholm Convention (tetra-, penta-, hexa-, and heptaBDE homologues) is presented in table 2.3-7.

*Table 2.3-7: Sum of congeners based on the inventory of c-pentaBDE and c-octaBDE commercial mixtures*

Homologue	$\Sigma$ c-octaBDE (kg)	$\Sigma$ c-pentaBDE (kg)	$\Sigma$ ( $\Sigma$ c-octaBDE+ $\Sigma$ c-pentaBDE) (kg)
tetraBDE		2,706.43	2,706.43
pentaBDE	-	4,756.30	4,756.30
hexaBDE	2.529,54	656.10	2,382.26
heptaBDE	12.385,74	41.00	7,961.26
INVENTORY: $\Sigma$ tetra-, penta-, hexa- and heptaBDE (kg)	14.915,28	8,159.83	23.075,11

Issues identified during the process of collecting available data for the inventory were as follows:

- Nomenclature of products for the purpose of developing statistical reports differs from the categories of EEE. WEEE is classified according to Annex I. A of the Ordinance on management of waste electrical and electronic equipment and appliances, or rather, data on the quantities of WEEE is kept on the level of specific categories (1 to 10). On the other hand, the use of c-octaBDE is related to precisely determined product or types of equipment under category 3 (information technology (IT) equipment and telecommunications equipment) and 4 (consumer entertainment equipment) of the abovementioned Ordinance for which accurate data on the quantities was not available.
- Statistical data on estimated end-of-life vehicles differs from data collected by the CAEN through prescribed forms from collectors and processors of end-of-life vehicles. Statistical data is based on the number of vehicles without extended registration, while data on temporarily unregistered vehicles is not kept and recorded. It is proposed that a revision of the regulation in this regard and a change of forms is considered.
- Data on the year of manufacture of vehicles that was reported by collectors and processors of end-of-life vehicles was not available. Ordinance on the management of end-of-life vehicles applies only to certain categories of vehicles which do not include buses. It is proposed that a revision of the regulation in this regard is considered.
- During the inventory equipment testing was not carried out that would indicate a presence of PBDEs in EEE on the market. It is therefore proposed to carry it out, so that potential additional activities/measures could be proposed, and the concerned public should be informed about the results which should be incorporated during the next NIP revision.
- The obligatory sampling and analysis of parts resulting from treatment of end-of-life vehicles (plastic parts or PUR foam in seats) for the purpose of determining the presence and content of c-pentaBDE is not specifically prescribed. However, the Act on the Implementation of the POPs Regulation defines the content concentration and processes/methods of treating waste in an environmentally sound manner.

#### 2.3.4 DDT, Annex B of the Stockholm Convention

DDT was widely used during World War II to protect soldiers and civilians from malaria, typhus, and other diseases spread by insects. After the war, DDT was continued to be used to control disease, and for protection of a variety of agricultural crops.

The best known toxic effect of DDT is the thinning of egg shells among birds, especially present in birds of prey. Although its use had been banned in many countries, DDT was found in food from around the world. Over the past two decades, levels of DDT found in the meat of domestic animals are in constant decline but food intake remains the greatest source of exposure for the general population. Short-term acute effects of DDT on humans are limited, however long-term exposure is associated with chronic health effects. DDT has been detected in breast milk and it therefore represents a significant threat to the health of infants.

The use of DDT in agriculture in the Republic of Croatia was prohibited in 1972. DDT was not used for disease control in the last 50 years since in that period there was no incidence of malaria, and the application and production of dicofol are prohibited. Available data on DDT production, use, import and export is presented in section 2.3.1 along with other pesticides containing POPs.

#### 2.3.5 Estimate and preliminary inventory of PFOS, its salts and PFOSF, Annex B of the Stockholm Convention

PFOS compounds are extremely stable and humans can be exposed to it through food and the environment. Unlike other bioaccumulative compounds, they are deposited in the liver and plasma proteins and not in the fatty tissues. They interfere with the metabolism of thyroid hormones, lipids and liver, as well as lung development.

Production and use of PFOS is prohibited for all parties except for acceptable purposes and specific exemptions as provided for by Part I of Annex B of the Stockholm Convention.

PFOS and PFOSF have been listed in Annex B of the Stockholm Convention in 2009, with a large number of specific exemptions and acceptable purposes. Pursuant to the provisions of the Stockholm Convention, as already mentioned, every four years the need for these chemicals is examined, and if there is no registration in the Register of specific exemptions, it is concluded that there is no need for them. Considering the above, in May 2015 at the seventh Conference of the Parties COP-7, the Decision with the aim of further restriction of exemptions for PFOS and PFOSF was adopted (UNEP-POPs-COP.7-SC-7/5).

In the European Union (and in the Republic of Croatia since 2013) the list of exemptions which referred only to acceptable purposes (POPs Regulation) on whose requirements and progress it is necessary to inform the European Commission every four years was already reduced.

The specific purposes from the POPs Regulation:

- a) surfactants in a controlled galvanization systems, until 26 August 2015
- b) photoresistive and anti-reflective coatings for photolithographic procedures,
- c) photographic coatings applied to films, paper or printing plates,

- d) substances to prevent condensation of non-decorative coatings from hard chromium (VI) in closed systems,
- e) hydraulic fluids used in aviation.

In the Republic of Croatia, there were no registered applications for abovementioned purposes.

PFOS and its derivatives are used in numerous manufacturing processes because of their non-reactive properties, low surface tension, chemical stability, resistance to acids and high temperature. They have a specific use as agents in the electronics, semiconductor industry, and photography. At the international level they are used in small quantities in closed systems. The production chain can be rather complicated and downstream users may not know that PFOS has been used in the preceding manufacturing processes. PFOS are also used as drilling fluids in the mining industry, surfactants in the oil and gas industry, and as surfactants or wetting agents in the metal plating industry. The gradual discontinuation of the production of PFOS by the company 3M resulted in a considerable decrease of the consumption of PFOS and derivatives. According to received information, PFOS was being used in metal plating, in hydraulic fluids for the aviation industry, leather industry and in the photographic industry.

Production in the territory of the European Union was generally suspended in the period from 2000 to 2004, and the one present in firefighting foam should have been removed/eliminated by 2011. But the presence of PFOS is still possible in waste streams, especially in upholstery, carpets, furniture, paper packaging, etc.

#### 2.3.5.1 Preliminary PFOS inventory in the Republic of Croatia

The inventory was carried out in accordance with the guidelines *Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants UNIDO, UNITAR, UNEP, 2012.*

Based on the expert assessment the priority sectors for PFOS inventory in the Republic of Croatia were defined as follows:

- Croatian Firefighting Association
- chemical industry
- suppliers of chemicals
- textile and synthetic carpet manufacture and sales
- paper and cardboard manufactures
- surface treatment of metals.

According to the results of a survey carried out prior to the inventory and submitted by the Croatian Institute for Toxicology and Antidoping, as the institution that keeps records on the production, import and introduction into the territory of the Republic of Croatia of chemicals from the annual register of legal and natural persons in the Republic of Croatia, production, import and export of PFOS and its derivatives were not recorded.

During the development of the inventory, questionnaires on the production and use of PFOS in semi-finished and finished products and/or parts thereof were collected. Companies and



organisations that submitted the completed questionnaires indicated that they did not produce, use or place on market products that contain PFOS, nor did they have stocks or produced waste that contains PFOS. The largest national operator in civil aviation stated that it never used hydraulic oils containing PFOS in its operation.

The Croatian Firefighting Association is the main firefighting organisation that integrates all fire-fighting organisations and units in the Republic of Croatia. All firefighting units, depending on the size and area they cover, usually perform fire drills 2 to 4 times per year. Average amount of foam utilised per drill amounts to 20-50 L.

Ten to twenty years ago, a very popular foam in the Republic of Croatia was the "Light Water" produced by the company 3M. It was synthetic foam that contained PFOS. There is no data on existing stocks or the quantities of that foam used during fire drills. There is a considerable number of small quantities of foam about which little is known. Often they are left by ships during repair or similar in the Republic of Croatia. All foams used today contain only fluorotelomers.

It should be noted that the inventory of firefighting foams is very extensive, involving many stakeholders and requiring thorough planning.

Following the above, it is recommended that firefighting organisations carry out detailed assessment/analysis of firefighting foams in use in order to remove doubts regarding the possibility of the presence of stock, and to inform users about the potential risks to health and the environment.

#### *2.3.6 Estimate and preliminary inventory of HBCD/HBCDD, Annex A of the Stockholm Convention*

HBCD was listed in Annex A to the Stockholm Convention in May 2013 along with specific exemptions for production and use relating to the following:

- production: as allowed for the Parties listed in the Register of Specific Exemptions in accordance with the requirements of Part VII of Annex A and
- use: EPS and XPS in buildings in accordance with the requirements of Part VII of Annex A.

HBCD/HBCDD is very persistent in the environment, has a potential for long-range environmental transport and has a strong potential of bio-accumulation and biomagnification. It is highly toxic to aquatic organisms. There is little information on the toxicity of HBCD for humans but vulnerable groups could be at risk, particularly with regard to the observed neuroendocrine and developmental effects.

Each Party that registered the exemption for the production and use of HBCD for EPS and XPS in buildings shall take necessary measures to ensure that EPS and XPS containing HBCD can be easily identified throughout their life cycle through labelling or other means.

There are no natural sources of HBCD. HBCD was first introduced in the 1960s and through introduction of fire safety regulations for articles, vehicles, and buildings in the 1980s began to be widely used as a flame retardant additive in polystyrene materials. The four main products in which HBCD is used are EPS, XPS, HIPS and back coating agents for textiles of which the largest area of application of EPS and XPS is for insulation and packaging.

The European Union has as early as 2008 classified HBCDD as a substance of great concern due to its PBT properties. Because of that in 2011 HBCDD was included in Annex XIV of the REACH Regulation, pursuant to which production and application in polystyrene foams in the territory of the European Union was permitted until 21 August 2015 only for temporary authorizations that are allowed by the ECHA, and requests submitted until 13 February 2014. In January 2016, in the Official Journal of the European Union a Summary of the European Commission Decision on authorizations for the placing on the market for use and/or for use of substances listed in Annex XIV to the REACH Regulation, concerning the authorized use of formulation of flame-retarded EPS to solid unexpanded pellets using HBCDD as the flame retardant additive (for onward use in building applications) and production of flame-retarded expanded polystyrene (EPS) articles for use in building applications, with the date of the review of 21 August 2017 was published since socio-economic benefits outweigh the risk to the environment.

In the territory of the European Union there were no recorded requests for authorization for the production of XPS, only for EPS.

The European Commission on behalf of the European Union and the Member States in November 2014 informed the United Nations depositary of being unable to accept the adopted decisions, and requested a temporary so-called "opt-out" until 21 August 2015 (the so-called "sunset date") due to legal issues and harmonization of EU legislation. However, since the debate at the level of European institutions extended over the indicated deadline, in August 2015 the European Commission again delivered a notice to the depositary of the United Nations in order to extend the so-called "opt-out" because the conditions for implementation of the indicated Decision at the level of the European Union were still not ensured but without defining a date on which this was expected.

But, by Commission Regulation (EU) 2016/293 of 1 March 2016 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I (Text with EEA relevance) (OJ L 55/4, 2.3.2016) in the European Union/the Republic of Croatia it is prohibited/production/use and placing on the market is restricted, except for authorizations granted in accordance with the REACH Regulation, or the above mentioned Summary Decisions of the European Commission from January 2016.

#### 2.3.6.1 Preliminary HBCD/HBCDD inventory

According to available data from the Croatian Institute for Toxicology and Antidoping, it was established that the company Dioki d.d., the largest former producer of EPS in the Republic of Croatia, was importing HBCD to the Republic of Croatia during the period 2005-2009 (table 2.3-8). The company Dioki d.d. ceased production in 2011.

*Table 2.3-8: Import of HBCD for the needs of the company Dioki d.d. 2005-2009*

	2005 (kg)	2006 (kg)	2007 (kg)	2008 (kg)	2009 (kg)
Import	10,000	48,000	72,025	72,200	36,000

In 2014, a questionnaire on the use of HBCD was prepared and distributed through the Croatian Employers' Association and Croatian Chamber of Economy to potential producers and users of articles containing HBCD.

Additionally, data obtained from the Croatian Bureau of Statistic related to production, import and export of EPS and XPS and granulated polystyrene was analysed.

Data on production, import and export of EPS and XPS in the period 2000-2013 is presented in table 2.3-9.

*Table 2.3-9: Production, import and export of EPS, XPS 2000-2013*

Year	Import (tonnes)	Export (tonnes)	Production (tonnes)	Stockpiles in country (import + production-export) (tonnes)
2000	1,052	1,357	3,654	3,349
2001	2,339	583	1,421	3,177
2002	4,283	90	-	4,193
2003	5,766	41	-	5,725
2004	6,364	29	1,020	7,355
2005	7,762	35	1,680	9,407
2006	8,129	4,772	10,970	14,327
2007	8,478	8,741	15,770	15,507
2008	8,100	8,935	16,226	15,391
2009	6,350	7,003	11,053	10,400
2010	5,963	6,121	9,029	8,871
2011	7,474	202	581	7,853
2012	6,414	-	-	6,414
2013	7,128	-	-	-

According to data submitted in the questionnaires, in 2013 four companies produced/imported EPS and XPS granulate in the total amount of 5,173 tonnes, with the HBCD content of 0.7-1% by weight, or 6,503 tonnes of HBCDs.

Estimated total quantity of HBCD on the market in the Republic of Croatia of 6,503 tonnes can be considered a rough estimate, since not all necessary data was available in order to consider and assess in more detail the historical use of HBCD in the Republic of Croatia.

Companies that confirmed the use of HBCDs said that their suppliers were for the most part in the process of replacing HBCD with other, less harmful alternative substances, because they were aware of their existence in the European Union market.

If by the end of the NIP revision process the need is identified for further use in accordance with the permitted exemption, the Republic of Croatia is obliged to notify the Secretariat of the Stockholm Convention, or as the European Commission on behalf of the European Union to register with the Register of specific exemptions.

European Union legislation has greater restrictions with respect to the adopted Decisions regarding the exemptions to production and use of HBCD, primarily related to the REACH Regulation and the POPs Regulation with the prohibition/restriction of production and use in terms of permitted authorizations for specific purposes and specific time.

### *2.3.7 Estimate and inventory of unintentional production and release of chemicals*

PCDD/PCDF, HCB, PCB, and PeCB belong to POPs formed and released unintentionally from anthropogenic sources, identified in Annex C of the Stockholm Convention. These compounds include organic matter containing chlorine formed and released from thermal processes and as a result of incomplete combustion or chemical reactions.

PCDD has been associated with numerous adverse effects in humans and it is classified as possible human carcinogen. PCDF is structurally similar to PCDD, shares many of its toxic effects and has been detected in breast-fed infants. In high doses, HCB is lethal to some animals and, at lower levels, adversely affects their reproductive fitness. HCB has been found in various types of food.

Over the last two decades, a total reduction of the levels of PCDD/PCDF, PCB, HCB and PeCB in the environment and in humans was achieved through control over industrial emission sources. However, taking into account the persistency of these compounds, there exists a need to continue the efforts for reduction of anthropogenic emissions into the environment with the ultimate goal to reduce and eliminate the indicated compounds, where possible. Furthermore, the concentrations of the indicated compounds in feed should additionally be reduced in order to limit human exposure.

PeCB as a new POPs was listed in Annex C of the Stockholm Convention in 2009 and has not been intentionally produced or used in the Republic of Croatia.

Its utilisation at the international level is associated with the use in electronic equipment as flame retardant and a by-product in the production of the pesticide quintozene. The most significant source of PeCB is release during the combustion process in waste incineration plants and thermal processes of combustion of various waste/materials, including coal.

In RIDSP/RRMA data on installations which report amounts of hazardous substances, i.e., raw materials, intermediates and products is maintained. In RIDSP/RRMA there is no data on these substances, and in the EPR only releases of PCDD/PCDF into the air are recorded.

#### *2.3.7.1 Stockholm Convention requirements related to unintentional release*

All parties to the Stockholm Convention shall:

- promote the application of available, feasible and practical measures to achieve a realistic and meaningful level of release reduction and source elimination
- promote the development, and where appropriate, require the use of substitute materials, products and processes to prevent the formation and release of the chemicals listed in Annex C

- promote and phase in the use of BAT as soon as practicable, but no later than four years after the entry into force of the Stockholm Convention, for new sources in the particular source categories (Annex C – Parts II and III) which have the potential for formation and release of POPs in Annex C into the environment
- promote the use of BAT and best environmental practices for existing sources within the categories listed in Annex C – Parts II and III, and for new sources within the categories listed in Annex C – Part III.

The Stockholm Convention also contains provisions and general guidance on BAT and BEP, aimed at preventing or reducing releases of the chemicals listed in Part I.

### 2.3.7.2 Regulations related to unintentionally produced POPs

Strategies and plans:

- Strategy for Sustainable Development of the Republic of Croatia
- Decision on the adoption of the Plan for the protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the 2013-2017 period
- Waste Management Strategy of the Republic of Croatia
- Waste Management Plan of the Republic of Croatia for the 2007-2015 period

Acts and subordinate regulations:

- Environmental Protection Act
- Regulation on environmental permit
- Regulation on the prevention of major accidents involving dangerous substances
- Ordinance on the Environmental Pollution Register
- Ordinance on the registry of installations in which dangerous substances are present and on the register of reported major accidents
- Act on the Implementation of Regulation (EC) No. 850/2004 on persistent organic pollutants
- Act on Sustainable Waste Management
- Air Protection Act
- Regulation on levels of pollutants in ambient air
- Ordinance on Air Quality Monitoring
- Regulation on limit values for pollutant emissions from stationary sources into the air
- Ordinance on monitoring pollutant emissions from stationary sources into the air
- Water Act
- Regulation on water quality standards
- Ordinance on emission limit values for wastewater discharges
- Act on Agricultural Land
- Ordinance on the Methodology for Monitoring the Status of Agricultural Land
- Ordinance on the Protection of Agricultural Land from Pollution
- Act on Contaminants
- Ordinance on Limit Values for Exposure to Hazardous Substances at Work and on Biological Limit Values.

### 2.3.7.3 The current and planned monitoring of unintentionally formed/released POPs listed in Annex C, PCDD/PCDF into the environment in the Republic of Croatia

As mentioned earlier, CAEN has an obligation, besides the other mentioned reports, to prepare annual reports on monitoring pollutant emissions from stationary sources in the territory of the Republic of Croatia on the basis of collected and processed data from annual reports on measurement of pollutant emissions from stationary sources into the air and other available data on emissions (<http://www.azo.hr/GodisnjiIzvjestajOPracenjuEmisija>).

Furthermore, CAEN prepares reports on PCDD/PCDF emission inventory as an integral part of regular annual reports on the inventory of pollutant emissions into the air in the territory of the Republic of Croatia. POPs emission inventory, including PCDD/PCDF, in the Republic of Croatia was initiated in 1996 in accordance with international EMEP/CORINAIR methodology, which is officially accepted by the Executive Body of the LRTAP Convention.

The last National Inventory Report for 2014 was prepared on the basis of the new and updated *EMEP-EEA Air Pollutant Emission Inventory Guidebook 2013*, which represents technical guidelines for the preparation of national emission inventories following the guidelines of the LRTAP Convention and Directive 2001/81/EC of the European Parliament and of the Council of 23 October 2001 on national on national emission ceilings for certain atmospheric pollutants. Collection of data on POPs in the RIDSP/RRMA is planned.

In RIDSP/RRMA data on installations which reported quantities of certain hazardous substances i.e. raw materials, intermediates and products (in small and large quantities according to Annex I of the Regulation on the prevention of major accidents involving dangerous substances) is maintained, and there are no reported POPs for the period 2008-2014.

