



CRNA GORA

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MINISTARSTVO ODRŽIVOG RAZVOJA  
I TURIZMA

# National Implementation Plan for the Stockholm Convention 2014-2021

Ministry of Sustainable Development and Tourism  
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After the Proposal National Implementation Plan for the Stockholm Convention was produced, the proposal was presented to administration authorities, institutions, non-governmental organisations and business sector representatives for the purpose of collecting suggestions and comments based

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## CONTENTS

INTRODUCTION .....	9
1 NATIONAL PROFILE OF MONTENEGRO.....	12
1.1 Montenegro – Background Information.....	12
1.1.1 Geographic Position and Population .....	12
1.1.2 Characteristics of the economic sectors .....	13
1.1.3 The state of the environment.....	15
2 INSTITUTIONAL AND LEGAL FRAMEWORK IN MANAGEMENT OF PERSISTENT ORGANIC POLLUTANTS .....	22
2.1 The Legal Framework.....	22
2.2 The Institutional Infrastructure in the Area of POPs Compounds .....	26
3 ASSESSMENT OF THE CURRENT CONDITION OF POPs COMPOUNDS IN MONTENEGRO.....	27
3.1 POPs Pesticides – Annex A, Part I of the Stockholm Convention .....	27
3.1.1 Legal Regulations from the Area of POPs Pesticides .....	30
3.1.2 Previous, Current and Future Production of POPs Pesticides .....	31
3.1.3 Previous, Current and Future Use of POPs Pesticides.....	31
3.1.4 Import and Export of POPs Pesticides.....	31
3.1.5 Current stockpiles, waste that contains POPs pesticides, landfill sites and sites contaminated with POPs pesticides .....	32
3.1.6 Current capacities/potentials for POPs pesticides testing .....	32
3.1.7 Statements.....	32
3.2 Polychlorinated biphenyls – PCBs, Annex A, Part II of the Stockholm Convention.....	33
3.2.1 Legislative Regulations from the area of PCBs.....	33
3.2.2 Legislative Framework for PCBs in the Work Environment .....	34
3.2.3 Legislative framework for handling PCB contaminated devices not in use and waste .....	34
3.2.4 Legislative Framework for Transport of Waste PCBs and PCB Contaminated Equipment.....	36
3.2.5 Legally allowable concentrations of PCBs in specific media .....	36
3.2.6 Quantities of PCB waste and PCB contaminated equipment in use .....	40
3.2.7 Previous, current and future production and use of PCBs and equipment with PCBs.....	43
3.2.8 PCB quantity in closed systems (capacitors, transformers) .....	44
3.2.9 Application of PCBs in semi-closed systems .....	44
3.2.10 Application of PCBs in open systems.....	44
3.2.11 PCB Prevention, Production/Use Measures.....	44
3.2.12 PCBs Import and Export .....	44
3.2.13 Current stockpiles, waste with PCBs and locations for disposal.....	46
3.2.14 Locations for handling and stockpiling of PCBs in Montenegro .....	46
3.2.15 National capacities for monitoring PCB status in the environment .....	46
3.2.16 Previous experiences in remediation of facilities contaminated with PCBs in Montenegro .....	47
3.2.17 Statements.....	47
3.3 Hexabromodiphenyl ether and Heptabromodiphenyl ether - Annex A, Part IV of the Stockholm Convention .....	48