CAEN within the environmental information system maintains EPR, which represents a collection of data on sources, type, quantity, manner and place of release and transfer of pollutants in the environment (air, water and/or sea and soil) as well as generated, collected and treated waste. By 2015 and the entry into force of the new Ordinance on the Environmental Pollution Register (OG No. 87/15), the Register was maintained on the basis of the old Ordinance on Environmental Pollution Register (OG No. 35/08). In addition to PCDD/PCDF release into the air, there were no other reports of POPs listed in Appendix C.

Table 2.3-10 shows the total POPs emissions (PAHs, PCDD/PCDF, HCB and PCB) in the Republic of Croatia in 2013, according to the inventory for the obligations under the LRTAP Convention.

*Table 2.3-10: Emission of POPs in the Republic of Croatia, 2013 according to Report on the inventory of pollutant emissions into air in the territory of the Republic of Croatia for 2013 (LRTAP Convention)*

Emissions in 2013-kg year <sup>-1</sup> for PAH, HCB and PCB; g I-TEQ year <sup>-1</sup> for PCDD/PCDF	PAH	PCDD/PCDF	HCB	PCB
Combustion in thermal power plants and energy conversion plants	2.2	0.3	1.4E-02	4.0
Combustion in non-industrial combustion plants	5,834.1	12.2	8.2E-02	3.1E-02

Emissions in 2013-kg year <sup>-1</sup> for PAH, HCB and PCB; g I-TEQ year <sup>-1</sup> for PCDD/PCDF	PAH	PCDD/ PCDF	HCB	PCB
Combustion in industry	464.0	0.6	2.3E-02	0.6
Production processes	54.7	0.34	0	2.8E-01
Extraction and distribution of fossil fuels and geothermal energy	0	0	0	0
Solvent and other product use	279.5	9.6E-04	0	4.3E+02
Road transport	128.5	0.4	NA	NE
Other mobile sources and machinery	49.5	5.00	3.1E-03	1.5E-02
Waste recovery and disposal	1.6E-04	1.92	5.5E-03	2.8E-03
Agriculture	0	0	0	0.0
<b>TOTAL</b>	<b>6,812.6</b>	<b>20.7</b>	<b>0.1</b>	<b>430.4</b>
Other sources (not included in total emissions)	87.3	6.1E-03	0	0
EMISSIONS PER CAPITA, g per capita <sup>-1</sup>	1.6	4.9E-03	3.0E-05	0.1
EMISSIONS PER SURFACE AREA, kg km <sup>-2</sup>	0.1	3.7E-04	2.3E-06	7.6E-03
EMISSIONS PER GDP, g EUR <sup>-1</sup>	0.2	4.8E-04	3.0E-06	1.0E-02
Share, %	PAH	PCDD/ PCDF	HCB	PCB
Combustion in thermal power plants and energy conversion plants	3.3E-02	1.3	11.3	0.9
Combustion in non-industrial combustion plants	85.6	58.9	64.4	7.2E-03
Combustion in industry	6.8	3.0	17.7	0.13
Production processes	0.8	1.6E+00	0	6.4E-02
Extraction and distribution of fossil fuels and geothermal energy	0	0	0	0
Solvent and other product use	4.1E+00	4.6E-03	0	98.9
Road transport	1.9	1.7	-	-
Other mobile sources and machinery	0.7	24.1	2.4	3.4E-03
Waste recovery and disposal	2.314E-06	9.3E+00	4.3	6.6E-04
Agriculture	0	0	0	0
<b>TOTAL</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Other sources (not included in total emissions)	1.3	2.9E-02	0	0

The Republic of Croatia, as a Party to the POPs Protocol to the LRTAP Convention complies with obligations to maintain emissions of POPs at the level of emissions in the base year 1990. Accordingly, table 2.3-11 provides an overview of quotas for certain POPs.

*Table 2.3-11: Emissions for certain POPs according to the POPs Protocol*

POPs	Emission levels in 1990
PAH	15.7 t
PCDD/PCDF	35.1 g I-Teq
HCB	0.16 kg
PCB	483.1 kg

National inventory is updated annually in order to reflect the availability of new information, sectoral improvements, changes in methodology used, identification of time series inconsistency, the accuracy of the estimates and the reduction of uncertainty.

The total emissions in the Republic of Croatia in the period from 1990 to 2013, by pollutant, are provided in table 2.3-12.

Table 2.3-12: Total emissions by pollutant (POPs) in the Republic of Croatia, 1990-2013, according to the obligations under the LRTAP Convention

POP	Unit	1990	1995	2001	2007	2009	2011	2013	Share of change 1990-2013
PCDD/PCDF	g I-Teq	35.1	21.61	21.67	22.26	23.48	20.56	20.71	-41%
PAH	t	15.7	5.35	4.58	4.90	5.17	6.68	6.81	-56%
HCB	kg	0.16	0.09	0.11	0.12	0.11	0.13	0.13	-17.80%
PCB	kg	483.13	468.32	434.09	435.80	433.60	432.99	430.40	-10.90%

#### 2.3.7.4 UNEP methodology used for PCDD/PCDF emission inventories according to the obligations under the Stockholm Convention

First PCDD/PCDF emission inventory in the Republic of Croatia was prepared based on the UNEP methodology, *Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases*, for 2001 during the preparation of the first NIP.

During the inventory process as part of the NIP revision project and the development of the Proposal of the second NIP for the preparation of PCDD/PCDF inventory revision for 2001, and the inventories for 2007, 2009 and 2013, the UNEP methodology, *Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs under Article 5 of the Stockholm Convention UNEP, 2013* (hereinafter: the Toolkit) was used which ensures a complete, consistent and clear inventory of PCDD/PCDF emissions into the environment.

PCDD/PCDF releases are accompanied by releases of other unintentional POPs, which can be minimized or eliminated by the same measures that are used to address PCDD and PCDF releases. The Toolkit recommends, for practical reasons, that inventory activities are focused on PCDD/PCDF, as these substances are indicative of the presence of other unintentional POPs. They are considered to constitute a sufficient basis for identifying and prioritizing sources as well as for devising applicable control measures and for evaluating their efficacy for all POPs listed in Annex C of the Stockholm Convention.

The Toolkit/UNEP methodology proposes five basic steps in the inventory of PCDD/PCDF:

- (1) identification of the main PCDD/PCDF source groups
- (2) identification of categories, current activities and potential release routes of PCDD/PCDF in the environment
- (3) data collection on specific processes
- (4) quantification of PCDD/PCDF sources and emission inventory using the emission factors, and
- (5) summary of the inventory.

#### 2.3.7.5 Baseline release estimates and updating of PCDD/PCDF

Parties to the Stockholm Convention have to prepare their initial release estimates and update these estimates at regular intervals in order to establish and maintain the consistency for discerning meaningful trends in releases over time.



The basis for the release estimate is the first national (or regional) inventory of sources and releases of POPs listed in Annex C, usually as part of the NIP developed in accordance with Article 7 of the Stockholm Convention.

This first inventory serves as a basis against which subsequent updated release estimates are updated in order to establish trends in releases over time and evaluate the efficacy of the adopted strategies for minimizing and/or eliminating unintentional PCDD/PCDF and other POPs releases.

The first baseline release estimate for PCCD/PCDF according to UNEP methodology/Toolkit from 2001, as mentioned above, for the purposes of the first NIP, is presented in table 2.3-13.

*Table 2.3-13: Assessment of PCDD/PCDF emissions into the environment in 2001*

No.	Source group	Annual PCDD/PCDF emissions (g I-TEQ year <sup>-1</sup> )				
		Air	Water	Land	Products	Waste
1	Waste Incineration	1.4				3.6
2	Ferrous and Non-Ferrous Metal Production	3.1	?	?		22.3
3	Power Generation and Heating	105.7?				20.6
4	Mineral Products	2.3				0.01?
5	Transport	0.9				
6	Open Burning Processes	2.2?		1.7		?
7	Production of Chemicals and Consumer Goods	0.1	0.002?		0.8	0.3?
8	Miscellaneous	0.001?			?	?
9	Disposal and Landfill	?	?	?		2.7
<b>1-9</b>	<b>Total</b>	<b>115.7?</b>	<b>0.002?</b>	<b>1.7?</b>	<b>0.8?</b>	<b>49.5?</b>

The values shown are medians; empty boxes show that the impact of potential release route is insignificant.

? Potential release route is significant, but either data or activity is missing.

? After the number means that the number (data) is not representative because some sub-categories have not been fully processed.

*Table 2.3-14: Results of revised inventory of PCCD/PCDF emissions for 2001*

No.	Source group	Annual PCDD/PCDF emissions (g I-TEQ year <sup>-1</sup> )				
		Air	Water	Land	Products	Waste
1	Waste Incineration	1.3885	0.0000	0.0000	0.0000	3.5703
2	Ferrous and Non-Ferrous Metal Production	1.5216	0.0010	0.0000	0.0000	23.2100
3	Power Generation and Heating	111.1563	0.0000	0.0000	0.0000	0.2750
4	Mineral Products	2.2806	0.0000	0.0000	0.1118	0.0373
5	Transportation	0.7083	0.0000	0.0000	0.0000	0.0000
6	Open Burning Processes	0.0577	0.0000	0.0087	0.0000	0.0000
7	Production of Chemicals and Consumer Goods	0.0001	0.0320	0.0000	0.7169	0.2325
8	Miscellaneous	0.0030	0.0000	0.0000	0.0000	0.0092
9	Disposal and Landfill	0.0000	0.1555	0.0000	0.9158	5.4350
10	Contaminated Sites and Hotspots				0.0000	0.0000
<b>1-10</b>	<b>Total</b>	<b>117.116</b>	<b>0.189</b>	<b>0.009</b>	<b>1.744</b>	<b>32.769</b>
<b>GRAND TOTAL</b>		<b>152</b>				

The inventory was revised by taking into account changes according to the new revised UNEP Toolkit from 2013, as well as new data on activities. The results of revised inventory of PCCD/PCDF emissions for 2001 are provided in table 2.3-14.

#### 2.3.7.6 Overview of environmental release trends

There are currently no municipal waste incineration plants in the Republic of Croatia (the only such incineration plant was closed in 2002). Three cement plants have valid permits for energy recovery of certain types of combustible waste.

Croatian metal industry includes production of steel, welded and seamless steel pipes, reinforcement, rolled wires, wire mesh for construction works and casting of metal. The primary production of pig iron produced in blast furnaces existed until 1992. It should be noted that in 1990 and 1991 the required quantity of sinter and pellets necessary for the production of pig iron was imported from abroad, so these activities were not present in the Republic of Croatia at that time. The steel was produced in the open hearth furnaces with Siemens Marten process up to 1991 and in the electric-arc steel furnaces which are still present in the Republic of Croatia. There are two steel manufacturers in Croatia. There was only one facility for primary aluminium production but it was shut down during 1991.

The waste management system was established, and the implementation of the integrated waste management system is ensured through application and meeting of the objectives defined by the Act on Sustainable Waste Management, Waste Management Strategy and Waste Management Plan of the Republic of Croatia for the 2007-2015 period.

In order to depict emission trends, the same methodology for PCCD/PCDF emission inventories was used for 2007, 2009, 2011 and 2013. The total PCCD/PCDF emissions by source group for the mentioned years are presented in Table 2.3-15-2.3-18.

*Table 2.3-15: Total PCCD/PCDF emissions by main source groups in 2007*

No.	Source Groups	Annual Releases (g TEQ year <sup>-1</sup> )				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.600	0.000	0.000	0.000	0.004
2	Ferrous and Non-Ferrous Metal Production	0.008	0.000	0.000	0.000	0.008
3	Power Generation and Heating	13.498	0.000	0.000	0.000	0.466
4	Mineral Products	0.267	0.000	0.000	0.022	0.007
5	Transportation	0.245	0.000	0.000	0.000	0.000
6	Open Burning Processes	0.126	0.000	0.019	0.000	0.000
7	Production of Chemicals and Consumer Goods	0.001	0.000	0.000	0.005	0.001
8	Miscellaneous	0.003	0.000	0.000	0.000	0.011
9	Disposal and Landfill	0.000	0.207	0.000	0.076	7.917
10	Contaminated Sites and Hotspots				0.000	0.000
<b>1-10</b>	<b>Total</b>	<b>14.747</b>	<b>0.207</b>	<b>0.019</b>	<b>0.103</b>	<b>8.413</b>
<b>Grand Total</b>		<b>23.49</b>				

Table 2.3-16: Total PCCD/PCDF emissions by main source groups in 2009

No.	Source Groups	Annual Releases (g TEQ year <sup>-1</sup> )				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.570	0.000	0.000	0.000	0.004
2	Ferrous and Non-Ferrous Metal Production	0.040	0.000	0.000	0.000	0.282
3	Power Generation and Heating	14.434	0.000	0.000	0.000	0.374
4	Mineral Products	0.200	0.000	0.000	0.014	0.005
5	Transportation	0.291	0.000	0.000	0.000	0.000
6	Open Burning Processes	0.028	0.000	0.004	0.000	0.000
7	Production of Chemicals and Consumer Goods	0.001	0.000	0.000	0.838	0.000
8	Miscellaneous	0.003	0.000	0.000	0.000	0.011
9	Disposal and Landfill	0.000	0.314	0.000	0.062	8.454
10	Contaminated Sites and Hotspots				0.000	0.000
<b>1-10</b>	<b>Total</b>	<b>15.566</b>	<b>0.314</b>	<b>0.004</b>	<b>0.914</b>	<b>9.131</b>
<b>Grand Total</b>		<b>25.93</b>				

Table 2.3-17: Total PCCD/PCDF emissions by main source groups in 2011

No.	Source Groups	Annual Releases (g TEQ year <sup>-1</sup> )				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.144	0.000	0.000	0.000	0.001
2	Ferrous and Non-Ferrous Metal Production	0.044	0.000	0.000	0.000	0.286
3	Power Generation and Heating	19.809	0.000	0.000	0.000	0.566
4	Mineral Products	0.171	0.000	0.000	0.012	0.004
5	Transportation	0.266	0.000	0.000	0.000	0.000
6	Open Burning Processes	0.033	0.000	0.005	0.000	0.000
7	Production of Chemicals and Consumer Goods	0.000	0.000	0.000	0.805	0.000
8	Miscellaneous	0.003	0.000	0.000	0.000	0.012
9	Disposal and Landfill	0.000	0.297	0.000	0.070	7.479
10	Contaminated Sites and Hotspots				0.000	0.000
<b>1-10</b>	<b>Total</b>	<b>20.470</b>	<b>0.297</b>	<b>0.005</b>	<b>0.888</b>	<b>8.347</b>
<b>Grand Total</b>		<b>30.01</b>				

Table 2.3-18: Total PCCD/PCDF emissions by main source groups in 2013

No.	Source Groups	Annual Releases (g TEQ year <sup>-1</sup> )				
		Air	Water	Land	Products	Residue
1	Waste Incineration	0.025	0.000	0.000	0.000	0.044
2	Ferrous and Non-Ferrous Metal Production	0.051	0.000	0.000	0.000	0.334
3	Power Generation and Heating	20.054	0.000	0.000	0.000	0.392
4	Mineral Products	0.151	0.000	0.000	0.009	0.043
5	Transportation	0.222	0.000	0.000	0.000	0.000
6	Open Burning Processes	0.020	0.000	0.003	0.000	0.000
7	Production of Chemicals and Consumer Goods	0.000	0.000	0.000	0.663	0.000
8	Miscellaneous	0.003	0.000	0.000	0.000	0.012
9	Disposal and Landfill	0.000	0.373	0.000	0.109	7.066
10	Contaminated Sites and Hotspots				0.000	0.000
<b>1-10</b>	<b>Total</b>	<b>20.527</b>	<b>0.373</b>	<b>0.003</b>	<b>0.781</b>	<b>7.892</b>
<b>Grand Total</b>		<b>29.6</b>				

Overall trend of PCCD/PCDF emissions by release vectors and by year is shown in graph 2.3-6.

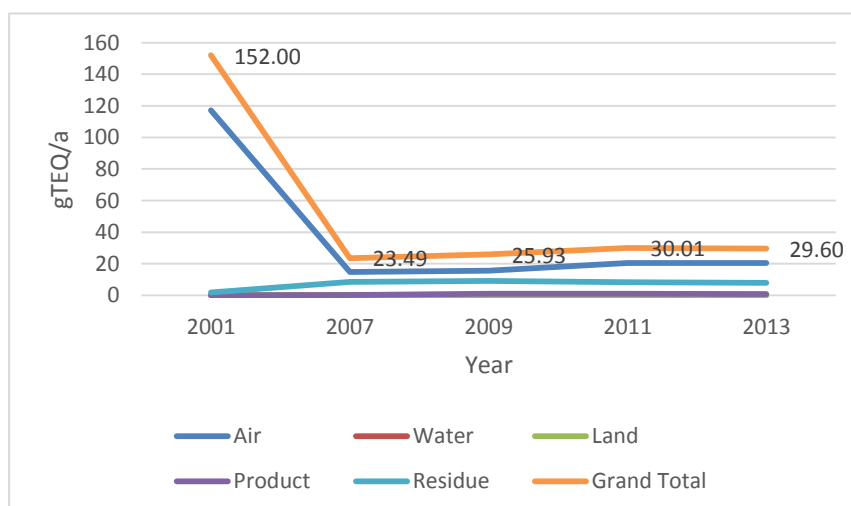


Figure 2.3-6: Overall trend of PCCD/PCDF emissions

### 2.3.8 Information on stockpiles, contaminated sites and waste

During preparation of the POPs inventory, no major POPs stockpiles or waste containing POPs (except for equipment containing PCB that is either faulty or represents an alternate solution/reserve) were recorded. However, the sites potentially contaminated with POPs have been identified that require further investigation to determine their level of contamination for the purpose of establishing the real risk to human health and the environment. During the process of inventory within the framework of the preparation of the first NIP, in cooperation with the Croatian Army and the Ministry of Defence, preliminary laboratory testing of soil from eastern Slavonia (where a great number of military armoured vehicles was destroyed) was carried out. Results did not indicate significant local contamination with PCBs. Given the fact that this area is used for intensive agricultural production, besides for PCB soil samples were also analysed for DDT and lindane. Those results have also not indicated any increased contamination at those sites.

### 2.3.9 Summary of future production, use and release of POPs in the year in which the inventory is being developed

At the moment in the Republic of Croatia, there is no on-going or planned production of POPs because the same is prohibited or restricted. Current and projected production, use and release of POPs are presented in table 2.3-19.

Table 2.3-19: Current and projected production, use and release of POPs

Year	2013	2020	2030
Pesticides	Production (tonnes)		
Aldrin	0	0	0
Chlordane	0	0	0
Dieldrin	0	0	0
Endrin	0	0	0
Heptachlor	0	0	0
Hexachlorobenzene	0	0	0

Year	2013	2020	2030
Pesticides	Production (tonnes)		
Mirex	0	0	0
Toxaphene	0	0	0
Lindane	0	0	0
Endosulfan	0	0	0
Use (tonnes)			
Aldrin	0	0	0
Chlordane	0	0	0
Dieldrin	0	0	0
Endrin	0	0	0
Heptachlor	0	0	0
Hexachlorobenzene	0	0	0
Mirex	0	0	0
Toxaphene	0	0	0
Lindane	0	0	0
Endosulfan	0	0	0
DDT			
Production (tonnes)	0	0	0
Use (tonnes)	0	0	0
Industrial chemicals			
Production (tonnes)	0	0	0
Stocks/use (tonnes)			
Total mass of equipment containing PCB	706.89**	*	*
HBCD/HBCDD	6.5	*	*
PFOS, PBDE	preliminary inventory	0	0
Unintentional production releases			
PCDD/PCDF (g TEQ year <sup>-1</sup> )			
Waste incineration	0.07	*	*
Ferrous and non-ferrous metal production	0.38	*	*
Power generation and heating	20,054.4	*	*
Mineral products	0.20	*	*
Transport	0.22	*	*
Uncontrolled combustion processes	0.02	*	*
Production of chemicals and consumer goods	0.66	*	*
Disposal and landfill	7,066.5	*	*
Miscellaneous	0.02	*	*
HCB (kg)	0.13	*	*
PCB (kg)	430.40	*	*
PeCB (kg)	0	*	*

\* to be determined

\*\* total mass of identified equipment containing PCB, of which 55% was disposed in 2013 (70% in 2015)

### 2.3.10 Existing programmes for monitoring POPs releases and their impact on human health and the environment

As part of the National Residue Monitoring Programme (NRMP) samples of freshwater fish in aquaculture are tested for organochlorine compounds (pesticides) as well as dioxin-like PCBs and dioxins. Samples of marine fish in mariculture are also tested for organochlorine compounds (pesticides) as well as dioxin-like PCBs and dioxins.

### 2.3.10.1 Concentrations in surface waters

Monitoring of old and so-called new POPs in waters of the Republic of Croatia in the period from 2007 to 2013

POPs listed in Annexes of the Stockholm Convention, which have not been identified as part of the water status monitoring in the Republic of Croatia in the period 2007 to 2013 and belonging to the group of older POPs: mirex, chlordane, toxaphene; and new POPs – chlordecone, HBB, PFOS, its salts and PFOSF, tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether), hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether), PCDD and PCDF.

During the period from 2007 to 2013, as part of the monitoring of the water status in the Republic of Croatia, identification of the following POPs was carried out: DDT total, 4,4' DDT, 2,4 DDT, 4,4' DDE, 4,4' DDD,  $\alpha$  HCH,  $\beta$  HCH,  $\gamma$  HCH (lindane), HCB, heptachlor, aldrin, dieldrin, endrin,  $\alpha$ -endosulfan, pentachlorobenzene, and PCBs (PCB 28, PCB 52, PCB 101, PCB 138 and PCB 153) at a total of 191 monitoring stations. The analysis was conducted by the Central Water Management Laboratory of Croatian Waters and other laboratories authorized for water sampling and analysis by the ministry responsible for water management. It is important to note that at the monitoring stations only some or all of the aforementioned POPs were being identified. Sampling frequency of analyte differed depending on the monitoring station or on the measured analyte itself.

Changes in the legal basis, scope, types and method of water testing affected to a great extent the monitoring programme in the period 2007-2013 as is shown below.

The legal basis, scope, type and method of water testing in the Republic of Croatia in the 2007-2013 period underwent various changes and modifications.

By the National Water Protection Plan in 1999 categorisation of waters was set by which watercourses, parts of watercourses, other waters and parts of the sea under the impact of pollution from land, were arranged into groups. These groups must meet the requirements stipulated for a particular type of water, pursuant to the Regulation on Water Classification (OG No. 77/98 and 137/08).

In addition to the mandatory parameters (oxygen regime, nutrients, microbiological and biological indicators), which defined the general function of water, additional indicators have also been analysed (metals, organic compounds-mineral oils, phenols, PCBs, DDT and lindane, and radioactivity) according to special programmes.

Limit values of indicators for type I water from the Regulation on Water Classification amounted to DDT  $< 0.001 \mu\text{g L}^{-1}$ , and for PCBs and lindane  $< 0.01 \mu\text{g L}^{-1}$ , while for example endrin, and heptachlor were not an integral part of the abovementioned Regulation. In 2007, at four monitoring stations on the Sava River-Jesenice, Oborovo, Jasenovac and downstream of Županja PCB, DDT and lindane were identified. At all monitoring stations these indicators were below

the detection limit, in the case of PCB the indicator was at limit values for type III waters, and for the other two indicators within the limit values for type I waters.

It is also important to note that some of the collaborating laboratories that were involved in the Water Monitoring Programme in 2007 had detection limit values that were too high to correspond to the prescribed type of water. Therefore, in assessing water quality a common principle was applied according to which for some indicators the assessment was not carried out when the limit of detection was equal to or higher than the permitted limit values for each type.

In general, systematic monitoring was until 2009 conducted in order to determine the general ecological functions of water, monitoring the loads from point and diffuse sources of pollution, and water quality monitoring at water intakes for drinking water and similar. Regulation on Hazardous Substances in Water (OG No. 137/08), in line with Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council, prescribes which substances and in which concentrations in the water are considered dangerous as well as quality standards for priority substances, however the same Regulation did not prescribe the assessment of the chemical status of surface waters. Since 2009, the national monitoring is starting to be aligned with the Water Framework Directive and the Water Act prescribes monitoring of water status which required the establishment of monitoring of volume, level, flow, speed, hydromorphological characteristics, ecological and chemical status and ecological potential for surface waters. In 2009 a surveillance monitoring was established for general assessment of the water status in the river basin districts, and the criteria for selection of monitoring stations for surveillance monitoring were taken from Annex V of the Water Framework Directive. In the same year, the chemical status was not determined for water bodies in which monitoring stations were located, because at that time the boundaries of water bodies were not yet known, instead the evaluation of chemical status was made at each monitoring station.

In 2010, the new Water Act came into force with the legal framework for the establishment of a harmonized monitoring and it also defined the monitoring objectives, which included identification of long-term changes, identification of changes due to the implementation of measures in areas which have been found not to meet the requirements for good status and the identification of unknown relationship.

In order to determine the water status prescribed by the above mentioned Act, in 2010 the Regulation on water quality standards came into force, which prescribed water quality standards for surface and groundwater, introduced the type of surface water and type-specific water status assessment system. Since the above mentioned Regulation was not complete, transitional provisions were applied together with the standards that were applied for the assessment of water status.

The report on the status of surface waters in the Republic of Croatia for 2012 includes the assessment of chemical and ecological status of inland surface waters in accordance with the said

Regulation. The ecological status of surface waters was determined by biological, hydromorphological, chemical and physio-chemical elements that accompany the biological elements, and the chemical status was determined in relation to the priority and the other (specific) pollutants.

The Monitoring Plan for surface water in 2012 was partly aligned with the requirements of the new regulations, and related to the implementation of surveillance monitoring in the monitoring stations of inland surface waters in the period from 2009 to 2012 because of the extensive nature of surveillance monitoring and limited capacities of analytical laboratories. Given the monitoring objectives the Water Act itself prescribes three types of monitoring: surveillance, operational and investigative.

The purpose of surveillance monitoring is to identify long-term changes, and it is performed in a sufficient number of surface water bodies in order to enable water status assessment in each basin or sub-basin district.

Among other analyses, indicators of chemical status were analysed, or rather 33 priority and priority hazardous substances (with the exception of pentabromodiphenyl ether, chloralkanes, di (2-ethylhexyl) phthalate, tributyltin compounds and triphluraline) at 38 monitoring stations in rivers and 5 monitoring stations in lakes. Frequency of sampling of physio-chemical indicators and indicators of the chemical status was 12 times.

#### *Water status in the period from 2009 to 2012*

Changes in the water status in the period from 2009 to 2012 were analysed based on the results of monitoring water status indicators at monitoring stations that were part of the monitoring programme in 2009 and 2012. Water status assessment in this period was carried out in line with the Regulation on water quality standards from 2010. Preliminary defined standards were used in the interim period, until the adoption of the Regulation on water quality standards currently in force.

Assessment of the chemical status of rivers is based on the monitoring results of priority substances in rivers in the water column. Indicators of chemical status in sediment and biota were not evaluated, due to the extremely small number of monitoring stations at which testing was carried out and the inability to extrapolate them. In the water column the state of all priority substances except pentabromodiphenyl ether, chloralkanes, tributyltin compounds and trifluralin was monitored. Indicators of chemical status were assessed in relation to the permitted average annual concentration, and permitted maximum annual concentration where applicable. In 7% of river water bodies the prescribed quality standards for the aquatic environment were not met. From the group of active substances of pesticides cyclodiene pesticides appear in 20 water bodies, endosulfan in 5 water bodies and, in several cases chlorfenvinphos, chlorpyrifos, pentachlorobenzene and HCB. From the group of hydrocarbons, PAHs, mostly fluoranthene and benzo (g, h, i) perylene, and less volatile halogenated hydrocarbons are present. Due to an extremely small number of monitoring stations at which priority or priority hazardous substances were measured reliability of the assessment of chemical status is relatively low.



Assessment of the chemical status (based on priority substances) of lakes was based on the monitoring results of priority substances in the period 2009-2012. As in the case of rivers the numerical assessment of the known load impact was used for lakes at which monitoring was not carried out, with intensity and spatial distribution of point and diffuse pollution sources as a starting point. Chemical status indicators were assessed in relation to the permitted average annual concentration, and permitted maximum annual concentration where applicable. Exceedance of the permitted concentrations of priority substances as well as contamination from specific pollutants was not found at any lake.

Assessment of the chemical status of groundwater in alluvial aquifers was carried out based on the results of national monitoring for 2012. Chemical elements in regards to which the status of groundwater was assessed, as well as quality standards for assessment, were defined according to the Regulation on water quality standards. In 2012, poor chemical status was determined with regard to the pesticide active compounds at the monitoring station in the Zagreb water body (mean annual concentration of the herbicide atrazine of  $0.12 \mu\text{g L}^{-1}$ ). Tetrachloroethylene concentration levels, and thereby also the sum of trichloroethylene and tetrachloroethylene concentration levels exceeded the maximum permitted concentration at 3 monitoring stations. All other groundwater bodies are in good state.

#### *Pollution by priority substances and specific pollutants from various sources*

Sources of water pollution by priority substances and specific pollutants from agriculture can be found in agricultural land excessively and/or inappropriate treated with pesticides. According to the data from Hrvatske vode (Croatian Waters) on consumption of individual pesticide active substances, in 2012 in the Republic of Croatia around 2,205 tonnes of active substances (hereinafter: a.s.) or 2 kg of pesticide a.s. per hectare of arable land was used. We are talking about 157 pesticide a.s. contained in the formulations that were applied in 2012, and by group that amounts to 56 a.s. from the group of herbicides, 65 a.s. from the group of fungicides and 36 a.s. from the group of zoocides.

Industrial waste water contamination is monitored through a larger number of pollutants present in the wastewater from industrial facilities, including specific and priority pollutants that are used in certain production processes and can occur in industrial waste waters from such production facilities. Pollutant burden assessment is based on data related to the annual quantities of waste water discharge and the mean concentration values from the analysis of waste water collected from users and stored in the Croatian Waters database. The list of priority and specific waste water pollutants in the Republic of Croatia contains a total of 87 indicators, of which 25 have not been monitored at any discharges.

Although the emission estimate methodology has not been defined, a set of pollutants was identified that can be expected in municipal landfill inflow waters: anthracene, fluoranthene, naphthalene, PAH, benzene, PBDE, cadmium, mercury, lead, nickel, DEHP, HCB, hexachlorobutadiene, hexachlorocyclohexane, pentachlorobenzene, pentachlorophenol, trichlorobenzenes.

### *Planned measures for elimination and reduction of pollution by priority substances*

Basic measures were set by the regulatory framework and include obligations which the Republic of Croatia accepted within the EU accession process. In defining a programme of measures for water status management in the period from 2016 to 2021, and from 2022 to 2027 the starting point is the assumption that all the remaining measures required by the existing water protection plans and programmes would be implemented within the set time frame, in particular measures to control pollution from point and diffuse sources originating from EU legislation that was transposed by the Regulation on water quality standards.

The issue of water pollution is planned to be resolved through a combined approach to water protection, in which priority is given to mandatory measures for control over pollution sources, and in cases where the state of the recipient demands it, additional measures are planned.

The approach to resolving the issues of pollution by priority and other relevant pollutants is also harmonised with the agreed approach at the EU level. The basic assumption is that competent authorities would continuously and promptly follow and take over European standards concerning control over industrial waste water discharges, in production, transport and use of chemicals as well as hazardous waste management, and in this way provide satisfactory control and reduction of chemical pollution of waters. The widest framework for the control and reduction of water pollution by priority and other relevant pollutants was set by regulations governing the field of chemicals management in general and separately for biocidal products and plant protection products. The Water Act includes various administrative, legal and economic instruments for the control of chemical pollution of waters.

### *Planned harmonisation measures in water status monitoring*

The limited scope of the monitoring data has for the most part had an impact on the reduction in the reliability of water status assessment, load and impact analysis, on determining the risk of achieving good water status, as well as monitoring the impact of implemented measures. By the development of a multiannual harmonization programme the process of improving the monitoring to the level necessary for effective water status management was initiated. Full harmonization of the annual monitoring plan of the status of surface and ground water was planned to be carried out gradually by the end of 2015, allowing the water status monitoring plan to synchronise with the schedule for the second cycle of the river basin management plan which started in 2016.

Also, through the amendments to the Regulation on water quality standards in accordance with Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 200/60/EC and 2008/105/EC as regards priority substances in the field of water policy (OJ L 226, 24.8.2013) the list of priority and priority hazardous substances was extended to a total of 45 substances. Among them are some of the new POPs that were not covered by monitoring in the period from 2007 to 2013 and will thus be included in the monitoring programme for the following period, and these are as follows:

- HBB

- tetra-, penta-, hexa- and heptabromodiphenylether
- PFOS and its salts
- 7 PCDDs: 2,3,7,8-T4CDD (CAS 1746-01-6), 1,2,3,7,8-P5CDD (CAS 40321-76-4), 1,2,3,4,7,8-H6CDD (CAS 39227-28-6), 1,2,3,6,7,8-H6CDD (CAS 57653-85-7), 1,2,3,7,8,9-H6CDD (CAS 19408-74-3), 1,2,3,4,6,7,8-H7CDD (CAS 35822-46-9), 1,2,3,4,6,7,8,9-O8CDD (CAS 3268-87-9)
- 10 PCDFs: 2,3,7,8-T4CDF (CAS 51207-31-9), 1,2,3,7,8-P5CDF (CAS 57117-41-6), 2,3,4,7,8-P5CDF (CAS 57117-31-4), 1,2,3,4,7,8-H6CDF (CAS 70648-26-9), 1,2,3,6,7,8-H6CDF (CAS 57117-44-9), 1,2,3,7,8,9-H6CDF (CAS 72918-21-9), 2,3,4,6,7,8-H6CDF (CAS 60851-34-5), 1,2,3,4,6,7,8-H7CDF (CAS 67562-39-4), 1,2,3,4,7,8,9-H7CDF (CAS 55673-89-7), 1,2,3,4,6,7,8,9-O8CDF (CAS 39001-02-0)
- 12 dioxin-like PCBs (PCB-DL): 3,3',4,4'-T4CB (PCB 77, CAS 32598-13-3), 3,3',4',5'-T4CB (PCB 81, CAS 70362-50-4), 2,3,3',4,4'-P5CB (PCB 105, CAS 32598-14-4), 2,3,4,4',5'-P5CB (PCB 114, CAS 74472-37-0), 2,3',4,4',5'-P5CB (PCB 118, CAS 31508-00-6), 2,3',4,4',5'-P5CB (PCB 123, CAS 65510-44-3), 3,3',4,4',5'-P5CB (PCB 126, CAS 57465-28-8), 2,3,3',4,4',5'-H6CB (PCB 156, CAS 38380-08-4), 2,3,3',4,4',5'-H6CB (PCB 157, CAS 69782-90-7), 2,3',4,4',5,5'-H6CB (PCB 167, CAS 52663-72-6), 3,3',4,4',5,5'-H6CB (PCB 169, CAS 32774-16-6), 2,3,3',4,4',5,5'-H7CB (PCB 189, CAS 39635-31-9).

#### 2.3.10.2 POPs concentrations in the sea

A large number of institutions monitors, collects and coordinates data and information on the sea, coastal area, fisheries and mariculture. In late 2006, CAEN in cooperation with the Institute of Oceanography and Fisheries in Split, started the project of implementation of a network application for entry, publishing and management of indicators on the state of marine environment. Besides with the mentioned Institute of Oceanography and Fisheries, CAEN also cooperates on data collection and preparation of reports with the Ruđer Bošković Institute in Rovinj, Institute for Marine and Coastal Research in Dubrovnik, Croatian Waters and the Ministry of Environmental and Nature Protection and the Ministry of Maritime Affairs, Transport and Infrastructure.

Most of the data was obtained on the basis of research carried out over many years. However, this research is in most cases not systematic since it was usually conducted within the framework of projects in various different fields. Therefore, most of the existing measurements and data is not evenly distributed.

Through the above mentioned application the completion of the Information system „MORE“, the main part of the future MORE portal was initiated, whereby it will soon be put into operation and made available to the general public. All currently available data and values will over time be supplemented and modified with new data and information that will become available.

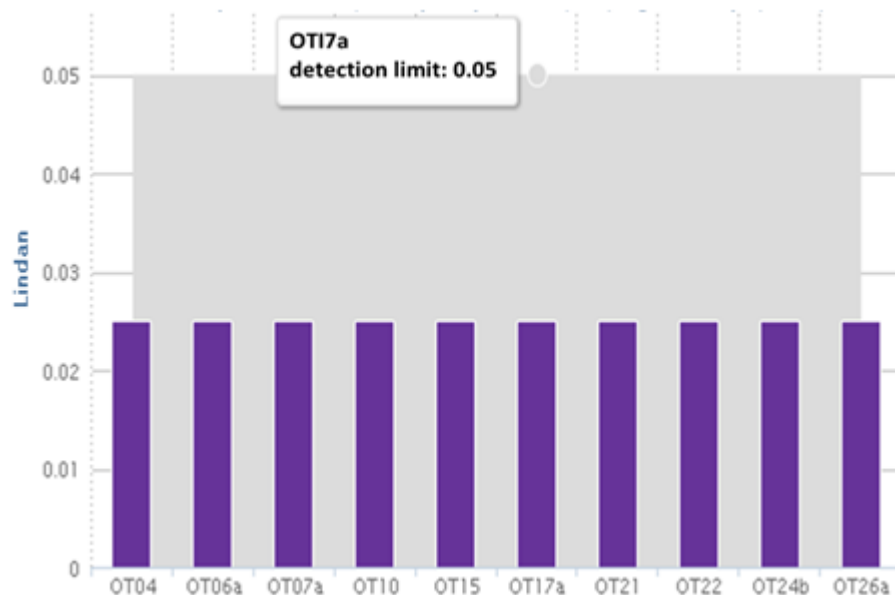
### *Hazardous substances in marine sediment and biota*

Within the framework of the project “Coastal Cities Pollution Control-Adriatic Sea Monitoring Programme (Phase 2)”, activities of scientific, experimental monitoring were carried out in 2013. On the basis of that monitoring a proposal for Monitoring and Observation System for Ongoing Assessment of the Adriatic Sea, within the framework of implementation of requirements under the Regulation on the preparation and implementation of documents under the Coastal and Marine Management Strategy which enables implementation of the provisions under the Marine Strategy Framework Directive. For the purpose of analysing hazardous substances in sediment, samples of surface sediment were taken at 10 stations along the eastern Adriatic coast. Due to a lack of funding, in 2014 measuring of the concentration of hazardous substances in marine organisms or in the sediment was not carried out.

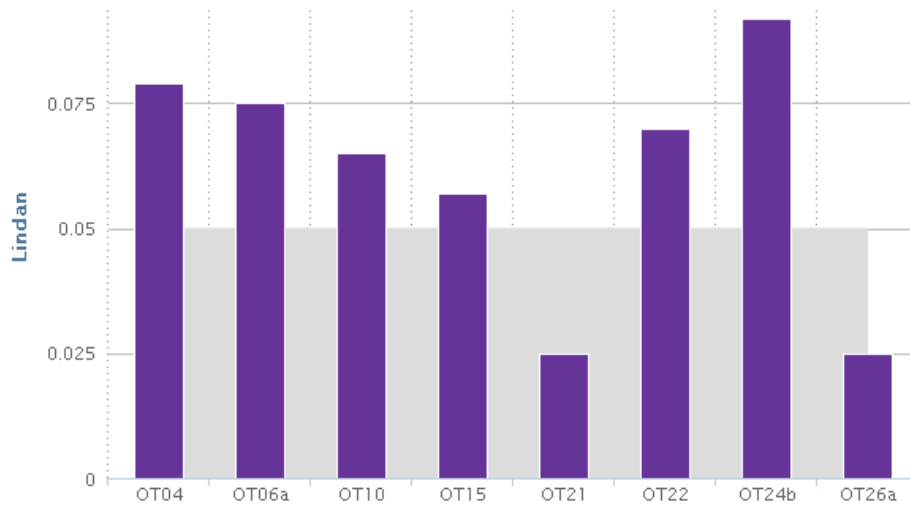
Analysis of the share of chlorinated pesticides did not confirm the presence of lindane in surface sediment at the investigated stations ( $< 0.05 \mu\text{g kg}^{-1}$  in relation to dry matter).