3.4	Tetrabromodiphenyl ether and Pentabromodiphenyl ether- Annex A, part V of the Stockholm Convention.....	49
3.5	Dichlorophenyl-trichloroethane (DDT) – Annex B of the Stockholm Convention.....	49
3.6	PFOS – Perfluorooctane sulfonic acid (CAS no: 1763-23-1), its salts and Perfluorooctane sulfonyl fluoride (CAS no: 307-35-7) Annex B of the Stockholm Convention.....	50
3.7	Unintentional production and release of HCB, PECB, PCB and PCDD/PCDF – Annex C of the Stockholm Convention .....	50
3.7.1	Monitoring of release of PCDD/PCDF to the environment in Montenegro .	51
3.7.2	Legal regulation from the area of PCDD/PCDF.....	52
3.7.3	Assessment of emissions of dioxin and furan to the air in 2006 - 2010 based on the data from the inventory of the Environmental Protection Agency.....	52
3.7.4	Pentachlorobenzene PeCB .....	57
3.7.5	Conclusion.....	58
4	LEVEL OF INFORMATION, AWARENESS AND PUBLIC EDUCATION.....	58
5	MECHANISMS FOR EXCHANGE OF INFORMATION AMONG THE PARTIES TO THE CONVENTION .....	59
6	ACTIVITIES OF NONGOVERNMENTAL ORGANISATIONS.....	59
7	REVIEW OF TECHNICAL INFRASTRUCTURE IN THE COUNTRY IN THE AREA OF MEASURING, ANALYSING, DEVELOPING AND RESEARCHING OF POPs COMPOUNDS.....	60
8	IDENTIFICATION OF THE POPULATION THAT IS THREATENED BY ADVERSE IMPACT OF POPs COMPOUNDS .....	60
9	ACTIVITIES, STRATEGIES AND ACTION PLANS.....	61
9.	Action Plan for ensuring technical and financial assistance for implementation of the NIP.....	62
9.1	Action Plan for institutional and regulatory measures for implementation of the Stockholm Convention and reporting.....	62
9.2	Action Plan for polychlorinated biphenyls.....	62
9.3	Action Plan for polybrominated diphenyl ethers (tetra, penta, hexa hepta bromodiphenyl ethers) .....	63
9.4	Action Plan for perfluorooctane sulfonic acid and its derivatives.....	65
9.5	Action Plan for phasing out and elimination of release of unintentionally produced POPs compounds (PCDDs/PCDFs, PeCB, HCB and PCB).....	66
9.6	Action Plan for contaminated areas .....	67
9.7	Action Plan for overall monitoring of POPs chemicals.....	68
9.8	Action Plan for education, raising awareness and public information .....	69
9.9	Action Plan for ensuring technical and financial assistance for implementation of the NIP.....	70

## TABLES AND GRAPHS

Table 1. Inventory of active substances from the group of pesticides classified as persistent organic pollutants and years of ban of their use

Table 2. Limit values in surface and underground waters on land and coastal sea waters in Montenegro

Table 3. Content of organohalogen components (PCBs and PBBs) in waters that can be used for fishing and shell farming

Table 4. Maximum allowable concentrations of chlorinated substances in waste waters that may be released to public sewage

Table 5. Maximum allowable concentrations of chlorinated substances in waste waters that may be released to natural recipients

Table 6. Maximum allowable concentrations of hazardous and harmful matters in agricultural soil

Table 7. Maximum allowable concentrations of POPs pesticides and PCB substances in foods

Table 7a. Maximum allowable concentrations of POPs pesticides and PCB substances in foods

Table 8. Prescribed equipment with PCBs in use and disposed in a specially constructed facility for PCBS disposal

Table 9. Review of transformers in the Machine Processing Hall

Table 10. Assessment of emission of Dioxin, Furan, PCBs and HCB for 2006

Table 11. Assessment of emission of Dioxin, Furan, PCBs and HCB for 2007

Table 12. Assessment of emission of Dioxin, Furan, PCBs and HCB for 2008

Table 13. Assessment of emission of Dioxin, Furan, PCBs and HCB for 2009

Table 14. Assessment of emission of Dioxin, Furan, PCBs and HCB for 2010

Table 15. Production of iron and steel based on the data from the Statistical Yearbook 2011 issued by MONSTAT

Table 16. Assessed PCDD/PCDF and PCB emission from production of steel and iron for the period 2006-2010

Table 17. Aluminium production

Table 18. Assessed PCDD/PCDF and HCB emission from secondary production of aluminium (plant of Silumina and Casthouse) for the period 2006-2010

Graph 1. PCDD/PCDF emission trend 2006-2010 from energy sector

Graph 2. PCB emission trend 2006-2010 from energy sector

Graph 3. HCB emission trend 2006-2010 from energy sector

Graph 4. PCDD/PCDF and PCB emission trend from the production of iron and steel for the period 2006-2009

Graph 5. HCB PCDD/PCDF and PCB emission trend from the secondary production of aluminium (plant of Silumina and Casthouse) for the period 2006-2010