For the purpose of analysis of the presence of hazardous substances, in 2013 analyses of sea sediment and biota samples were carried out. Samples were taken at several locations along the Adriatic coast, for marine sediment at 10 locations and samples of shellfish (*Mytilus galloprovincialis*) at 8 stations. Among others, samples were analysed for the presence of lindane, PCBs and DDT.

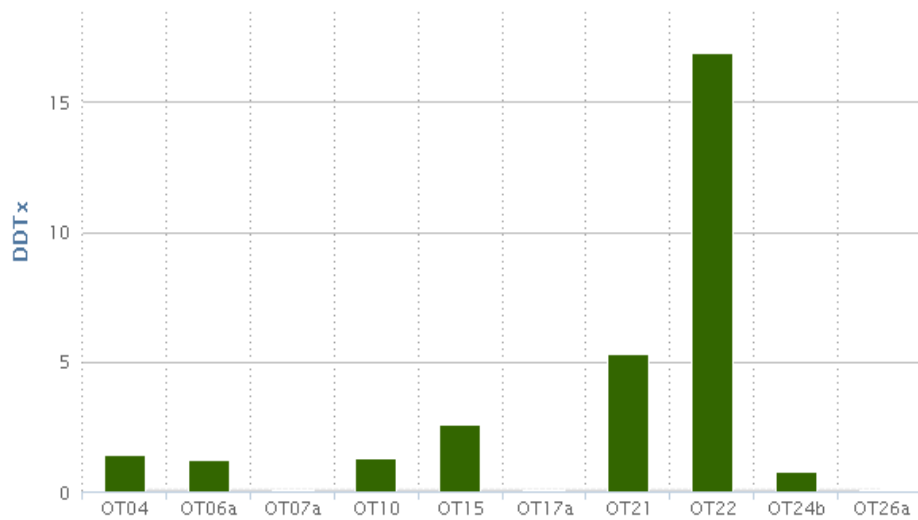
Measured values of lindane, DDT and PCB mass fractions in marine sediment and shellfish tissue are shown in graphs 2.3-7-2.3-12. Values in sediment are expressed as mass fraction of pesticides and PCBs in dry matter ( $\mu\text{g kg}^{-1}$ ). Values in shellfish tissue are expressed as mass fraction in tissue ( $\mu\text{g kg}^{-1}$ ), in dry matter.



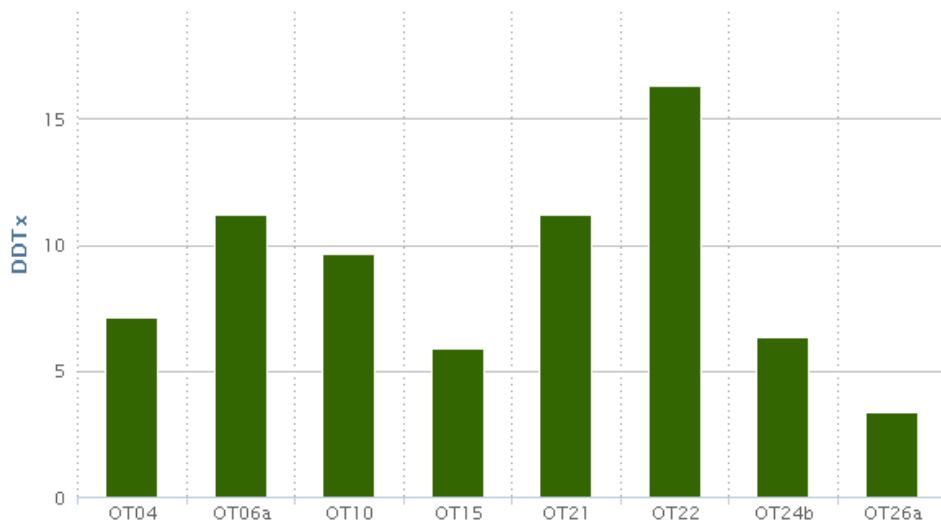
Graph 2.3-7: Mass fraction of lindane in marine sediment ( $\mu\text{g kg}^{-1}$  of dry matter) at all stations



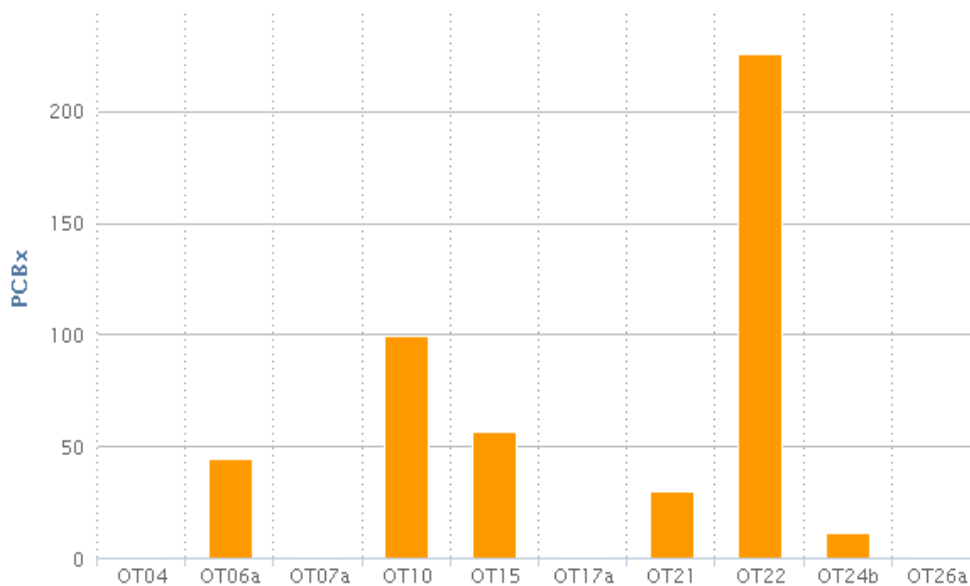
Graph 2.3-8: Mass fraction of lindane in sea organisms ( $\mu\text{g kg}^{-1}$  of dry matter) at all stations



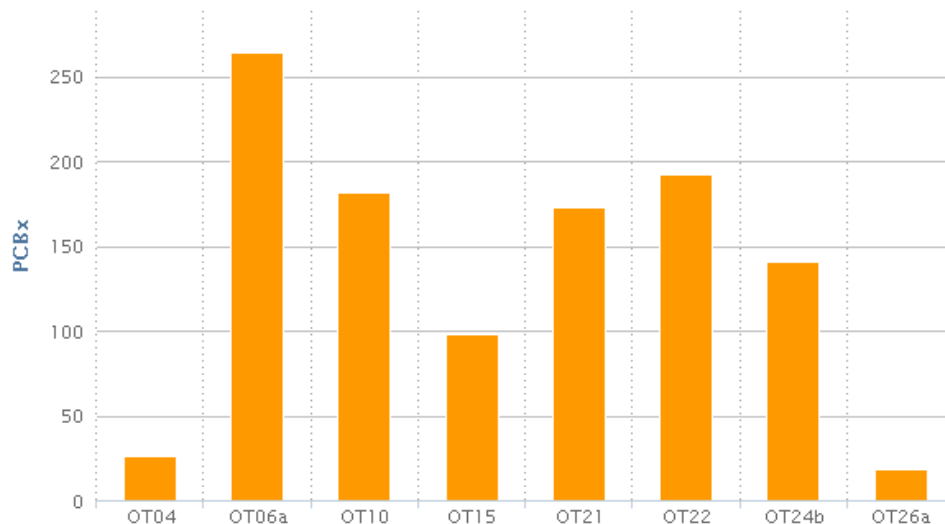
Graph 2.3-9: Mass fraction of DDT in marine sediment ( $\mu\text{g kg}^{-1}$  of dry matter) at all stations



Graph 2.3-10: Mass fraction of DDT in marine organisms ( $\mu\text{g kg}^{-1}$  of dry matter) at all stations



Graph 2.3-11: Mass fraction of PCBs in marine sediment ( $\mu\text{g kg}^{-1}$  of dry matter) at all stations



Graph 2.3-12: Mass fraction of PCBs in marine organisms ( $\mu\text{g kg}^{-1}$  of tissue) at all stations

#### Results of experimental monitoring in 2013

The analysis of mass fraction of chlorinated pesticides did not confirm the presence of lindane in surface sediment at monitoring stations at which research was carried out ( $< 0.05 \mu\text{g kg}^{-1}$  of dry matter). The mass fraction of lindane in the soft tissue of shellfish expressed in relation to dry matter was in a very narrow range of  $< 0.05$  to  $0.09 \mu\text{g kg}^{-1}$  of dry matter showing values slightly above detection level. The highest value was found at the station OT24b (Marina Rovinj).

As opposed to lindane, DDT compounds were shown as the sum of the DDE, DDD and DDT mass fractions, and were measured in the range of  $< 0.09$ - $16.9 \mu\text{g kg}^{-1}$  of dry matter. The highest value was recorded at station OT22 in the port of Rijeka.

Total PCBs were measured in significantly higher proportions in relation to pesticides, in a range from  $0.68$  to  $225 \mu\text{g kg}^{-1}$  of dry matter and  $18.8$  to  $264 \mu\text{g kg}^{-1}$  of dry matter in marine biota.

Marine sediment: Comparison of values for pesticide and PCB mass fractions in sediment resulting from monitoring carried out in 2013 with multiannual data (2006-2011) for eastern Adriatic coast generally indicates the absence of lindane in the environment. For DDT compounds in 2013, a similar range of values is observed, excluding station OT22 which was not monitored in the period 2006-2011. A low share of pesticides in the environment is to be expected as their production and use are prohibited in developed countries and thus also in the Republic of Croatia. The range of PCB mass fraction is generally similar to the range of values established in the period 2006-2011, which indicates that PCB pollution sources are still present in the coastal area of the Adriatic Sea near city and port centres, marinas and port facilities.

Marine biota: A comparison of the values for mass fraction of pesticides and PCBs in shellfish, resulting from monitoring carried out in 2013, with multiannual data (2002-2011) for the eastern Adriatic coast, shows a lower range of values for chlorinated pesticides. This is to be expected since their production and use are prohibited in developed countries and thus also in the Republic of Croatia. The range of PCB mass fraction is generally similar to the range of values established

in the period 2002-2011, which indicates that PCB pollution sources still exist in the coastal area of the Adriatic Sea. Monitoring results are available at <http://baltazar.izor.hr/azopub/bindex>.

In addition to the aforementioned monitoring, related to the research in recent years, a survey related to morays was conducted in cooperation between several institutions: Faculty of Science (University of Zagreb), Zagreb University of Applied Health Sciences, Teaching Institute for Public Health and Institute of Oceanography and Fisheries. Analyses of organochlorine pesticides and PCBs screening were carried out. Endrin, pp'-DDE, heptachlorepoxide, heptachlor, aldrin, lindane,  $\beta$  HCH,  $\alpha$  HCH and endrin aldehyde were analysed. Quantities of pesticides during the winter period ranged from 0.1-0.7  $\mu\text{g kg}^{-1}$  of dry matter. In samples taken in the summer, quantities of endrin reached maximum values of 14.45 to 10.97  $\mu\text{g kg}^{-1}$  of dry matter.

#### *Planned harmonisation of measures for sea pollution monitoring*

Monitoring and observation system for ongoing assessment of the Adriatic Sea was developed as the first action programme of the Coastal and Marine Management Strategy, within the framework of implementation of the Marine Strategy Framework Directive. Proposal of the monitoring system was partly based on the monitoring of the Adriatic Sea conducted within the framework of the Coastal Cities Pollution Control Project during 2007/2008 and 2013/2014. Future monitoring of the presence and concentration of various pollutants (priority substances and priority hazardous substances, organotin compounds, Cd, Pb, Cu, Zn, Hg, Cr, HCB, aldrin, dieldrin, endrin, heptachlor, p,p'-DDE, DDD, DDT, PCB – 7 congeners, PAH) will be carried out within Descriptor 8 (from Annex 1 of the Marine Strategy Framework Directive) of concentration of pollutants at 16 set locations.

#### 2.3.10.3 Monitoring of POPs in the air

One of CAEN's obligations is the preparation of regular annual reports on air quality monitoring in the Republic of Croatia. Reports are developed in the current year for the previous calendar year and include data on pollutant concentrations gathered from the national and local networks for air quality monitoring published at its website (<http://www.azo.hr/GodisnjiIzvjestajOPracenju>).

From among POPs measured at stations in the national and local networks are PAHs in particulate matter  $\text{PM}_{10}$ : BaP, benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene and dibenzo(a,h)anthracene.

Reference laboratory for measuring concentrations of particulate matter, including POPs in  $\text{PM}_{10}$  is the Institute for Medical Research and Occupational Health.

According to the 2012 Annual Report on Air Quality Monitoring in the Republic of Croatia, at the automatic monitoring station Zagreb-1, annual average concentration of BaP in  $\text{PM}_{10}$  was 1.085  $\text{ng m}^{-3}$ , which is higher than the prescribed limit value (1.0  $\text{ng m}^{-3}$ ). At the automatic monitoring station Ksaverska cesta, annual average concentrations of BaP in  $\text{PM}_{10}$  amounted to



1.039 ng m<sup>-3</sup>, which is higher than the prescribed limit value (1.0 ng m<sup>-3</sup>). At Sisak-1 station, the determined annual average concentration of BaP in PM<sub>10</sub> was 1.658 ng m<sup>-3</sup>, also more than the prescribed limit value. Only at the Rijeka-1 station the concentration was below the prescribed limit value (0.1574 ng m<sup>-3</sup>).

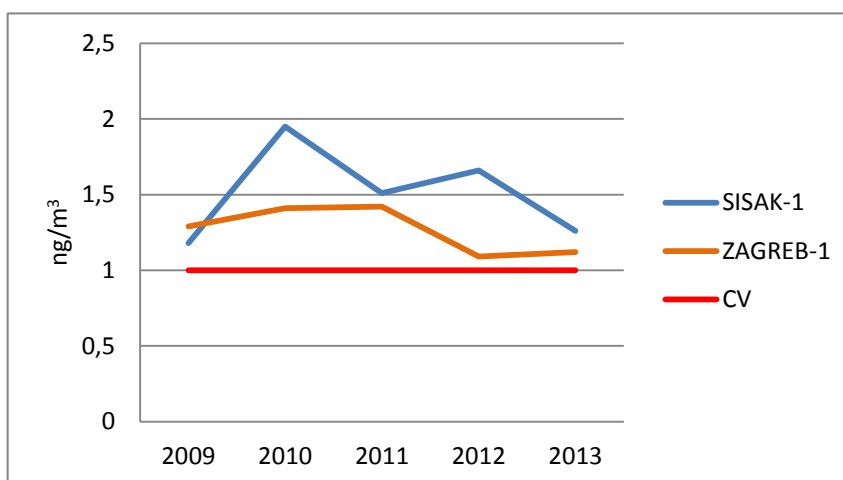
In 2013, measurements of BaP in PM<sub>10</sub> from two monitoring stations were processed (2013 Annual Report on Air Quality Monitoring in the Republic of Croatia, Croatian Environment Agency, 2014): Zagreb-1 in Zagreb agglomeration and Sisak-1 in the Industrial zone. Measurement was not carried out at the Zagreb-3 station. Data for the assessment in zones Continental Croatia (HR 1), Lika, Gorski kotar and Primorje (HR 3), Istria (HR 4) and Dalmatia (HR 5) was obtained by emission modelling. Summarized statistical data on concentrations of BaP in PM<sub>10</sub> in the air, obtained through modelling is presented in table 2.3-20.

Annual average concentration of BaP in PM<sub>10</sub> must not exceed the target value of 1 ng m<sup>-3</sup> in a calendar year. For other PAHs, target values are not prescribed. Measurements of other PAHs in PM<sub>10</sub>, benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3,-cd)pyrene and dibenzo(a,h)anthracene were not carried out.

Table 2.3-20: Summarized data on concentrations of BaP in PM<sub>10</sub> in the air

BaP in PM <sub>10</sub> (ng m <sup>-3</sup> ) and BaP						
Zone/ Agglomeration	Monitoring station/ Modelling	Pollutant	24-hours concentrations			Target value
			C <sub>year</sub>	C <sub>year</sub> (rounded value)	C <sub>max</sub>	
HR ZG	Zagreb-1	BaP in PM <sub>10</sub>	1.10	1	12.93	1
HR1	Model	BaP	0.71	1		1
HR 2	Sisak-1	BaP in PM <sub>10</sub>	1.26	1	14.68	1
HR 3	Model	BaP	0.46	0		1
HR 4	Model	BaP	0.99	1		1
HR 5	Model	BaP	0.28	0		1

Emission trend for BaP in PM<sub>10</sub> for the period 2009-2013 is shown in graph 2.3-13.



Graph 2.3-13: Emission trend for BaP in PM<sub>10</sub> for the period 2009-2013

Annual average values of BaP in PM<sub>10</sub> at monitoring stations Zagreb-1 and Sisak-1 are not considered to be exceeded because the values are rounded to 1, which is equal to the target value. Values are rounded to the same number of decimal points as that of the target value.

The most significant sources of BaP emissions is fuel combustion in the general consumption sector, while fuel combustion in energy plants, industry, building sector and traffic has a lesser impact.

#### *Planned measures related to the improvement of air quality monitoring*

The project “Modernization of national air quality monitoring network” is planned within the framework of preparation of project proposals for EU Structural Funds for the programming period 2014-2020 within which upgrading of national network for air quality monitoring is planned in accordance with the requirements of Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L 152, 11.6. 2008), including the establishment of POPs monitoring.

#### 2.3.10.4 Monitoring of POPs in soils

Pursuant to the Act on Agricultural Land, the following implementing regulations were adopted:

- Ordinance on the protection of agricultural land against pollution
- Ordinance on the methodology for monitoring the status of agricultural land, with requirements for performing analysis by which preconditions are established, in operational and institutional terms, for implementing the envisaged measures of continuous monitoring of agricultural land
- Ordinance on agro-technical measures
- Ordinance on the criteria for determining particularly valuable arable (P1) and valuable arable agricultural land (P2).

As mentioned earlier, in order to protect agricultural land from pollution and damage, analysis and continuous monitoring of the state of pollution of agricultural land is carried out in the sense of inventory and monitoring established and maintained by the Agricultural Land Agency, as a reference centre, while analysis may also be carried out by laboratories authorized by the ministry responsible for agriculture.

Within the project at pilot locations Potok, Satnica Valpovačka and Donji Miholjac during 2006 and 2007 analysis of organic pollution (lindane, HCH and DDT) was carried out at the Teaching Institute for Public Health “Dr. Andrija Štampar”. Results of analyses did not indicate the presence of POPs at the examined locations.

One of the main tasks was to establish the status of pollution and monitoring/surveillance of agricultural soils, including also the establishment of the content of POPs (PAH, PCB triazine herbicides, organochlorine pesticides), the sampling dynamics of which was determined in Article 26 of the Ordinance on the methodology for monitoring the status of agricultural land. The Programme of continuous surveillance/monitoring is established over a period of 9 years,

and preparatory work has only just begun within the Centre itself on the basis of 90 stations located according to the system of representativeness within the agri-ecological areas or subregions. The start of operation of the system for continuous surveillance/monitoring depends on the availability of funds in the budget of the Republic of Croatia.

The development of a GIS-database with located spots for continuous surveillance/monitoring, pursuant to the Programme of continuous soil monitoring in the Republic of Croatia, will serve as a basis for the collection, analysis and availability of data on the status of all changes in agricultural land, and in particular of the content of harmful substances, in line with the reporting obligations on the environmental status in the Republic of Croatia, and with assumed international obligations.

Continuous monitoring of agricultural land was one of the key assignments of the Croatian Centre for Agriculture, Food and Rural Affairs, whose aim was to establish, develop and manage the Information subsystem for management and protection of agricultural land in the Republic of Croatia.

In 2013, the new Act on Agricultural Land was adopted pursuant to which the Institute for Soil of the Croatian Centre for Agriculture, Food and Rural Affairs was moved to the Agricultural Land Agency and became one of the Agency's Departments. The Agency took over all the Institute's activities and there were also changes to the accompanying regulations.

As part of the project that lasted from 2012 to 2013, sampling and analysis of soils in the territory of the city of Varaždin and the Plitvice Lakes National Park was carried out due to the presence of organochlorine pesticides and PCBs. Unlike Plitvice Lakes, where significant levels of PCBs were not identified, in soil samples taken in the city of Varaždin, the presence of 1 to 9 PCB congeners was found. The most common pesticide compounds present in both locations were 4,4'-DDE, HCB,  $\gamma$ -HCH and 4,4'-DDT. Significantly higher levels of DDT were found in Varaždin.

During 2014, the Agricultural Land Agency participated in the preliminary examination of soil pollution in flooded areas of Sava River basin in Županja, and at 6 locations (two in Gunja, in Rajevo Selo, Račinovci, Vrbanja and Stošinci) analysis of the organic pollution of soil was carried out. The presence of organic pollution was not determined in any of the analysed samples.

In cooperation with the Croatian Geological Survey and Croatian Forest Research Institute, the Agricultural Land Agency is implementing the LULUCF project "Changes in carbon stocks and calculation of trends of total nitrogen and organic carbon and C:N ratio in soil". Data collection and processing will be carried out in accordance with the IPCC methodology at 750 locations. Samples will be archived in the Agricultural Land Agency, and until the national monitoring of agricultural land is established it will be possible to subsequently analyse some of the organic pollution for the purpose of implementing the Stockholm Convention.

#### 2.3.10.5 Pesticide residues in food

Implementation of the National monitoring programme for pesticide residues was initiated in 2007 and included the monitoring of pesticide residues in a total of 9 products, 7 of which according to the Commission Recommendation 2007/225/EC for concerning a coordinated Community monitoring programme (OJ L 96/21/2007) (head cabbage, onions or leek, lettuce, tomato, peaches or nectarines, apples and rice). One item important for the diet of population in the republic of Croatia (potato) was added to this list, together with one item (orange) in which during previous analyses residues were found that exceeded maximum pesticide residue concentrations.

The National monitoring programme for pesticide residues in and on food (hereinafter: the Programme) is prepared and coordinated by the competent department of the Ministry of Agriculture-Department of food quality and phytosanitary policy, Sector for phytosanitary policy, Service for Plant Protection Products, Division for sustainable use of pesticides. Sampling is carried out by the Department for improvement of health of the Ministry of Health, as well as the agricultural and veterinary inspectors, while laboratory analysis is carried out by the Croatian Institute of Public Health and the Croatian Veterinary Institute. The ministry responsible for agriculture revises the Programme and prepares the Guidance for programme implementation in accordance with implementing regulations under the Act on the Implementation of Regulation (EC) No. 396/2005.

The objective of monitoring pesticide residues in food is to determine the quantity of pesticide residues in products of plant origin, to verify compliance with regulations setting pesticide MRLs and whether manufacturers comply with principles of good agricultural practice and in that way protect consumers' health.

Sampled products are selected according to the Commission Implementing Regulation (EU) No 788/2012 of 31 August 2012 concerning a coordinated multiannual control programme of the Union for 2013, 2014 and 2015 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin (Text with EEA relevance) (OJ L 235, 1.9.2012) for a three year period in order to ensure compliance with MRLs and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin. Products are also selected based on their importance in the diet of the population of the Republic of Croatia, pesticide residues found in previous monitoring programmes, products that have not been covered by the programme and products that, due to their lower accessibility on the market, were not sampled in the planned number. The Ministry responsible for health samples products in accordance with the Guidance for the implementation of monitoring prepared every year by the Ministry of Agriculture. Sample collection and control procedure is carried out in large supply centres-central distribution warehouses, wholesale markets and cold storage units where complete batches are more readily accessible, in shops and at markets. Cities were selected given the size of the population and the prior representation of cities in the Programme. Sampling in primary production is carried out in the warehouses for agricultural products after harvest/gathering, hatcheries, slaughterhouses and dairies where plant and animal products intended for the market are prepared and preserved.

Appropriate measures are taken for samples with pesticide content exceeding stipulated MRLs, taking into account measurement uncertainty in accordance with the Act on the Implementation of Regulation (EC) No. 396/2005, Act on Official Controls Performed in Accordance with Regulations on Food, Feed, Animal Health and Welfare and the Food Act (OG No. 81/13, 14/14 and 30/15). By 2014, only products of plant origin were sampled and analysed, and the number of active substances and metabolites that were analysed did not meet the requirements of EU legislation. From 2014 monitoring also covered products of animal origin and in the same year the number of active substances and metabolites which were analysed in products of plant origin was significantly increased.

The plan of the National monitoring programme for pesticide residues in and on food for 2014 included the monitoring of pesticide residues in a total of 17 products of plant and animal origin, where taking of 24 samples of each product was planned in 6 cities: Zagreb, Osijek, Split, Rijeka, Pula and Dubrovnik. POPs pesticides included in the Programme are shown in table 2.3-21.

*Table 2.3-21: Pesticides containing POPs included in the National monitoring programme for pesticide residues in and on food in 2014*

Products of plant origin	Products of animal origin
aldrin	aldrin
dieldrin	dieldrin
endosulfan alpha	DDT
endosulfan beta	endosulfan
endosulfan sulfate	endrin
endrin	HCB
HCB	HCH, alpha isomer
$\alpha$ HCH	HCH, beta isomer
$\beta$ HCH	HCH, gamma isomer (lindane)
chlordane	
lindane	
o,p-DDT	
p,p-DDT	

Residues of pesticides containing POPs were not found in any of the analysed samples.

The results of the analysis within the framework of the annual report are published on the website of the ministry responsible for agriculture ([www.mps.hr](http://www.mps.hr)).

The Veterinary Act in Article 93 defines the monitoring programme of systematic monitoring of residues and other pollutants harmful for human health in products of animal origin intended for human consumption. By the National monitoring programme for residues samples of cattle, pigs, poultry, sheep, goats, horses, freshwater and saltwater fish, honey, milk and eggs are checked for organochlorine compounds (pesticides), for dioxins and dioxin-like PCBs.

The ministry responsible for agriculture within official controls carries out the Feed monitoring plan within which samples of feed are analysed for organochlorine pesticides (DDT, HCH, HCB and chlordane), and dioxins and dioxin-like PCBs.

### 2.3.10.6 Monitoring of POPs in forestry

The Forest Act (OG No. 140/05, 82/06, 129/08, 80/10, 124/10, 25/12, 68/12, 148/13 and 94/14), regulates the obligations related to establishment of preconditions for efficient implementation of measures arising from the requirements under the Stockholm Convention.

Pursuant to these legal obligations, and harmonising them with the EU acquis, by the Ordinance on the methods for monitoring the damage to forest ecosystems (OG No. 76/13 and 122/14) stipulates the methods for systematic and long-term surveillance/monitoring of damage to forest eco-systems, networks of sites, methods of collecting data and keeping the register, and conditions for the use and delivery of the collected data on damage to forest ecosystems to domestic and international bodies and institutions.

Monitoring/surveillance of damage to forest ecosystems in the Republic of Croatia is carried out within the framework of the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests at the network of Level 1 sites and Level 2 surface areas, pursuant to the LRTAP Convention.

The objectives of the programme are:

1. monitoring of air pollution and its effects, and observation of other causes and factors that have an impact on forests (biotic, abiotic and anthropogenic factors)
2. to assess requirements for monitoring of forest ecosystems and to develop monitoring of soils, carbon sinks, climate change and biodiversity impacts, and protective function of forests
3. to permanently evaluate the efficiency of monitoring in assessment of damage of forest ecosystems and further development of monitoring activities.

Although analyses of forest land, which are carried out on the basis of data collected from bio indicative areas at the Croatian Forest Research Institute in Jastrebarsko (national coordination centre for assessment and monitoring of the impact of atmospheric pollution and other factors on forest ecosystems), are primarily directed towards analysis of biogenic elements in soils, the Ordinance on the methods for monitoring the damage to forest ecosystems, by its programme prescribes linking and harmonising with appropriate international agreements.

Since POPs which damage forests primarily through atmospheric pollution (PCDD and PCDF, as by-products of burning of forest matter), are singled out by the LRTAP Convention and POPs Protocol/Stockholm Convention, prevention and mitigation of forest fires is a direct contribution of the forestry sector to reducing the harmful emissions of PCDD and PCDF into the air.

The Republic of Croatia continuously invests significant funding in order to minimize damage from forest fires caused naturally and by anthropogenic influence. Remediation and afforestation of the damaged surfaces and effective fire protection measures are carried out along with coordinated campaigns aimed at raising awareness of the importance of forests, with a particular emphasis on prevention of forest fires. The Ordinance on the protection of forests against fires (OG No. 32/14) prescribes technical, preventive and cultivation measures, as well as other forest

protection measures against fire which have to be carried out by owners or users of forest and forest land. The objective of the described measures is early detection and notification on the occurrence and spread of forest fire, and ensuring timely extinguishing action.

In line with the Forest Act, the Register of fires (system of documentation, data and information on forest fires), harmonised with the EFFIS database, became operational on 1 January 2009. The operation of the Register is prescribed by the Ordinance on the method of data collection, keeping the register and requirements for the use of data on forest fires (OG No. 75/13 and 150/14).

#### 2.3.10.7 Organochlorine pesticides and PCBs in human milk

In the Republic of Croatia, PCBs and organochlorine pesticides were analysed in human milk over 40 years ago. Earlier investigations involve analyses of total PCB while more recent research includes total PCB and results of PCB and similar analyses.

In the studies conducted in 2009/2010 and 2011, besides organochlorine pesticides and PCB indicator congeners, 3 mono-ortho and 8 mono-ortho substituted PCB congeners that are important from the toxicological point of view were also analysed.

Analyses were performed on two sets of human milk samples: milk from donors from the city of Zagreb, and from the city of Zadar that was exposed to destruction during the war in former Yugoslavia. In the course of these events, an electrical substation was destroyed which caused higher PCB levels in air and fish from that area. Human milk samples were collected from healthy mothers that had no history of accidental or occupational exposure to analysed compounds.

In more than 90% of samples from Zagreb, all organochlorine pesticides, except p,p-DDD and the following PCB congeners: 28, 52, 74, 153, 138, 180 and 170, were found.

Non-ortho PCB congeners (PCB 77, PCB 126 and PCB 169), PCB 123 and PCB 114 were not found in any of the samples. PCB 167 was found in one sample and PCB 189 in two samples. The residue of PCB congeners and p,p-DDD were found in 25-85% of samples.

In more than 89% of samples from Zadar all organochlorine pesticides and PCB congeners: 28, 52, 153, 138, 180 and 170 were found. Non-ortho PCB congeners and PCB 123 were not found in any of the samples, PCB 157 and PCB 189 were found in one sample, PCB 167 in two samples, PCB 114 in only 17% of samples, and the residue of PCB congeners in 33-78% of samples.

In the milk samples from Zagreb, organochlorine pesticides were found in the range between 0.1 and 97.5 ng g<sup>-1</sup> milk fat, and in the samples from Zadar between 0.3 and 107.8 ng g<sup>-1</sup> milk fat.

PCBs in the samples from Zagreb ranged between 0.5 and 53.7 ng g<sup>-1</sup> milk fat, and in the samples from Zadar between 0.5 and 66.4 ng g<sup>-1</sup> milk fat.

EDI was calculated to examine infants' exposure to organochlorine compounds. The calculation was based on assumption that a 5 kg infant ingested 700 g milk per day. The calculated EDI values were one to two orders of magnitude lower than TDI, except for PCBs (the highest individual EDI is two times lower than the corresponding TDI). Based on these results, it can be concluded with certainty that infants who consumed human milk analysed in that study were not at risk of adverse effects caused by organochlorine compounds.

A considerable decrease in the concentrations over a 10-year period was observed. This decrease is most notable in the case of the most abundant organochlorine compound in human milk samples-p,p'-DDT. Median p,p'-DDT concentration is 12 times lower in the samples collected in 2009/2010 than in the samples collected ten years earlier.

By comparing the obtained results with those reported in literature, it can generally be concluded that concentrations of organochlorine compounds in human milk samples from this study are in the lower part of the concentration ranges reported for Europe.

According to the presented results, Croatian population is not at high risk of organochlorine contamination. However, it is necessary to monitor POPs levels both in people and the ecosystems at locations with secondary pollution sources.

#### 2.3.10.8 Other relevant research and international/regional cooperation

Institute for Medical Research and Occupational Health in collaboration with WHO and UNEP participated and contributed to analyses related to the POPs analysis in human milk, as part of the Global Monitoring Plan (GMP) which monitors the effectiveness of implementation of the Stockholm Convention at the international level.

Furthermore, in cooperation with the Stockholm Convention Regional Centre RECETOX, Brno, Czech Republic, within the framework of the project "Towards the Global Monitoring of POPs, Contribution of the MONET Networks", in order to collect data for GMP, monitored POPs in the air in Central and Eastern European countries, including Croatia, with the assistance of passive samplers.

In the authorized laboratories of the Department for Environmental Protection and Environmental Health of the Teaching Institute for Public Health "Dr. Andrija Štampar", samples of various types of waste, waste oil and sludge from the wastewater treatment plants were analysed. In accordance with regulations currently in force, among others, organic pollutants (PCB, PAH, BTEX) were determined.

In the period from 2010 to 2015, approximately 500 samples of waste oil (e.g. motor, hydraulic, insulation, transformer) were analysed. In 15 samples, PCBs were quantified, and the highest value amounted to 760.9 g kg<sup>-1</sup>. In the same period, approximately 1,200 samples of waste, including sludge were analysed, of which PCBs were quantified in 19 samples. Highest values were found in the waste sludge (sludge from shredders) and amounted to 104 mg kg<sup>-1</sup> and 89 mg kg<sup>-1</sup>. In the same period, around 65 soil samples were analysed, and PCBs were not quantified in any of them. These analyses indicated the need for further monitoring of the presence of these substances.



Furthermore, as part of the project "Endocrine-active substances in food and reproductive failures" of the Ministry of Science, Education and Sports, adverse effects of selected food contaminants which were at the same time POPs to the reproductive parameters *in vivo* in rats and *in vitro* in animal cell cultures were determined. Also, certain toxic effects of selected PCB congeners (PCB 77, PCB 153), were examined.

In cooperation between the Institute for Medical Research and Occupational Health from Zagreb and the Institute of Oceanography and Fisheries from Split a survey entitled "Chlorinated compounds in the muscle tissue of fish from the eastern Adriatic Sea: preliminary data on pollution and health risks" was carried out.

Mass fractions of 17 PCBs and 7 of organochlorine pesticides (OCP) were measured in the muscle tissue of 18 commercially important fish species from the eastern Adriatic Sea. Mass fractions of PCBs (< LOD to 8,866 ng kg<sup>-1</sup> fat) accounted for more than 66% of all analysed compounds. In their profile PCB 138 and PCB 153 are dominant congeners. DDE (14.2-649 ng g<sup>-1</sup> fat), the main isomer of DDT, was the only one detected in all samples. In less than 50% of the analysed samples β-, γ- and α HCH and HCB were found. In the range of trophic levels of the analysed species (3.0-4.5) bioaccumulation of organic pollutants in the food chain did not occur.

The results of the risk assessment for human health have shown that there was no risk of chronic (non-cancerous) impacts on human health.

Experts from the Faculty of Food Technology and Biotechnology in Zagreb researched the toxicological effects of POPs.

#### *2.3.11 Current state of public information, awareness and education*

The general Croatian public is not sufficiently informed about POPs and their adverse effect on humans and the environment. The issue of POPs in the Republic of Croatia is not adequately covered in primary and secondary schools' curricula. Sufficient level of information is present only in scientific institutions and among professionals whose activities are related to this issue, as well as at the universities which cover the topic of POPs and their issues through their existing teaching programmes and courses, but not as a separate topic.

One of the main principles of the Environmental Protection Act is the *Principle of access to information and public participation*. Besides the fact that "The public has the right of access to environmental information held by public authorities, persons supervised by public authorities and persons holding information for public authorities...", public authority shall ensure access to environmental information that it possesses and/or supervises pursuant to this Act and special regulations regulating the right of the public to access information. In 1998 UNECE adopted the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention). The Republic of Croatia took active part in the preparation of Aarhus Convention and signed it the same year. The Republic of Croatia ratified the Aarhus Convention with the Act on the Ratification of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (OG-IT No. 1/07), and it came into force with respect to the Republic Croatia on 25 June 2007, and the effective date was published in OG-IT No. 7/08.

The Government of the Republic of Croatia at its session held in November 2009 adopted the Code of Practice on Consultation with the Interested Public in Procedures of Adopting Laws,

Other Regulations and Acts (OG No. 140/09). This document establishes general principles, standards and measures for consultation with the interested public in procedures of adopting laws, other regulations and acts of state authorities, which regulate the issues and form positions that are of general interest (protection and promotion of human rights, public services, judiciary, environmental protection, etc.).

Furthermore, the right of access to information which is in the possession of or supervised by the ministry responsible for environmental protection tasks is regulated by the Act on the Right of Access to Information (OG No. 25/13 and 85/15). The said Act also prescribes the principles of the right of access to information, the exceptions and the procedure to realise and protect the rights of access to information.

The CAEN project “Cooperation with the Public” is a permanent project. In addition to ensuring quick, verified and reliable information on the state of the environment in the Republic of Croatia for the purposes of legislative power in the Republic of Croatia, public administration or governmental organisations, CAEN also strives to acquaint other parts of society-economic entities, scientific community, nongovernmental organisations, environmental associations and organisations, and particularly the public media, with the information and actual events in the field of environment.

#### *2.3.12 Reporting mechanisms in accordance with Article 15 of the Stockholm Convention on taken measures and exchange of information between parties*

A working group for monitoring the fulfilment of obligations under NIP, consisting of representatives of all the bodies responsible for the implementation of the Stockholm Convention has been established due to the multi-disciplinary approach to the regulation of POPs. The ministry responsible for environmental protection was appointed focal point for the exchange of information with the Stockholm Convention Secretariat as well as the Parties to the Stockholm Convention. This ministry regularly exchanges and submits information to the Secretariat of the Stockholm Convention which it collects from competent authorities, and among other things, it submitted in 2008 the first, in 2010 the second and in 2014 the third Report pursuant to Article 15 of the Stockholm Convention.

#### *2.3.13 Activities and work of non-governmental organisations*

A great number of non-governmental organizations and associations involved in environmental protection in the Republic of Croatia are of a locally character. Coordination of the non-governmental sector is not developed, which causes dispersion of their actions and activities. Furthermore, an additional problem in the work of non-governmental organizations and associations in the republic of Croatia is insufficient financing by the state, which prevents the realisation of the key precondition for their continuous and systematic work.

There are currently several associations in the Republic of Croatia that are indirectly dealing with POPs, through their engagement in areas of air and water protection and waste management. The Committee for monitoring the implementation of the NIP revision project was

established in July 2014 and all potential stakeholders including representatives of non-governmental organizations were appointed and actively participated in its work.