## Abbreviations and acronyms

EPA - Environmental Protection Agency  
BAT - Best Available Techniques  
GDP - Gross Domestic Product  
CLRTAP - Convention on Long Range Trans-Boundary Air Pollution  
DDT - dichloro-diphenyl-trichloro ethane  
EEA - European Environment Agency  
EIONET - Environmental Information NETWORK  
EMEP - Environmental Monitoring, Evaluation and Protection Program  
EU - European Union  
HCB - Hexachlorobenzene  
IPPC - Integrated Pollution Prevention and Control  
ISO - International Organization for Standardization  
KAP - Aluminium Plant Podgorica  
MONSTAT - Statistical Office of Montenegro  
MSDT - Ministry of Sustainable Development and Tourism  
MARD - Ministry of Agriculture and Rural Development  
NIP - National Implementation Plan for the Stockholm Convention  
NSDS - National Sustainable Development Strategy  
Octa-BDE - hexabromodiphenyl ether and heptabromodiphenyl ether  
PBB - Polybrominated biphenyls  
Penta-BDE - Tetrabromodiphenyl ether and pentabromodiphenyl ether  
PeCB - Pentachlorobenzene  
PCBs - Polychlorinated biphenyls  
PCT - Polychlorinated terphenyls  
PCDD - Polychlorinated dibenzo-p-dioxins  
PCDF - Polychlorinated dibenzofurans  
PFC - Perfluorohydrocarbons  
PFOS - Perfluorooctane sulfonic acid/ sulfonyl fluoride  
POPs - Persistent Organic Pollutants  
TPP - Thermal Power Plants  
WHO - World Health Organization



## INTRODUCTION

Montenegro has been a state party to the Stockholm Convention on Persistent Organic Pollutants (hereinafter referred to as POPs) since March 2011. The objective of the Stockholm Convention is to protect human health and the environment from POPs. POPs are chemical matters that resist degradation, may bioaccumulate and are risky for human health and/or the environment. These pollutants are transported across international boundaries far from their place of release, even to the places where they have never been used or produced. Taking into account their potential to be transported across boundaries by air, water and products, a country cannot protect its citizens and the environment from POPs on its own. In order to reduce and eliminate the production, use and release of these matters, international cooperation is required.

The purpose of the National Implementation Plan for the Stockholm Convention (NIP) is to contribute to the implementation of the obligations arising from the Convention, to raise awareness of POPs and measures for their control, to present measures undertaken and establish a strategy and action plans for further steps related to persistent organic pollutants. After it has been adopted by the Government of Montenegro, the NIP will be submitted to the Secretariat of the Stockholm Convention.

The Stockholm Convention on POPs was formally adopted in May 2001 in Stockholm, Sweden, after the negotiations carried out under the United Nations Environment Programme (UNEP). Generic exemptions allowed by the Convention include the use of POPs for laboratory-scale research, or as a reference standard and the presence of trace contaminants in products. Import and export of intentionally produced POPs listed in Annex A and B are strictly banned by the Stockholm Convention. After the exemptions expire for all the substances, import and export will be allowed only for the purpose of depositing under strict conditions, in the way environmentally sound manner. The Stockholm Convention includes specific provisions for individual parties with prescribed assessment schemes. They need to test the existing chemicals to POPs characteristics and undertake prescribed measures as to prevent development, production and marketing of new substances exhibiting POPs characteristics.

It should be pointed out that Montenegro is in the process of joining the EU, which has ratified the Stockholm Convention and UNECE POPs Protocol through the Regulation (EC) 850/2004 on POPs. The Regulation is in some parts stricter than the Stockholm Convention or the POPs Protocol. The NIP shall specify actions in view of harmonizing with the Stockholm Convention. The stricter provisions of the EU POPs Regulation will be transposed into the national legislation in line with the timeline of European integration in the area of the environmental protection.

The Stockholm Convention on Persistent Organic Pollutants, UNECE Convention on Long-Range Transboundary Air Pollution - LRTAP and its Protocol on Persistent Organic Pollutants are interrelated international treaties. The Convention on Long-Range Transboundary Air Pollution came into force in 1983, and the Protocol that was adopted in 1998 came into force in 2003. Montenegro confirmed the Protocol on

Persistent Organic Pollutants in June 2011 and passed an Action Plan for its implementation.

Obligations under LRTAP Protocol are as follows:

1. Eliminate production and use of the substances listed in Annex I to the Protocol: Aldrin, Chlordane, Chlordecone, DDT, Dieldrin, Endrin, Heptachlor, Hexabromobiphenyl, Hexachlorobenzene, Mirex, Toxaphene;
2. Restrict the substances listed in Annex II to the Protocol (DDT, HCH and PCB) to be used for special purposes and under specific conditions:
  - a) use of DDT is restricted to public health protection in case of malaria (malaria-encephalitis) for the period of one year after the production has ceased and DDT has been used and in the process of production of Dicofol,
  - b) use of Lindane (HCH) is restricted to use in chemical production processes (where it is used as an agent), while the use of products with at least 99% of their isomers in the  $\gamma$  (gamma) form are restricted to specific uses in agriculture and wood industry specified in Annex II to the Protocol,
  - c) use of polychlorinated biphenyls (PCB) is restricted by the date of production. (These substances may be used if they are produced prior to 31 December 2005).