#### *2.3.14 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternative and prevention measures, management, research and development*

##### 2.3.14.1 National capacities for monitoring the releases of POPs into the environment

There are laboratories in the Republic of Croatia equipped for determining organochlorine pesticides and PCBs and according to the latest available information with the equipment for measuring the levels of PCDD/PCDF. Such measuring is also possible in the cooperation with internationally verified foreign institutions. Monitoring of PCDD/PCDF emissions into the air from stationary sources can be carried out by a small number of legal entities in the Republic of Croatia which have obtained a permit from the ministry responsible for environmental protection. Croatian Institute for Public Health, Croatian Veterinary Institute, Teaching Institute for Public Health “Dr. Andrija Štampar” and to some extent certain regional public health institutes possess the equipment and the knowledge for determining the levels of other POPs. It should also be noted that the public scientific institutes-Ruder Bošković Institute and Institute for Medical Research and Occupational Health possess adequate equipment, have staff highly educated in this area and are able to carry out such measurements, which has to date been proven by numerous research results. Agricultural Land Agency also possesses equipment. However, there is a need for more detailed research and information, as well as capacity building in scientific and research institutions related to research and analysis methodology for so called new POPs.

##### 2.3.14.2 National capacities for monitoring the effect on human health

Measuring of the concentrations of organochlorine pesticides and PCBs in blood and human milk is carried out in the Republic of Croatia, while analyses of PCDD/PCDF levels were until recently mostly carried out in cooperation with foreign institutions but it will be possible to carry them out in the Republic of Croatia. The Republic of Croatia has a sufficient number of medical doctors and occupational medicine specialists who should, on the basis of the education they received, be able to recognize health changes caused by organochlorine compounds. Croatian health system does not have organized networks for collection of data related to the exposure and health problems caused by POPs, this is mainly performed within the framework of specific projects.

##### 2.3.14.3 Proposal for improvement of existing practices

Although data about these compounds in humans is available, studies have not covered all Croatian regions. In order to estimate the levels of burdening in the population, the research should be expanded to more regions, taking into account the lifestyle of individuals, primarily their dietary habits. It would be interesting to monitor groups of inhabitants living in the vicinity of destroyed industrial plants that are known to be affected by PCBs contamination. Similarly, it would be useful to monitor the population in the vicinity of sources of contamination, especially with PCDD/PCDF, such as the areas surrounding industrial plants (metal and metal

manufacturing facilities, cement plants, heating plants and landfills) and professionally exposed individuals (fire-fighters and the workers in sub-station workshops and workers who handle PCB equipment).

Out of the POPs that are the subject of the first but also this NIP, the least results were collected about PCDD/PCDF in any media. Hence, further measuring should be directed primarily towards evaluation of these compounds as well as new POPs in samples taken from the environment and humans, taking into account the regional distribution.

Particular attention should be paid to a more detailed analysis of capabilities for testing the so-called new POPs, as well as those that are under consideration (*POPRC*) in all environmental components and matrices, by certain comparable methodologies. The obtained results would serve as an expert basis for proposing new measures/activities. It is recommended to strengthen cooperation between scientific research institutions and policy makers, more active participation and exchange of information in the subsidiary bodies of the Stockholm Convention.

#### *2.3.15 Identification of the part of population or environment with established negative impact caused by POPs*

Analysis of the existing research results in the Republic of Croatia shows absence of exact indicators that within a group of persons occupationally exposed to POPs there are clearly defined risk groups. Given that pesticides containing POPs are no longer used in the Republic of Croatia, it is to be expected that there would be no work-related exposure to pesticides containing these substances.

Given the nature of their job, workers at electrical substations are exposed to PCBs, i.e. those workers who are producing and repairing transformers and capacitors filled with PCBs. It is to be expected that during potential accidents involving transformers and capacitors filled with PCBs, some local contamination would occur the scope of which is hard to predict. Such accidents usually involve accidental exposure of a certain part of the population, and risk groups are those who handle such equipment, as well as fire-fighters and persons carrying out remediation. Fire-fighters belong to the risk group because of their exposure to PCDD/PCDF. It is a known fact that any fire generates PCDD and PCDF and due to the nature of their work firemen are persons most exposed to post-fire smoke. Furthermore, employees in waste management, especially those managing waste that is proven to contain or potentially contains POPs, for example, employees who work in decontamination of equipment containing PCBs, recovery of EEE, end-of-life vehicles, etc. can be exposed to POPs. Croatia has no data on blood levels of PCDD and PCDF in fire-fighters but similar is true for other countries.

As mentioned before, studies of general population show that the highest levels of POPs occur in infants, who are considered a vulnerable group. Their daily intake through mother's milk is being reduced and more and more rarely exceeds acceptable daily intake recommended by international organizations. However, this intake is not considered harmful even if it exceeds ADI because the period of breast-feeding is relatively short in relation to the entire lifetime.

### *2.3.16 Relevant mechanisms for the management of chemicals on the market and new chemicals*

As mentioned before, there are various regulations that regulate registration, permits for export, application, production and circulation of chemicals/substances such as:

- medications for human and veterinary use
- produce and general use products and substances that come in direct contact with food
- cosmetics
- plant protection products
- dangerous chemicals, etc.

Bodies responsible for management and control of chemicals in the Republic of Croatia are:

- Ministry of Health (registration, authorization, evaluation and ban/restriction of chemicals, classification, labelling and packaging of chemicals, export and import of banned or severely restricted chemicals, biocidal products, detergents, Rotterdam and Minamata Convention)
- Ministry of Environmental and Nature Protection (Stockholm and Basel Conventions, LRTAP Convention, ESPOO Convention)
- Ministry of Agriculture (plant protection products)
- Ministry of Economy (chemical weapons, EEE products)
- Ministry of Labour and Pension System (safety at work)
- Ministry of Finances-Customs Service (export and import of chemicals)

Ministry of Health is responsible for carrying expert tasks of risk assessment, evaluation of substances, proposals regarding restrictions and prohibitions, and in the execution of these tasks it cooperates with authorized expert institutions such as the Croatian Institute for Toxicology and Antidoping and the Institute for Medical Research and Occupational Health, and others.

Ordinance establishing the method for keeping registers of dangerous chemicals and the method and deadlines for submitting data from these registers prescribes the method for keeping registers of chemicals that are produced and imported or introduced into the territory of the Republic of Croatia.

### *2.3.17 Development and recommendations of synergistic mechanisms for other international agreements closely connected to management of chemicals and sustainable waste management*

A number of decisions were adopted for the purpose of improving cooperation and coordination among the Parties of the Basel, Rotterdam and Stockholm conventions.

This so-called "synergies process" aims to strengthen the implementation of the three conventions at the national, regional and global levels by providing coherent policy guidance, enhancing efficiency in the provision of support to Parties to the conventions, reducing their administrative burden and optimizing the effective and efficient use of resources at all levels, while maintaining the legal autonomy of each multilateral environmental agreement.

The decisions on enhanced cooperation and coordination among the Parties were adopted for the Basel Convention in June 2008, the Rotterdam Convention in October 2008 and the Stockholm Convention in May 2009.

The "synergies" decisions concern synergies at the national, regional and global levels in the following areas:

- 1) organizational issues in the field
- 2) technical issues
- 3) information management and public awareness issues
- 4) administrative issues, and
- 5) decision-making.

The synergistic process continued in the first extraordinary Conference of Parties to the Basel, Rotterdam and the Stockholm Convention in Bali in 2010, and then with the work of the joint Secretariat to the BRS (Basel/Rotterdam/Stockholm) Conventions (UNEP) in Geneva, with the part of the Secretariat, which still has a share of its headquarters in the FAO in Rome, which is the seat of the Rotterdam Convention.

Furthermore, in 2013 and 2015, also the Conference of the Parties of BRS Convention with joint sessions on general common topics was simultaneously held.

### 3. STRATEGIES, ACTION PLANS AND ACTIVITIES

#### 3.1 POLICY OF THE GOVERNMENT OF THE REPUBLIC OF CROATIA AND STRATEGY FOR NIP IMPLEMENTATION

In order to create preconditions for meeting the obligations of the Republic of Croatia as a party to the Stockholm Convention, as mentioned before, the body for coordination and implementation of the Stockholm Convention, organisation and supervision of implementation of measures and activities deriving from the NIP was determined.

Already by the Act on the Ratification of the Stockholm Convention on Persistent Organic Pollutants the division of responsibilities between the central state administration bodies responsible for environmental protection, agriculture, forestry and water management, health and the economy, labour and entrepreneurship was defined.

The ministry responsible for environmental protection was, pursuant to item II of the Decision on the adoption of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants, in cooperation with other competent authorities in charge of preparing and submitting a biennial report on fulfilment of obligations to the Government of the Republic of Croatia.

So far two reports on the implementation of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants in the Republic of Croatia were developed:

- The First report, for the period January 2009-December 2010, and
- The Second report, for the period January 2011-December 2012.

Reports are available to the public on the website of the ministry responsible for environmental protection, while a Proposal of the third report is under preparation, for the period from January 2013-December 2014.

The ministry responsible for environmental protection is in charge of the delivery of the revised NIP to the Secretariat of the Stockholm Convention.

Given the above, the ministry responsible for environmental protection in cooperation with all stakeholders involved and in charge of the implementation of activities from the revised NIP is charged with the task to continue reporting biannually to the Government of the Republic of Croatia on its implementation.

Therefore, it is necessary to expand the working group and include the ministry responsible for science, for defence, for safety at work, Croatian Institute for Occupational Safety Improvement, the Customs Administration, the Agricultural Land Agency, and representatives of the scientific research institutions with the aim of more effective coordination and exchange of information.

Besides the obligation to manage POPs with the aim of protecting its people and the environment in its territory, as a member of the international community the Government of the Republic of Croatia undertakes measures to protect the environment of the neighbouring countries from the outcomes of the long-range transport of POPs.

Informing and active participation of the public, potentially vulnerable groups and professionals in resolving the issues related to POPs is already a part of existing policies of the Government of the Republic of Croatia.

Therefore, the management of chemicals throughout their life cycles in the form of active substance/product until it becomes waste, is directed towards increasing the awareness about the hazards from bad and uncontrolled management of POPs or from the activities that generate them as by-products.

### *3.1.1 Basic NIP policy and goals*

The Stockholm Convention came into force in the Republic of Croatia on 30 April 2007, which confirmed the country's commitment to assume obligations stemming from it. Given the fact that the revised second NIP incorporated various measures and activities, it is necessary to harmonize their implementation. The main goal of the NIP as of the Stockholm Convention itself is to protect human health and environment from the negative effects of POPs.

The most important priority goals that are to be achieved through NIP implementation are:

- elimination of all potential sources of PCB emissions into the environment, as well as other so-called new POPs
- systematic control of the levels of POPs in all environmental components
- restriction and control of PCDD/PCDF, PCBs, HCB and PeCBs emissions from unintentional release/production, encouraging the application of BAT solutions that affect the reduction or cessation of POPs releases from stationary sources and

- information dissemination and informing the wider public about the impact of POPs on human health and the environment, especially the potential sources of so-called new POPs, ways of their intake into the human body and about the measures that need to be undertaken in order to avoid exposure as well as environmentally sound waste management.

NIP contributes to the implementation of environmental protection strategic and planning documents (National Environmental Action Plan, Strategy for Sustainable Development of the Republic of Croatia).

The planned gradual reduction of POPs in the environment presupposes active participation of the public and all stakeholders who will participate in disseminating information on POPs effects and the necessity for the reduction of their use and control of their unintentional production. Public education is an indispensable part of the activities, and will be realised through the media, organization of workshops/seminars, expert panels, preparation of various publications (brochures/flyers/guidelines) and distribution to target and vulnerable groups, etc. Already during the NIP revision process the brochure containing basic information about the Stockholm Convention and the so-called new POPs was produced with the assistance from UNEP.

Results of monitoring the POPs concentration in the environment will be/are available to the public through CAEN's media of communication (web site, publications, reports for the Government of the Republic of Croatia, and technical reports from competent ministries) in accordance with the current legislation related to international and national obligations, and public information.

### *3.1.2 Approach to NIP implementation*

Basic approach which will be used during the implementation of NIP is the joint and comparable implementation of all measures and activities, with the aim to ensure appropriate NIP implementation and avoid overlapping or discrepancy of implementation activities.

### *3.1.3 Implementation monitoring mechanisms*

During implementation of the revised/second NIP, each institution/body/organization will periodically on an annual basis report on the taken measures/activities from the second NIP within the framework of its competence, or the progress of the implementation of activities in the proposed time frame, so that the ministry responsible for environmental protection could prepare the biennial Implementation Report, and report on it to the Government of the Republic of Croatia.



## 3.2 ACTIVITIES, STRATEGIES AND ACTION PLANS

Main limitations in defining specific activities, strategies and action plans are related to the following:

- responsibilities of individual state authorities and public institutions cannot be defined by action plans but can only be proposed, and it is uncertain what will fall under the competence of individual institutions
- financing dynamics depends on the state budget but also on the financial resources of local self-governments and the priorities given in the allocation, and
- financing the implementation of an action plan depends on the willingness of the international community to provide financial assistance in carrying out certain activities, or funding opportunities from other sources of financing.

One of the key methodological issues in the assessment of costs for certain activities for the implementation of the Second NIP is to separate these costs from other environmental protection costs. Very often impacts related to POPs manifest together with effects of other substances, and therefore measures and instruments for their prevention or mitigation are applied simultaneously. Considering the above, proposed measures for the continued implementation of the Stockholm Convention commitments, by particular activities, along with the definition of the competent authorities, with expert and technical support, deadlines and approximate estimates of required financial resources are given below.

### 3.2.1 Activity: *The institutional and legal strengthening measures*

During the preparation of the POPs inventory, institutional responsibilities and regulatory frameworks have been specified for each segment of POPs treatment and management (production, use, import, export, monitoring, waste management, control, etc.).

In the EU accession process, environmental legislation was fully transposed into national legislation and therefore this document does not include additional measures related to the changes in the legislative framework in the Republic of Croatia in the field of POPs. However, possible modifications in the terms of the mechanism of data collection, amendments to forms for reporting purposes etc. are proposed for consideration.

In the period from 2011 to 2012 under the guidance of the Basel Convention Regional Centre from Slovakia, the Republic of Croatia took part in a regional cooperation project with Serbia and Montenegro with the aim of institutional strengthening related to transboundary movements of chemicals and hazardous waste entitled: “*Strengthening the capacity of Croatia, Montenegro and Serbia to monitor and control the transboundary movements of chemicals and hazardous wastes*“.

Representatives responsible for implementation of all three related Conventions closely linked by issues of safe management of chemicals and waste management, the Stockholm, Basel and Rotterdam Convention participated in all synergy conferences of parties, as well as regular Conferences of the Parties. Meetings related to other similar issues such as safe management of chemicals at the international level are systematically monitored; Strategic Approach to

International Chemicals Management (SAICM), and as part of the negotiation process concerning the new Convention on mercury (Minamata Convention), and the LRTAP Convention.

Representative of the Republic of Croatia was appointed in the *CEE-Environmental Network for Optimizing Regulatory Compliance on Illegal Traffic* related to issues under the Basel Convention. Croatian representatives also actively participate in working groups within ECHA that work to determine the method of risk management and their analysis.

The inclusion and more active participation of scientific and professional institutions in the work of subsidiary bodies of the Stockholm Convention is proposed, as well as in related conventions with the aim of capacity building.

Subsequent chapters propose concrete activities with related timeframes to ensure implementation of necessary changes in the institutional framework of the Republic of Croatia.

Areas requiring additional adjustments are as follows:

- locations contaminated with POPs
- systematic monitoring of POPs in the environment, food and humans
- analysis of products in use, in stockpiles and waste (end-of-life vehicles, EEE, textile, furniture, carpets, plastics, rubber products...) that might contain the so-called new POPs
- dissemination of information on the methods of environmentally sound management of waste containing POPs and the safe elimination of contaminated materials/products
- awareness raising in target groups, and
- improvement/expansion of the existing mechanism for information exchange at the national level.

### *3.2.2 Activity: Production, import and export, use, stockpiles and waste pesticides (residues) (Annex A, Part I)*

As mentioned before, pesticides containing POPs are not produced in the Republic of Croatia, nor are active substances imported from which ready formulations for placing on the market would be produced. Today, there are numerous preparations registered in the Republic of Croatia that have gradually replaced the toxicologically unfavourable pesticides, including POPs. Since the production of pesticides containing POPs is prohibited in the Republic of Croatia, future production is not anticipated nor possible.

Given the fact that the current status complies with requirements of the Stockholm Convention, no additional activities have been proposed nor is there a need to improve current practices and regulatory framework for management and handling of pesticides.

The only area for which improvement is proposed is the systematic monitoring of pesticides containing POPs in the environment (including the identification of contaminated sites) aimed at determining concentrations of these compounds and thereby confirming the conclusion of the latest inventory that pesticides containing POPs do not represent a real/significant problem/risk in the Republic of Croatia with regard to their impact on human health and the state of the environment.

During the process of NIP revision, the Institute for Plant Protection of the Croatian Centre for Agriculture, Food and Rural Affairs prepared the expert background document "Report on the use of lindane and endosulfan in the territory of Republic of Croatia" in which it was determined that the largest quantities of lindane were applied in Osijek-Baranja and Vukovar-Srijem County, while endosulfan was frequently used in wine-growing areas of the Republic of Croatia. In the mentioned report it was concluded that there existed the need for carrying out more extensive research by which residue could also be found in soil, which greatly depends on the quality of soil and crops that were later grown. Endosulfan residue could be found on the evergreen plants in the vicinity of the treatment spot. Given the above, the Agricultural Land Agency was charged in cooperation with the Croatian Centre for Agriculture Food and Rural Affairs, and other competent bodies/institutions with developing the Programme for monitoring lindane and endosulfan substances and basic parameters in the soil with a list of activities, and related to soil sampling in 12 Croatian counties, along with consideration of the need for potential expansion to other counties for 2016/2017, or 2018. The aim of the indicated programme would be development of the trend of the presence of lindane and endosulfan, or determining the need for further monitoring in view of the degree of potential risk to human health and the environment.

It is proposed that the indicated activity be carried out within the existing regular nine-year Programme, or rather it is necessary to ensure additional funds or it will not be possible to fund what is required under the existing Programme.

The estimated value of the Programme implementation over the two-year period is 200,000.00 HRK.

Considering the obligations under the Stockholm Convention regarding pesticides containing POPs, it is clear that the requirements relating to the production, use, import and export have already been met.

### *3.2.3 Activity: Production, import and export, use, identification, labelling, decontamination, storage and disposal of PCBs and equipment containing PCBs (Annex A, Part II)*

During the preparation of PCB inventory, it was established that in the Republic of Croatia there was no production of PCBs but there was use of equipment containing PCBs.

The requirements listed in the Stockholm Convention regarding PCB management and removal could be summarized as follows:

- remove equipment containing PCB at the latest by 2025
- make significant efforts to identify, label and remove from use equipment containing more than 0.05% of PCBs in relation to total mass of fluid and volumes greater than 5 litres
- prohibit import and export of equipment containing PCBs, except in the case of waste disposal in an environmentally sound manner
- prohibit collection of liquids with a share of PCBs higher than 0.005% for the purpose of reuse in other equipment, except for the purposes of servicing and maintenance

- achieve sustainable management of waste liquids containing PCBs and equipment contaminated with PCBs with PCB content above 0.005% as soon as possible but no later than 2028, and
- every five years prepare a report on the progress in eliminating PCBs and submit it to the Conference of the Parties.

The priority (specific) objectives for this activity are:

1. labelling, identification and removal of equipment containing PCBs ( $> 50 \text{ mg L}^{-1}$ ,  $> 50 \text{ mL}$ ) at the latest by 2025, and the disposal of liquids/equipment containing PCBs  $> 50 \text{ mg L}^{-1}$  in an environmentally sound manner in line with the Stockholm Convention requirements, or until deadlines set by the national legislature, and
2. education and raising awareness of target groups

### *1. Removal of equipment containing PCBs until 2025*

Proposed measures:

- determine possible priority sites, abandoned/unprotected sites on the basis of a Report on PCB equipment in use, and
- conduct the removal of equipment from the use or disposal of equipment containing PCBs.

It is necessary to carry out a detailed analysis of the equipment containing PCBs according to type, condition, age, location, etc. based on the collected reports on equipment. Priority, high risk sites should be assessed, if they exist, and the equipment should be removed from them as quickly as possible. The Framework plan for removing the equipment containing PCBs should be developed based on the data submitted by the holders of the equipment and their intended plans for decontamination and disposal, by which a timeframe for the removal of all equipment containing PCBs from the territory of the Republic of Croatia would be set.

### *2. Education and raising awareness of target groups*

Proposed measures:

- develop educational materials on PCBs for all interested parties, for use of substitutes for PCBs, for an environmentally sound management of waste containing PCBs, and allow the general public access to existing guidelines/guides (UNEP CHW-COP.12-BC-12/3) and
- develop instructions for safe use for equipment holders.

Education, dissemination and the availability of information are the key preconditions for an effective implementation of the plan. Timely availability of information should be ensured for all interested parties.

In order to raise awareness and inform the public on PCBs in general, the preparation of the material that would provide general information about the characteristics and properties of PCBs, their impact on health and the environment and potential ways and risk of exposure is proposed.

These materials should be available to the general public, e.g. through the website of the ministries responsible for environmental protection, safety at work, health and the economy.

In addition to the prescribed obligations, at the moment there are no unique instructions for identification, decontamination, use, transport, storage and disposal of equipment containing PCBs available to the holders of the equipment. To ensure meeting of the requirements under the Stockholm Convention related to the handling of equipment and waste containing PCBs, it is proposed to draft guidelines for holders of the equipment that would contain information on the requirements for:

- identification and labelling of the equipment in use containing PCBs (the method of determining the PCB content in the equipment suspected to contain it)
- use of equipment containing PCBs (functioning of the equipment, areas where it can(not) be used)
- proper/safe handling of equipment containing PCBs
- transportation of equipment containing PCBs
- management of stockpiles of equipment containing PCBs and PCBs
- safe handling and disposal in an environmentally sound manner of PCB waste
- labelling of waste containing PCBs
- temporary storage of PCB waste at the production site, and
- procedure in case of PCB leakage from equipment in operation or equipment out of use.

Table 3.2-1 contains a description of the measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to the management of PCBs in the Republic of Croatia, identifies the institutions responsible for their implementation, and provides the timetable and the estimated necessary funds.

*Table 3.2-1: Activity: Production, import and export, use, identification, labelling, decontamination, storage and disposal of PCBs and equipment containing PCBs*

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: IDENTIFICATION AND SAFE REMOVAL OF EQUIPMENT CONTAINING PCBs IN THE TERRITORY OF THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Removal of equipment containing PCBs by 2025, monitoring</i>			
Measure 1.1: Record keeping and preparation of regular reports on equipment containing PCBs, and PCBs (including information about disposed PCBs and remaining PCBs/equipment)	CAEN	continuously	0
Measure 1.2: Carry out removal from use/disposal of equipment and PCBs	Mandatory for holders/owners of equipment, MENP-control over implementation/inspection	no later than 2025/2028	4,500.00
<i>Specific goal 2: Education and raising awareness of target groups</i>			
Measure 2.1: Preparation and distribution of educational materials about PCB (promotion/stimulation of alternative solutions, information on the safe handling of equipment, harmful effects on health and the environment, environmentally sound waste management)	MENP (MH/CITA/CIOSI/ professional and scientific institutions)	2016/2017	100,000
<b>TOTAL</b>			<b>4,600,000</b>

*3.2.4 Activity: Production, import and export, use, stockpiles and waste hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where appropriate (Annex A, Part I)*

PBDE or their commercial mixtures are not produced in the Republic of Croatia, however, the use of products/equipment containing these substances has been assumed. Since the production of HBB stopped in the 1970s, the majority of products and articles that contained HBB have been discarded/disposed of long ago. Therefore, this chemical is not considered significant for the preparation of the inventory.

The requirements regarding the so-called new POPs, including PBDE are as follows:

- implementation of control measures for each chemical listed in the Stockholm Convention (Articles 3 and 4)
- preparation of the inventory of chemicals in stockpiles (Article 6)
- preparation of the revised and updated NIP (Article 7)
- inclusion of "new" POPs, including PBDE into reports (Article 15), and
- inclusion of "new" POPs, including PBDE into the programme for the evaluation of implementation efficiency (Article 16).

Specific measures and activities are identified that need to be carried out in accordance with defined priorities and objectives in order to successfully implement all obligations related to management of PBDE in the Republic of Croatia. The main objective is reduction, gradual phase-out of use and final cessation of use of equipment that contains or is contaminated with PBDE, preventing release of PBDE into the environment, and ensuring conditions for the disposal of PBDE waste in an environmentally sound manner.

Specific objectives are as follows:

1. raising the awareness and strengthening technical capacities related to safe management of PBDE, raising awareness of target groups on potential sources and harmfulness to health and the environment, information on the methods of environmentally sound management of waste that contains them, and its systematic removal, and
2. information and analysis of capabilities and methodology for rapid detection of PBDE in used imported EEE, furniture and vehicles.

*1. Raising the awareness and strengthening technical capacities for PBDE management*

Proposed measure:

- revise the developed preliminary inventory with the aim of preparing a more detailed inventory of PBDE in the Republic of Croatia in order to provide a downward trend in the upcoming years in articles that potentially contain it, including a report on stockpiles (for the purposes of regular reporting in line with the requirements under the Stockholm Convention).

## 2. Education and raising awareness of target groups

Proposed measure:

- prepare information material on potential sources, harmfulness to health and the environment, substitutes, possibilities for rapid detection, how to manage waste that potentially contains it in an environmentally sound manner.

Instructions should be based on technical guidelines for environmentally sound management of waste containing POPs (UNEP CHW-COP.12-BC-12/3).

The description of measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to PBDE management in the Republic of Croatia, identification of the institutions responsible for their implementation, as well as the timetable and estimated necessary funds are provided in table 3.2-2.

*Table 3.2-2: Activity: Production, import and export, use, stockpiles and waste hexaBDE, heptaBDE, tetraBDE, pentaBDE, and HBB*

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: IDENTIFICATION AND SAFE REMOVAL OF PRODUCTS CONTAINING PBDE IN THE TERRITORY OF THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Raising the awareness and strengthening technical capacities for PBDE management</i>			
Measure 1.1: Revise the preliminary inventory with the aim of preparing a more detailed inventory of PBDE in the Republic of Croatia, and prepare a Report for the purposes of regular reporting obligations under the Stockholm Convention	CAEN (MENP/CITA/CBS/Customs Directorate)	2017/2018/ continuously	150,000
<i>Specific goal 2: Education and raising awareness of target groups</i>			
Measure 2.1: Preparation and distribution of informational materials	MENP (MH/CITA)	2017	50,000
<b>TOTAL</b>			<b>200,000</b>

### 3.2.5 Activity: Production, import, export, use, stockpiles and waste DDT (Annex B)

A special action plan relating to DDT was not prepared, and further activity within the NIP revision process was not proposed given that it was assessed that DDT did not present a problem in the Republic of Croatia regarding the potential risk to health and the environment (it is not produced or imported and its use is prohibited since 1972).

### 3.2.6 Activity: Production, import and export, use, stockpiles and waste PFOS, its salts and PFOSF (Annex B, Part III)

During the preparation of the inventory, no production, import or export of PFOS and its derivatives nor current use were recorded in the Republic of Croatia. Ten to twenty years ago firefighting foam that contained PFOS was very popular in the Republic of Croatia. There is no precise data on existing stocks or quantities of that foam used. It should be noted that the inventory of firefighting foams is very extensive, involving many stakeholders and requiring thorough planning. It would therefore be advisable, as mentioned before, that firefighting services carry out a detailed assessment of firefighting foams used and of those on stockpiles.

The Stockholm Convention requirements regarding the so-called new POPs, including PFOS are:

- implementation of control measures for each chemical listed in the Stockholm Convention (Articles 3 and 4)
- preparation of the inventory of chemicals in stockpiles (Article 6);
- preparation of a revised and updated NIP (Article 7)
- inclusion of "new" chemicals, including PFOS in the reporting (Article 15) and
- inclusion of "new" chemicals, including PFOS in the programme for evaluation of implementation efficiency (Article 16).

In order to successfully implement all obligations under the Stockholm Convention relating to PFOS management in the Republic of Croatia, concrete measures and activities were identified to be carried out in accordance with defined priorities and objectives. The main goal is to reduce, gradually phase out and ultimately stop the utilisation of PFOS and equipment containing or contaminated with PFOS, to prevent release of PFOS into the environment, and ensure conditions for the disposal of waste containing PFOS in an environmentally sound manner.

Specific goals are as follows:

1. strengthening of technical capacities for PFOS/PFOSE management and
2. education and raising awareness of target groups

#### *1. Strengthening of technical capacities for PFOS/PFOSE management*

Proposed measure:

- revise the preliminary inventory with the aim of preparing a more detailed inventory of PFOS/PFOSE in the Republic of Croatia, in order to obtain the downward trend in the upcoming years in products that potentially contain them, including a report on stockpiles (for the purposes of regular reporting in line with Stockholm Convention requirements).

#### *2. Education and raising awareness of target groups*

Proposed measure:

- prepare informational materials on possible sources, harmfulness to health and the environment, substitutes, and how to manage waste that potentially contains it in an environmentally sound manner.

Instructions should be based on technical guidelines for environmentally sound management of waste containing POPs (UNEP-CHW-COP.12-BC-12/3).

An overview of specific goals and activities for management of PFOS that need to be realised in order to ensure implementation of the Stockholm Convention is provided in table 3.2-3.



Table 3.2-3: Activity: Production, import and export, use, stockpiles and waste PFOS, its salts and PFOSF

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: IDENTIFICATION AND SAFE REMOVAL OF PRODUCTS CONTAINING PFOS IN THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Strengthened technical capacities for PFOS/PFOSF management, monitoring</i>			
Measure 1.1: Revise the preliminary inventory with the aim of preparing a more detailed inventory of PFOS in the Republic of Croatia, for the purposes of regular reporting in accordance with obligations under the Stockholm Convention	CAEN (MENP/CBS/CITA/ Customs Directorate)	2017/2018/ continuously	150,000
<i>Specific goal 2: Education and raising awareness of target groups</i>			
Measure 2.1: Prepare informational materials	MENP (MH/CITA)	2017	50,000
<b>TOTAL</b>			<b>200,000</b>

### 3.2.7 Activity: Production, import and export, use, stockpiles and waste HBCD

Preliminary inventory established that there was no available data on production of HBCD in the Republic of Croatia, however, the use of HBCD was confirmed. Companies that imported/used HBCD are in the process of substituting HBCDs with other less harmful alternative solutions.

The Stockholm Convention requirements regarding the so-called new POPs, including HBCD are:

- implementation of control measures for each chemical listed in the Stockholm Convention (Articles 3 and 4)
- preparation of the inventory of chemicals in stockpiles (Article 6)
- preparation of an updated and revised NIP (Article 7)
- inclusion of "new" chemicals, including HCBd in the reporting (Article 15) and
- inclusion of "new" chemicals, including HBCD in the programme for evaluation of efficiency (Article 16).

In order to successfully implement all obligations under the Stockholm Convention related to the main objective of this activity—the establishment of appropriate HBCD management in the Republic of Croatia, concrete measures and activities were identified to be carried out in accordance with defined priorities and objectives.

Specific goals are as follows:

1. strengthening of technical capacities for HBCD management with the aim of monitoring the implementation of the disposal of stockpiles in an environmentally sound manner and
2. education and raising awareness of target groups.

#### 1. Strengthening of technical capacities for HBCD management

Proposed measures:

- regularly keeping records of the remaining stocks (for the purposes of regular reporting in line with the obligations under the Stockholm Convention and POPs Regulation) and

- information and analysis of capabilities and methodology for rapid detection of HBCD.

## 2. Education and raising awareness of target groups

Proposed measure:

- preparing informational materials about possible sources, harmfulness to health and the environment, substitutes, and how to manage waste that potentially contains it in an environmentally sound manner.

Instructions should be based on technical guidelines for environmentally sound management of waste containing POPs (UNEP-CHW-COP.12-BC-12/3).

The description of measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to HBCD management in the Republic of Croatia, identification of the institutions responsible for their implementation, as well as the timetable and the estimated necessary funds are provided in table 3.2-4.

*Table 3.2-4: Activity: Production, import and export, use, stockpiles and waste HBCD*

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: IDENTIFICATION AND SAFE REMOVAL OF HBCD AND PRODUCTS CONTAINING HBCD IN THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Strengthening of technical capacities for HBCD management, monitoring</i>			
Measure 1.1: Keep a record on use/import/export/production/stockpiles and waste	MH/CITA/CAEN (MENP/CBS/Customs Directorate)	continuously	0
Measure 1.2: Revise the preliminary inventory, prepare a report on stockpiles for the purposes of regular reporting	CITA/CAEN/MENP	2017/2018/ continuously	100,000
<i>Specific goal 2: Education and raising awareness of target groups</i>			
Measure 2.1: Prepare informational materials	MENP (MH/CITA)	2017	50,000
<b>TOTAL</b>			<b>150,000</b>

### 3.2.8 Activity: Register of exemptions and the need for exemptions (Article 4)

The Republic of Croatia did not submit an application for any exemptions listed in Annex A or Annex B related to POPs. It was decided that the Republic of Croatia will not register for such exemptions in the future and for the moment no activities are required related to the obligations under Article 4 of the Stockholm Convention. In case a need arises for exemptions, the Republic of Croatia will in due time inform the Secretariat of the Stockholm Convention thereof.

### 3.2.9 Action plan: Measures to reduce releases from unintentional production (Article 5)

Highest emissions of PCDD and PCDF occur due to residential wood burning. Other processes that contribute to these emissions are the processes of steel production in arc furnaces, fuel combustion in the transport sector, as well as waste incineration and cremation. HCB emissions primarily originate from biomass and solid fuel combustion and to a lesser extent from thermal treatment of waste. In the Republic of Croatia, the dominant source of HCB emissions is fuel combustion in stationary sources in the energy sectors. The dominant source of PCBs is emission from refrigeration and air conditioning equipment using halogenated hydrocarbons and electrical

equipment. Other sources such as steel production, thermal treatment of infectious waste and fuel combustion have a minor contribution to PCBs emissions.

The Parties to the Stockholm Convention are required to prepare their initial assessments of the releases and update assessments at regular intervals. Also, the Parties may revise their initial and subsequent assessments in order to establish and maintain the consistency of assessment trends over time.

The main objective of this National action plan is to ensure an adequate framework for PCDD/PCDF management in the Republic of Croatia, including the reduction and prevention of their future releases into the environment.

As Parties to the Stockholm Convention have the obligation to revise the action plan related to Article 5 every five years, this activity was carried out during the process of NIP revision. This action plan/activities and measures are included in this document.

The proposed measures are divided into four categories of activities/specific objectives:

- further development and updating of POPs releases inventory
- strengthening the capacity of competent authorities and improving cooperation and information exchange for a more efficient management of POPs
- programme for development and dissemination of information, and
- reduction and elimination of the releases of POPs listed in Annex C.

Further development and maintenance of POPs releases inventory

Proposed measures:

- harmonization of requirements pursuant to obligations related to development and reporting under LRTAP Convention and Stockholm Convention
- development of instructions/guidelines for data collection and preparation of the Inventory, and
- periodic review of the Release Inventory.

Measures within the framework of this activity aim to improve the methods of data collection and future revisions of the Release Inventory. First of all, it is necessary to compare and harmonize the reporting obligations and requirements under the LRTAP Convention and Stockholm Convention in order to allow better insight into activity data according to each category and class of sources, data on the status of equipment for emission reduction/restriction and data on specific technological processes, as well as to avoid duplication in the data collection process.

Strengthening the capacity of competent authorities and improving cooperation and information exchange for a more efficient management of POPs

Proposed measure:

- further improvement of the implementation of supervision over the fulfilment of the Stockholm Convention requirements.

Implementation of the Stockholm Convention and efficient management of POPs require involvement of authorities and organization from different fields of responsibility. To ensure adequate cooperation and information dissemination as well as regular monitoring of implementation it is necessary to further improve the implementation of supervision over the fulfilment of requirements under the Stockholm Convention.

Programme for development and dissemination of information and reduction and elimination of releases of POPs listed in Annex C

Proposed measures:

- implementation of measures from the Plan for the protection of air, ozone layer and climate change mitigation in the Republic of Croatia for the 2013-2017 period (OG No. 139/13); further work on the promotion and increase of energy efficiency in the industrial and public sectors, as well as households, renewable energy sources, and education and dissemination of information about the proper use of fuel and management of combustion plants and the effects of uncontrolled combustion in residential buildings, and
- dissemination of information about the harmfulness and potential hazards to health and the environment.

A very important target group for reduction of releases of POPs listed in Annex C are households, which participate with around 65% in total emissions of PCDD/PCDF into the air. Measures for reduction of these releases include public information and awareness raising and education programmes on the appropriate selection of combustion plants and fuel and the effects of uncontrolled combustion in residential buildings.

In addition, the existence of sites contaminated with POPs listed in Annex C was not indisputably determined during the preparation of POPs inventory in the first NIP, and contaminated sites were only preliminary recognized. In order to determine contaminated sites it is necessary to develop procedures or guidelines for the assessment of pollution, assessment of the impact on humans and the environment and for setting remediation priorities. A prerequisite for determining contaminated sites is a consideration/adjustment of existing and/or development of new regulations that will set the limit values for pollutants in soils for various purposes. The legal framework exists for the soil used for agricultural purposes, namely, the Ordinance on the Protection of Agricultural Land from Pollution.

The description of measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to the reduction of releases from unintentional production in the Republic of Croatia, identification of the institutions responsible for their implementation, as well as the timetable and estimated necessary funds are provided in table 3.2-5.

Table 3.2-5: Action plan: Measures to reduce and control releases from unintentional production

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: REDUCTION OF RELEASES FROM UNINTENTIONAL PRODUCTION IN THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Further development and maintenance of POPs releases inventory</i>			
Measure 1.1: Harmonization of reporting requirements under LRTAP Convention and Stockholm Convention	CAEN	2017	200,000
Measure 1.2: Development of instructions/guidelines or programme for data collection and Inventory development	CAEN	2017	100,000
Measure 1.3: Preparation of an annual inventory according to requirements of the Stockholm Convention, with periodic revision of releases Inventory every three years	CAEN	2018/continuously	300,000
<b>TOTAL</b>			<b>600,000</b>

### 3.2.10 Activity: Measures to reduce releases from stockpiles and wastes (Article 6)

Article 6 of the Stockholm Convention requires Parties to:

- develop appropriate strategies for identifying stockpiles and wastes (including products and articles that have become wastes) containing, consisting of or contaminated with chemicals listed in Annexes A, B or C
- identify and manage stockpiles in a safe, efficient and environmentally sound manner
- implement measures to reduce or eliminate releases from stockpiles and wastes containing chemicals listed in Annexes A, B or C in a manner that protects human health and the environment
- take appropriate measures to ensure that waste products and articles containing chemicals listed in Annexes A, B or C are handled in an environmentally sound manner
- dispose waste products and articles containing chemicals listed in Annexes A, B or C in a way that destroys or irreversibly transforms the POPs content, taking into consideration international rules, standards and guidelines
- develop strategies for identifying sites contaminated with chemicals listed in Annexes A, B or C; if remediation is required then it must be done in an environmentally sound manner and
- cooperate in the activities on the implementation of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The abovementioned should be taken into account when implementing the measures set out in chapters:

- 3.2.2 Activity: Production, import and export, use, stockpiles and waste pesticides (residues) (Annex A, Part I)
- 3.2.3 Activity: Production, import and export, use, identification, labelling, decontamination, storage and disposal of PCBs and equipment containing PCBs (Annex A, Part II)
- 3.2.4 Activity: Production, import and export, use, stockpiles and waste hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where appropriate (Annex A, Part I)

- 3.2.6 Activity: Production, import and export, use, stockpiles and waste PFOS, its salts and PFOSF (Annex B, Part III)
- 3.2.7 Activity: Production, import and export, use, stockpiles and waste HBCD.