Also, the parties undertake, as to the PCB, to:

- a) eliminate the use of PCBs in equipment (transformers, capacitors and the like) containing PCBs in volumes greater than 5dm<sup>3</sup> or having a concentration equal to or exceeding 0.05% no later than 31 December 2015 in case of countries with economies in transition;
- b) destroy or decontaminate the quantities of liquid PCBs used in the equipment and other liquids with PCBs concentration exceeding 0.005% no later than 31 December 2020 in case of countries with economies in transition and
- c) decontaminate and destroy PCBs in accordance with the environmental protection principles.

1. As regards the substances specified in Annexes I, II and III to the Protocol, each Party undertakes to develop a strategy to identify products or waste containing the mentioned substances and undertake measures for such products after becoming waste to be destroyed or finally disposed in line with the environmental protection principles.

2. Each Party undertakes to reduce the overall annual emissions of substances referred to in Annex III to the Protocol (Polycyclic Aromatic Hydrocarbons - PAHs, Dioxins/Furans-PCDD/PCDF, Hexachlorobenzene-HCB) in relation to the reference year which may be 1990 or some year during the period between 1985 and 1995. In these terms, the Parties will apply the best available techniques (BAT) and emission limit values (ELV) to the existing and to new stationary sources, and undertake corresponding measures for control of emissions from mobile sources.

Each Party is obliged to keep an inventory of emissions of substances referred to in Annex III (PAH, Dioxins/Furans, Hexachlorobenzene) and is to collect available data related to production and sale of substances referred to in Annexes I and II in accordance with EMEP methodology (in case of countries under EMEP).

Under the provisions of the Protocol the Parties undertake to:

1. exchange information and technologies in accordance with national laws;

2. promote raising awareness of persistent organic pollutants and inform the public, particularly individuals who are direct users of these substances;
3. develop strategies, policies and programmes to achieve the objectives of the Protocol;
4. carry out research and development, the monitoring of emissions, their trans-boundary transport, the level of deposition matters, development of mathematical models for their evaluation, elaboration of the procedure for harmonisation of relevant methodologies, etc, and
5. reporting in line with the EMEP.

Although the requirements, restrictions and objectives of both Conventions and the Protocol are almost identical, this document is dealing solely with the requirements of the Stockholm Convention.

The release of unintentionally produced by-products listed in Annex C shall be subject to continuing phasing out followed, where feasible, by ultimate elimination. The main tool that the Parties use to achieve this is the NIP, which should include the inventories of sources, assessment of release and plans for reduction of release. The most stringent control provision related to by-products is that the Parties are to promote and, in line with their action plans, require the application of the best available techniques to new sources within their categories of main sources identified in Part II Annex C of the Stockholm Convention.

The waste containing, composed of or contaminated by POPs should be deposited in the way that the POPs content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of persistent organic pollutants. In cases when destruction or transformation do not represent the preferable option or the POPs content is low, the waste must be deposited in the way safe for human health and the environment. The disposal operations that may lead to recovery or reuse of POPs chemicals are banned by Article 6 of the Convention. However, when the list was adopted of brominated flame retardants and perfluorooctane sulfonic acid and its salts PFOS, which were deemed normal in waste of material recycling, this Article accepted an exemption with expiry date. At the fifth meeting of the Parties to the Convention, a voluntary work programme was adopted, including a recommendation how to ensure elimination of these substances from waste and the Parties committed to report on the implementation of the work program.

As regards transport (import and export) of waste, relevant international rules, standards and guidelines such as Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 should be taken into account. The State of Montenegro has been a Party to the Basel Convention since 1999.

In addition to the control measures, the Stockholm Convention includes several general obligations. Each Party is obliged to develop and endeavour to implement its NIP, facilitate or establish exchange of information and raise awareness and facilitate public access to information regarding POPs. The Parties also must encourage or carry out adequate research, development, monitoring and collaboration related to POPs and where required, their substitutes and apply with POPs substances. They also must regularly report to the Conference of the Parties on the measures for implementation of

the provisions of the Stockholm Convention. The performance related to the Convention is evaluated regularly based on monitoring and data from the reports.