### *3.2.11 Strategy: Identification of stockpiles, articles in use and wastes*

The Strategy for identification of stockpiles, articles in use and wastes is not separately analysed because it is a part of the following chapters:

- 3.2.2 Activity: Production, import and export, use, stockpiles and waste pesticides (residues) (Annex A, Part I)
- 3.2.3 Activity: Production, import and export, use, identification, labelling, decontamination, storage and disposal of PCBs and equipment containing PCBs (Annex A, Part II)
- 3.2.4 Activity: Production, import and export, use, stockpiles and waste hexaBDE and heptaBDE (Annex A, Part IV), tetraBDE and pentaBDE (Annex A, Part V) and HBB, where appropriate (Annex A, Part I)
- 3.2.6 Activity: Production, import and export, use, stockpiles and waste PFOS, its salts and PFOSF (Annex B, Part III)
- 3.2.7 Activity: Production, import and export, use, stockpiles and waste HBCD.

### *3.2.12 Strategy: Identification of contaminated sites (Annexes A, B and C) and environmentally sound remediation*

Given the fact that during the preparation of the preliminary inventory the existence of sites contaminated with POPs was not indisputably determined, but rather potentially contaminated ones were preliminary identified, this chapter will contain the activities and measures necessary for potential development of the national Programme for identification of contaminated sites, scope of contamination and potential environmentally sound remediation, as well as indicate technical measures needed for a timely implementation of this Programme.

During development of the POPs Inventory, based on the available data, the existence of sites contaminated with POPs pesticides was not determined. However, given the fact that in the Republic of Croatia pesticides were produced, used, imported and exported, further systematic investigation needs to be carried out in the areas where they were applied in larger quantities when in use. These investigations should be carried out in the territory of Osijek-Baranja, Vukovar-Srijem and Bjelovar-Bilogora Counties.

With regard to previous and current existence of equipment containing PCBs in the Republic of Croatia (transformers and capacitors) and the past war period (1991-1995) that caused considerable destructions and shelling of power plants, there was a post-war preliminary identification of sites at which environment could have been contaminated with PCBs. At these sites the presence of PCB compounds in the soil and air was determined. On the basis of past examination and the carried out inventory of POPs three sites were identified in the coastal part (Zadar, Rijeka Dubrovačka and Bilice in the vicinity of Šibenik) which require further investigation in order to indisputably determine their actual status and a degree of potential contamination.

Additional investigations are required to determine sites potentially contaminated with PCDD/PCDF since such data is lacking. When determining potential contaminated sites attention should be given to sites near potential sources of PCDD/PCDF emissions and to those where preliminary studies revealed the presence of PCBs in soil because it is likely that certain quantities of PCDD/PCDF will be found there.

The main goal of this strategy is reduction of environmental pollution through the remediation and recovery of identified locations contaminated with POPs.

Specific goal is as follows:

- establishment of a system for the management of contaminated areas.

#### *1. Establishment of a system for the management of contaminated areas*

Proposed measures:

- carry out preliminary investigation of sites potentially contaminated with POPs
- establish a register of contaminated areas
- define technical guidelines for remediation of contaminated areas
- carry out a detailed investigation of identified sites contaminated with POPs
- identify priority contaminated sites
- prepare plans for remediation of sites contaminated with POPs
- carry out remediation of contaminated areas (respecting prioritised areas) and
- monitor the effects of remediation.

It is necessary to develop at a professional level procedures or instructions for identification of sites contaminated with POPs and assessment of their level of pollution (along with determining priority for remediation). Competent state administration bodies and competent public institutions should carry out preliminary investigation at locations potentially contaminated with POPs, selected on the basis of agreed criteria, such as types of industrial activities related to POPs emission/release into environmental components, natural characteristics and sensitivity of the area, as well as available data on POPs monitoring in the Republic of Croatia (see chapter 2.3.10). Data collected during the preliminary investigation will be used for the establishment of the register of contaminated areas. After the identification of priority sites for remediation, it is necessary to develop instructions and procedures for implementation of environmentally sound remediation of contaminated sites. Owners of contaminated sites, in cooperation with competent ministries, have to prepare plans for remediation and decontamination of these sites. Dynamics of monitoring of remediation/decontamination of potentially identified contaminated sites will be adjusted to specificities of individual cases.

One of the potential sources of releases into the environment and a potential danger for the environment are undoubtedly illegal landfills, and for now, unremediated municipal waste landfills.

However, there has been great progress with regard to remediation of 12 landfills across the Republic of Croatia, based on the model which does not burden the budgets of cities and

municipalities, and so far is HRK 220 million have been ensured. For remediation the local self-government units were provided with 100% financing from EU funds and the Environmental Protection and Energy Efficiency Fund.

All landfills in the Republic of Croatia will be remediated and closed within one year after the opening of waste management centres for specific counties. In the Republic of Croatia, a total of 13 waste management centres will be built the value of which is estimated at HRK 5 billion, but it is still considered an urgent problem.

The description of measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to the identification and remediation of contaminated locations in the Republic of Croatia, identification of the institutions responsible for their implementation, as well as the timetable and the estimated necessary funds are provided in table 3.2-6.

*Table 3.2-6: Activity: Identification of contaminated locations and environmentally sound decontamination*

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: REDUCTION OF ENVIRONMENTAL POLLUTION THROUGH REMEDIATION AND RECOVERY OF IDENTIFIED SITES CONTAMINATED WITH POPs</b>			
<i>Specific goal 1: Establishment of a system for the management of contaminated areas</i>			
Measure 1.1: Carry out preliminary investigation of sites potentially contaminated with POPs	MENP/MA/CAEN/ALA/MDRC	2018	200,000
Measure 1.2: Establish a register of contaminated areas	CAEN/MENP/MA/ALA	2019	200,000
Measure 1.3: Define technical guidelines for remediation of contaminated areas	MENP/CAEN	2019	150,000
Measure 1.4: Carry out a detailed investigation of sites contaminated with POPs in addition to establishing priority contaminated sites	MENP/MA/ALA/MDRC/LSU/CAEN	2020	1,200,000
Measure 1.5: Prepare plans for remediation of sites contaminated with POPs	Owners, LSU	2020	Private owners: own financing; State-owned sites: 800,000
Measure 1.6: Carry out remediation of contaminated areas (respecting prioritised areas)	Owners, MENP	2020-2025	For the implementation of this activity it is necessary to ensure resources from international funds (grants, projects). The exact amount needed will be determined after detailed investigations have been carried out and remediation plans prepared
Measure 1.7: Monitor the effects of remediation	MENP/CAEN/MA/ALA	-	The dynamics of monitoring contaminated sites and the amount of necessary funds will be determined on a case-by-case basis
<b>TOTAL</b>			<b>2,550,000</b>

### *3.2.13 Activity: Enabling or implementation of information exchange and involvement of interested parties*

The exchange of information on POPs in the Republic of Croatia is not at a satisfactory level. The main goal of the activity is to improve the exchange of information and to enable/ensure the exchange of information on production, use and release of POPs and their alternatives, including information on their harmful properties and financial and social costs that they might generate.



The Parties to the Convention can exchange information with each other through direct contact or through the Stockholm Convention Secretariat. The main task of the national focal point is to represent a link between the Stockholm Convention and all interested parties in the country, i.e. between all stakeholders which will participate in information exchange at the international and national level. The practice to date has been the exchange of available information between competent state administration bodies or research institutions.

The identified specific goal is as follows:

- development of the information exchange system between relevant institutions in the Republic of Croatia and the National focal point.

*1. Development of the information exchange system between relevant institutions in the Republic of Croatia and the National focal point*

Proposed measures:

- extending the working group responsible for the implementation of NIP and reporting to the Government of the Republic of Croatia by the ministry responsible for environmental protection
- appointment of contact persons for data collection and exchange of information depending on the issue and the Stockholm Convention requirements, inclusion of representatives from economy, scientists, non-governmental organizations and other stakeholders, and
- improve the system for exchange of information between all stakeholders.

A need for improvement of the system for exchange of information between civil society organisations, government sector and institutions responsible for the implementation of the Stockholm Convention was identified.

*3.2.14 Activity: Public awareness raising, informing and education (Article 10)*

It is necessary to work on improvement of public awareness and education levels regarding the issue of POPs. The level of public awareness about the impact of POPs on humans and the environment is not satisfactory, which can result in inadequate handling of chemicals and waste and especially with regard to the so-called new POPs.

It is necessary to adopt individual programmes for education and raising of public awareness for each of the identified target groups. The ultimate aim of such programmes is primarily to inform the public about the potential sources of the so-called new POPs, their potential harmful effects on health and the environment since production and use is prohibited or restricted. However, work should be carried out on the prevention of releases into the environment and ensuring the disposal of waste containing POPs in an environmentally sound manner.

Possible programmes/activities and target groups for which they are intended are shown in table 3.2-7.

*Table 3.2-7: Programmes/activities and target groups for which they are intended*

	Representatives of competent institutions	Expert public/ authorized persons	Technical managerial staff	Workers (CCE, CEA, CCTC)	Teachers and pupils	Media representatives	Representatives of non-governmental organizations
Publications (posters, brochures, leaflets)	√	√	√	√	√	√	√
Instructions and guidelines			√	√			
Seminars, workshops, professional lectures		√	√	√	√	√	√

The indicated activities are considered to be short term goals (next 1-5 years). The lack of technical equipment, ensuring necessary financial resources and lack of management support in business entities may be the limiting factor in the implementation of these activities. The necessary funds will be determined after the preparation of individual programs and the indicative cost is estimated to be approximately HRK 1,500,000.

### *3.2.15 Activity: Effectiveness evaluation (Article 16)*

Conference of the Parties to the Stockholm Convention has decided on mechanisms for periodical effectiveness evaluation of the implementation of the Stockholm Convention.

The Stockholm Convention requirements regarding the so-called new POPs, among other things, encompass the inclusion of "new" chemicals/POPs in the effectiveness evaluation programme (Article 16).

In order to provide Conference of the Parties with data on monitoring of the presence of POPs listed in Annexes A, B and C of the Stockholm Convention, and on their regional and global presence/distribution, the ministry responsible for environmental protection as the national focal point will report for the purposes of the required evaluation of implementation effectiveness and meeting the requirements of the Stockholm Convention related to Article 15 and the regular four-year report. The Republic of Croatia participated in the first and second phase of the UNEP/WHO research, as well as of the RECETOX Institute (Czech Republic, Stockholm Convention Regional Centre) related to the analysis of two of the four key matrices; air quality monitoring in passive samplers and analysis of human milk, of old and even some of the new POPs. Results can be found in the following documents First regional monitoring report for Central and Eastern Europe from September 2008 and the Second regional monitoring report for Central and Eastern Europe from December 2014 (<http://chm.pops.int/Implementation/GlobalMonitoringPlan/MonitoringReports/tabid/525/Default.aspx>). In the COP-7 document UNEP/POPS/COP.7/IN/39 the "Guidance on the global monitoring plan for persistent organic pollutants" was presented, including the old and the so-called new POPs with appropriate recommendations.

### *3.2.16 Activity: Reporting (Article 15)*

The Republic of Croatia has prepared and so far submitted three Reports to the Secretariat of the Stockholm Convention pursuant to Article 15 of the Stockholm Convention and fulfilled the obligation of reporting on taken measures, strategies and stockpiles, which are published on the website of the Stockholm Convention (the dates of delivery: 1) 31.7.2008, 2) 21.10.2010 and 3) 16.9.2014).

### *3.2.17 Activity: Research, development and monitoring (Article 11)*

During the development of the inventory, it was confirmed that the current level of research programmes was insufficient and consideration of additional research programmes is proposed for a more effective control and monitoring of POPs in the environment, including the impact of these compounds on humans, in particular regarding the so-called new POPs (as described in detail in section 2.3.10 Existing programmes for monitoring POPs releases and their impact on human health and the environment). Through the upgrading of existing monitoring, a more complete picture of the state of the environment will be provided.

The main goal of this activity is to improve the systematic research and monitoring of POPs, especially the so-called new POPs which would confirm and complement the information on their concentrations in the environment, biota and humans, and, among other things, improve and extend the scope of the results of the research and analyses carried out to date (e.g. through analyses of contaminated sites, articles in use, landfills) and confirm the hypothesis that POPs do not pose a significant problem with regard to negative effects on health and the environment in the Republic of Croatia, and cross-border risk.

Specific goals are as follows:

- strengthening technical capacity for monitoring of POPs in the environment and humans, including new POPs
- analyses of the presence of potential POPs that are under consideration (POPRC) and adverse effects on health and the environment, and
- monitoring in the environment and humans.

Strengthening technical capacity for monitoring of POPs in the environment and humans, including new POPs

Proposed measures:

- continue with the development of research programmes for a more efficient control and monitoring of POPs in the environment and assessment of the impact of POPs on humans and
- ensure conditions and adequate equipment necessary for implementation of research, development and monitoring activities.

Given the shortcomings of the existing research programmes and lack of inclusion of the so-called new POPs in them established during the development of the inventory, it is necessary to provide additional programmes or supplement the existing ones and ensure appropriate conditions for a more effective control and monitoring of POPs in the environment and for

assessing the impact on humans, which should be implemented in all regions of the Republic of Croatia.

POPs monitoring in the environment and humans

Proposed measure:

- continue with implementation of existing monitoring with amendment to the programme for control and monitoring of POPs in the environment and assessment of the impact of POPs on humans.

The description of measures and activities to be implemented in order to fulfil all the obligations under the Stockholm Convention relating to research, development and monitoring of POPs in the Republic of Croatia, identification of the institutions responsible for their implementation, as well as the timetable and estimated necessary funds are provided in table 3.2-8.

*Table 3.2-8: Activity: Research, development and monitoring*

Goals/Measures	Implementing agency (professional and technical support)	Implementation period	Costs (HRK)
<b>MAIN GOAL: RESEARCH, DEVELOPMENT AND MONITORING OF POPs IN THE REPUBLIC OF CROATIA</b>			
<i>Specific goal 1: Strengthening technical capacity for monitoring of POPs in the environment and humans, including new POPs</i>			
Measure 1.1: Continue with the development of research programmes for a more efficient control and monitoring of POPs in the environment and assessment of the impact of POPs on humans	MSES, MENP, MA, MH	continuously	1,000,000
Measure 1.2: Ensure conditions and adequate equipment necessary for implementation of research, development and monitoring activities	MSES, MENP, other institutions and organizations responsible for the implementation of specific research and monitoring	continuously	The cost of this measure will be determined after development/supplementing of certain programmes
<i>Specific goal 2: POPs monitoring in the environment and humans, including new POPs</i>			
Measure 2.1: Continue with implementation of monitoring according to the amended/expanded programmes	CEAN, MENP, MA, MH, MSES, CA, ALA	continuously	The cost of this measure will be determined after development/supplementing of certain programmes
<b>TOTAL</b>			<b>1,000,000</b>

### 3.2.18 Activity: Technical and financial assistance (Articles 12 and 13)

Requirements for successful implementation of NIP are ensuring the necessary funds within the budget of the Republic of Croatia, LSUs, own sources of financing of the persons obliged to implement, or other forms of financing/co-financing based on the estimates and planned activities.

## 3.3 AREAS IN WHICH STRENGTHENING OF EXISTING CAPACITIES IS NECESSARY

Areas in which strengthening of the current capacities is necessary are defined in the overview of individual activities given in Chapter 3.3.

Priorities are defined as follows:

1. Capacity building with the aim of continuing the process of developing inventories and monitoring for the purpose of reporting to the Secretariat of the Stockholm Convention
  - The need was established for more efficient inventory procedures are needed, especially regarding landfills, dumpsites and potential contaminated sites
2. Improvement of public awareness and level of education
  - level of public awareness about the effects of POPs on humans and the environment is not at a satisfactory level, which can result in inappropriate handling of equipment, articles or management of waste containing POPs
3. Additional research programmes for a more efficient control and monitoring of POPs in the environment and humans
  - during the inventory phase and revision of NIP, the need was identified for extension of research programmes to the so-called new POPs.

Requirements for a successful implementation of NIP are as follows:

- ensuring necessary funds based on the estimates and plans for listed activities/measures,
- successful coordination of all NIP activities.

### 3.4 TIMETABLE FOR NIP IMPLEMENTATION

The timetable is based on the estimate of the time necessary for implementation of each measure and activity (see Chapter 3.2/3.3).

Overlapping of implementation of specific measures and activities for which the timetable is proposed shows that the implementation is based on:

- organisation phase
- development of technical instructions, guidelines, procedures that ensure implementation of regulations and
- implementation of measures proposed in action plans/activities and strategies.

Figuring as a short-term goal is the planning of specific activities. This phase is very important as properly organized activities and their initiation can ensure their continued implementation in the future.

A medium-term goal is to continue with the implementation of the initiated measures for 5-10 year period. In the long-term period (10 or more years), it is necessary to continuously carry on with activities resulting from specific measures and activities. The duration of these activities depends on how quickly the activities are carried out in the midterm period.

Below (table 3.4-1) is presented the sequence of implementation, competent authorities for the implementation of measures/activities and envisaged time limits.

*Table 3.4-1: NIP implementation timetable*

Activity/Measure	Implementing agency	Implementation period
Activity plan	MENP/MA/MH/CAEN	2016-2021
Implementation of measures, programmes and activities	MENP/MA/MH/CAEN	from 2016 onwards

### 3.5 FUNDS NECESSARY FOR NIP IMPLEMENTATION

Funds required for the implementation of the Second NIP in the Republic of Croatia include approximate cost assessment for certain previously analysed activities (see Chapters 3.2 and 3.3).

As mentioned before, it should be noted that one of the key methodological issues in the process of the assessment of costs for certain activities for the implementation of the Second NIP is the separation of NIP implementation costs from other environmental costs.

Very often POPs related impacts manifest along with the impacts of other substances, and therefore measures and instruments for their prevention or mitigation are applied simultaneously.

Considering the above, the total cost of NIP implementation in its key segments is estimated to the amount of around HRK 10,000,000.00 which includes activities integrated into existing programmes, excluding the costs for the implementation of additional research and monitoring programmes that will be prepared during the development of individual programmes.

Consequently, in the past period contributed the Operational Programme Environment, which is the programming document for the absorption of EU funds allocated to the Republic of Croatia for the implementation of European Union cohesion policy in the environmental sector and includes a seven-year programming period from 2007 to 2013. Operational Programme Environment is co-financed by the Cohesion Fund in the total amount of EUR 281,099,011.

The main objective of the Operational Programme Environment is the development of infrastructure and public services in the field of municipal waste management, supply of drinking water, treatment of municipal wastewater and protection of water resources, for the purpose of a balanced and sustainable development of the Republic of Croatia.

Operational Programme Environment concerns the following priority areas:

1. development of the waste management infrastructure in order to establish an integrated waste management system in the Republic of Croatia
2. protection of Croatia's water resources through improved water supply and integrated wastewater management systems and
3. technical assistance.

Managing Authority of the Operational Programme Environment is MENP.

Furthermore, on 12 December 2014 the European Commission approved the Operational Programme Competitiveness and Cohesion 2014-2020. Through this programme, the Republic of Croatia has at its disposal EUR 6.881 billion of EU funds for investment into growth and development, namely EUR 4.321 billion from the European Regional Development Fund and EUR 2.559 billion from the Cohesion Fund. The largest amount of investment, over EUR 3.5 billion the Republic of Croatia will invest into environmental protection (water-utility infrastructure and waste management), transport infrastructure and adaptation to climate change (protection against flood and other natural disasters) whereby in the forthcoming period potential risks to human health and the environment from POPs will be reduced, given the priority and potential presence of waste containing them at municipal waste landfills.