The Stockholm Convention recognises the special needs of the developing countries and the countries with economies in transition, therefore the general obligations also include special provisions regarding the mechanisms of technical and financial assistance.

Currently the Stockholm Convention covers 22 substances and groups of substances. At the IV Conference of the Parties, held in May 2009, it was for the first time agreed that 9 substances would be added to those already included in the Convention (12). This group includes two pesticides (chlordecone and lindane), three are found in pesticides (alpha- and beta hexachlorocyclohexane,  $\alpha,\beta$ -HCH and pentachlorobenzene, PeCB), and four are industrial chemicals (hexabromodiphenyl, HBB, perfluorooctane sulfonic acid/sulfonyl fluoride PFOS/PFOSE, and commercial penta- and octa-bromodiphenyl ether BDEs). Pentachlorobenzene may be unintentionally formed in thermal operations. At the V Conference of the Parties, held in May 2011, technical endosulfan with its related isomers was added too.

## **1 NATIONAL PROFILE OF MONTENEGRO**

### **1.1 Montenegro – Background Information**

#### **1.1.1 Geographic Position and Population**

Montenegro is an Adriatic and Mediterranean and Dinaric country, situated between 41°52' and 43°32' of north latitude and 18°26' and 20°21' of east longitude. The country area is 13,812 km<sup>2</sup> and it has 4,800 km<sup>2</sup> of sea area (internal waters). According to the census from 2011 the population of Montenegro is 620,029 inhabitants, with the population density of 44.9 inhabitants per 1 km<sup>2</sup>. The total length of its land border is 614 km, of which 14 km to Croatia, 17.2 km to Albania, 203 km to Serbia and 225 km to Bosnia and Herzegovina. The width of the territorial sea is 12 nautical miles (22,224 m), and the coefficient of indentation is 2.8 3.3 for the Adriatic coast in general.

#### General information:

Montenegro is open with a 293.5 km long coastline towards the Adriatic Sea. The functional characteristics of the geographical position lie primarily in its dynamism, which is closely related to its transitiveness and connectivity in relation to the continental and coastal areas, then the attractiveness of the total potential, as well as the regional complementarity and quality of the transportation system in Montenegro.

#### Natural and geographical features:

Montenegro with its 13,812 km<sup>2</sup> is a mainly mountainous, and at the same time a Mediterranean country. This fact, as well as other factors, of which the most important are the geographical, geological, hydrographic, hydro-geological, pedological, climatic and historical factors, led to the development of a unique system of living conditions, and thus the development of a unique wildlife. The primary areas of biodiversity with a characteristic set of living conditions and specific living communities are as follows: the

high mountainous area, the mountainous forest zone, the karst zone, the zone of the coastal freshwater wetlands and the coastal zone.

#### Population:

The population according to the census conducted in 2011<sup>1</sup> is 620,029 inhabitants. Administratively, Montenegro is divided into 22 municipalities, of which Nikšić is the largest (2,065 km<sup>2</sup>), and Tivat is the smallest municipality (46 km<sup>2</sup>). The capital city of Podgorica (1,441 km<sup>2</sup>) has 169,132 inhabitants, or nearly one-third of the total population of Montenegro.

### **1.1.2 Characteristics of the economic sectors**

#### Agriculture, fisheries, forestry and food industry

In 2012 the share of agriculture, forestry and fisheries in the GDP was 7.4%. In the total imports of Montenegro in 2010 the import of agricultural and food products amounted to 24.52%. On the export side, in the total exports of Montenegro, the export of agricultural and food products amounted to 14.08% in 2010. The area of used agricultural land within family farms is 212,724.4 ha, which represents 72.2% of the total available land. The average area of used agricultural land by family farm is 4.4 ha. Other land categories such as gardens, fields, vineyards, orchards and nurseries make less than 4%.

#### Industry

Based on MONSTAT data for the year 2012, the manufacturing sector recorded a share of 4.3% in the GDP structure. The contribution of mining in the same period was 1.1%. The industrial capacities are dominated by outdated technologies which are characterized by a high level of emissions. The largest industrial plants are in the fields of extractive metallurgy and metal processing. Recently, the structure of industrial production has somewhat changed through a significant production of food and beverages and the introduction of chemical production.

From the viewpoint of sustainable development, the overriding objective is to reduce the impact of industry on the environment. Measures to achieve this objective include consistent implementation of the Law on Integrated Pollution Prevention and Control (IPPC) and the Law on the Environment, which define the fees for environmental pollution ("polluter pays" principle).

#### Tourism

In 2012 the share of providing accommodation and food in the GDP was 6.7%. In Montenegro, the revenues from tourism in 2012 amounted to EUR 700 million €, which is 4.3% more than in 2011. Tourism in Montenegro during 2012 generated, according to the above estimates of the World Travel and Tourism Council, directly and indirectly 19.5% of the GDP<sup>2</sup>. During 2012 Montenegro was visited by 1.4 million tourists, i.e. 4.7% more than in 2011, and 9.1 million overnight stays were made, which is an increase of 4.3% in comparison to the previous year. Foreign tourists made 5.25% more arrivals and 4.15% more overnights, while domestic tourists recorded an increase of 1.73% in terms of their total number for twelve months and 4.15% when it comes to overnight stays.

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<sup>1</sup> Data source - MONSTAT

<sup>2</sup> World Travel & Tourism Council: Economic Impact Montenegro, 2013

As in previous years, most tourist arrivals in 2012 were recorded during the summer months, when Montenegro was visited by 69% of tourists and 76% of overnight stays were made during this period.

### Construction

On the basis of available MONSTAT data for the year 2012, the construction sector recorded a share of 4.6% in the GDP structure. The status of construction in Montenegro is characterized by a large increase in investments in the area of maintenance and construction of a road network and other infrastructure structures, as a result of the allocation of funds for capital investments by the Government of Montenegro and cooperation with international financial institutions. The tremendous increase in investments in building construction on the Montenegrin coast and in Podgorica is the result of an increase in the number of foreign investors, who at the same time require applying international standards and quality in construction. Alongside, continued the process of creating the legal infrastructure in different areas with the aim of direct or indirect incentives and developing the investment environment, removing administrative barriers for investments, especially at the local level and ensuring full and effective protection of property rights.

### Transport

During 2012 the share of transport (with storage) in the GDP ratio stood at 4.1%. Road transport is the dominant mode of transport, with about 5.73 million transported passengers and approximately 3.98 million tons of cargo in the year 2012. The density of main roads is 13 km per 100 km<sup>2</sup> and the number of registered passenger vehicles is slightly below 190,000. The road network in Montenegro consists of about 850 km of main roads, 950 km of regional roads and 5,100 km of local roads.

The length of railways in Montenegro is 250 km, while more than a quarter of the track comprises of bridges and tunnels. The density of the railway network in 1,000 km<sup>2</sup> is 18.1 km. In recent years, with the assistance of international financial institutions, funds have been provided for the reconstruction and modernization of the existing infrastructure. The total capacity of rail transport is estimated at about 8 million tons per year. Rail transport is an acceptable form of transport because:

- the railway lines are electrified - electricity is used as fuel;
- it is economically cost effective – when transporting mass cargo, four times less energy is consumed than when the same amount of freight is transported by trucks;
- it is the smallest air pollutant - according to research by the International Rail Association the emission of harmful substances into the air that comes from rail transport is 3%.

Air transport is carried out through two international airports - Podgorica and Tivat. Montenegro Airlines is the national airline company which was founded in 1994. The fleet of the company consists of eight aircrafts. Passenger traffic at airports in the year 2012 reached 1.36 million.

In Montenegro there are five ports open for international traffic - Bar, Kotor, Risan, Tivat and Zelenika. The Port of Budva is opened for international traffic during the four months of the tourist season. The most important is the Port of Bar, where about 95% of all port activity is carried out.

## Public Utilities

The system of public utilities is a system that is regulated by the Law on Public Utilities, which defines the public utilities and principles, general conditions and manner of their performance. Utility services are performed as public services. Local governments, which provide public utility services, are required to ensure the continuity and quality of services, as well as the maintenance and functionality of utility facilities.

## Trade

During 2012 the share of wholesale and retail trade (including repair of motor vehicles and motorcycles) to the GDP ratio stood at 12.3%. At the 8th Ministerial Conference of the World Trade Organization (WTO) held in Geneva on 17th December 2011 Montenegro was approved accession to the WTO. On 27th February 2012 the Montenegrin Parliament adopted the Law on Ratification of the Protocol of Accession of Montenegro to the Marrakesh Agreement Establishing the World Trade Organization, and the instrument of ratification was submitted on 30th March 2012. Montenegro became a full member of the World Trade Organization on 29th April 2012. Montenegro's membership in the WTO represents an obligation for further liberalization of the national trade regime and for providing a transparent and predictable environment for both domestic and foreign companies.

### **1.1.3 The state of the environment**

Observed as a whole, the quality of the environment is preserved, enabling comprehensive and dynamic sustainable development of Montenegro. The Government of Montenegro each year on the Proposal of the Ministry of Sustainable Development and Tourism adopts the Information on the state of the environment prepared by the Agency for Environmental Protection. Through implementation of the annual monitoring program all segments of the environment, including POPs, are monitored. The Information on the state of the environment is the basic document which examines the overall state of the environment in Montenegro, and gives recommendations for environmental policy planning on an annual basis.

## Air

Air in Montenegro, assessed in terms of the global indicator of sulphur(IV)oxide (SO<sub>2</sub>) is of a very good quality. Concentrations of nitrogen(IV)oxide (NO<sub>2</sub>) at all measurement locations were within the prescribed criteria. Good air quality assessment refers to the concentration of ground-level ozone (O<sub>3</sub>) and carbon(II)oxide (CO). Concentrations of heavy metals in PM<sub>10</sub> particles were also within the prescribed norms. Air of a worse quality was mainly affected by exceeding concentrations of particulate matters PM<sub>10</sub> and PM<sub>2,5</sub>. This problem is mainly pronounced in Pljevlja and Nikšić, where, besides the large number of exceedings, high concentrations on a daily basis have been recorded, as well as exceeding of the allowed annual average concentration. Increased concentrations of polycyclic aromatic hydrocarbons, benzo(a)pyrene markers and benzo(a)pyrene itself, whose average annual concentration in Nikšić and Podgorica exceeds the prescribed target value, indicate the large impact of fuel combustion on air quality.

Air quality was mostly influenced by industrial activities and emissions resulting from fuel combustion in large and small furnaces and internal combustion engines. During 2012 exceedings in concentrations of PM particles in comparison to specified values were recorded in Pljevlja, Nikšić and Podgorica. The presence of these particles in concentrations exceeding the prescribed ones in terms of health care and protection is the largest in Pljevlja. Exceedings occur most frequently during the heating season and in cases of large forest fires during the summer months.

The National Strategy for Air Quality Management and the Action Plan for the period 2013-2016 was adopted in February 2013. The Action Plan for the stated period of four years contains 54 measures. According to the Law on Air Protection (OGM 25/10), Article 21, in areas where pollutant concentrations exceed any established threshold or target value, the Ministry, in collaboration with the Agency for Environmental Protection and the local government unit in whose territory the exceeding has occurred, is obliged to produce an Air Quality Plan. In February 2013, the Ministry, in collaboration with the Agency for the Environmental Protection and the Municipality of Pljevlja, passed the Air Quality Plan for the Municipality of Pljevlja in order to as soon as possible reach the values determined by the Decree on determining types of pollutants, threshold values and other air quality standards.

#### Monitoring of transboundary transport of air pollution -EMEP

Transboundary transport of air pollution at a regional scale is monitored at the international air quality station in Žabljak. The station works according to the EMEP program, under the Convention on Long-range Transboundary Air Pollution (CLRTAP). The station is located at the meteorological station and began its work in 1993. The measuring program included monitoring the content of gases SO<sub>2</sub> and NO<sub>x</sub> in the air, the chemical composition of precipitation (pH, conductivity and major ion species) and the content of heavy metals in precipitation (Pb, Hg and Cd). Since 2000 when the implementation of the measurement program on the station came under the complete jurisdiction of the Hydrometeorological and Seismological Service of Montenegro in Podgorica, the measurement of heavy metals stopped, due to the lack of appropriate analytical equipment in the Service. A set of available data since 2000 has been sent to the EMEP technical experts to assess the quality, in order to be able to establish regular reporting, at least according to these parameters.

Revitalization of work at the station is an obligation in both program and technical terms, which is enhanced by ratifying the Protocol on heavy metals, the POPs Protocol and the Protocol to abate acidification, eutrophication and ground-level ozone from the CLRTAP (the Protocol on EMEP was previously ratified). As a signatory of CLRTAP, Montenegro has the obligation to report under these Protocols, therefore this problem must be overcome as soon as possible. At the station in Žabljak since 1986 the measurement of the expositional dose of gamma radiation in the air and precipitation has been introduced, within the program GAW (Global Atmosphere Watch Programme).

#### Waters

Although the discharge of municipal and industrial wastewater into the natural recipient is done almost without any purification (with the exception of some industrial plants and part of municipal wastewater in Podgorica and Mojkovac), Montenegro has good quality and abundant groundwater and surface waters. Another problem is the



lack of pre-treatment of industrial wastewaters which are discharged into the public sewer systems. The most polluted waterways, as in the previous years, were: Vezišnica and Čehotina in the area Pljevlja, Morača in the area of Podgorica, Ibar at Baća and Lim near Bijelo Polje. The measurement results indicate the high sensitivity of these aqua ecosystems, especially during the low water level period, as well as an increase in human activities along the riverbanks. The water quality monitoring program is mainly based on physic and chemical parameters. However, in accordance with the Water Framework Directive, water quality is equally defined by biological and hydromorphological indicators. The importance of the Framework Directive for Montenegro is in the fact that the requirements for data collection and information management for developing effective plans for river basin management are very important, and the legislative framework and national environmental monitoring network must be extremely relevant in order to meet all the requirements of the mentioned directive. A cadastre of pollutant sources, as the main instrument in the policy of determining measures and plans to prevent and/or reduce pollution, does not exist.

According to the results of the Hydrometeorology and Seismology Service of Montenegro, the main sources of water pollution are untreated municipal wastewater, then industrial wastewater, especially from the food industry, followed by agriculture, transport, etc. Every year the monitoring of qualitative and quantitative characteristics of surface waters is conducted, on the basis of which the assessment of water quality is made.

### Waste

Waste management in Montenegro is organized in accordance with the legal framework that complies with European regulations, respecting the principles of sustainable development, proximity and regional waste management, preventive action, as well as the "polluter pays" principle. The Law on Waste Management has determined that waste management is carried out in accordance with the state and local waste management plans.

Solving the problem of municipal waste management is very complex because of the complicated procedures, and the lack of adequate staff and lacking funds in the local governments that are responsible for municipal waste management. In this regard, the Ministry of Sustainable Development and Tourism is significantly involved in this issue. In the last few years some improvements are evident, such as:

- The construction of two regional centres for waste treatment with modern sanitary landfills "Livade" in Podgorica and "Možura" in Bar, where municipal waste is disposed of from the territory of the capital city of Podgorica and the municipalities of: Danilovgrad, Bar, Ulcinj, Budva, Tivat, Herceg Novi and Kotor. To overcome the problem of accumulation of municipal waste in a way that minimizes the negative impact on the environment, the local governments that do not dispose of waste in sanitary landfills organize temporary storages of municipal waste;
- Significant activities related to the remediation of uncontrolled landfills;
- Implementation of selective waste collection, so-called primary recycling, which is based on separate collection of waste fractions that can be reused or recycled, in order to separate the flow of certain types of waste: waste tires, waste vehicles, electrical and electronic waste, batteries, car batteries, metal, paper, packaging, plastics, waste oil, medical waste, etc. In this part of waste management

significant results are achieved in the capital of Podgorica and the coastal municipalities;

- The construction of a recycling centre and recycling yard in the capital city, the equipment for selection and recycling has been installed in the landfill "Lovanja" in Kotor and in Herceg Novi a station has been built with pressing machines for paper, cardboard and PET containers, a plastic grinding mill, a glass crusher and a recycling yard in which the following is collected: paper and cardboard, glass, PET, hard plastic, cables and metals, clothing and footwear, tires, household appliances, electronic waste, waste furniture and wood waste, waste edible oils, motor oils and accumulators and batteries, as well as a recycling centre.
- Solving the problem of medical waste in a manner where a concessionaire has been selected and a Concession Agreement concluded between the Ministry of Health and the Consortium OMP Ekomedika on 29th June 2011. The subject of this Agreement is the financing and construction of facilities, installation of equipment for treatment of medical waste and medical waste management in Montenegro for a period of 15 years. With this Agreement, the concessionaire is obliged to collect and process the produced quantity of medical waste and ensure 100% sterilization. In this way we get a substance that has the characteristics of inert waste that can be disposed of on a sanitary landfill for non-hazardous waste.

It has been anticipated to install the equipment for processing of medical waste first in the hospitals in Berane and Podgorica, and later in Nikšić and Bar.

Also, in the areas of management of industrial hazardous waste certain results have been achieved through the implementation of the projects "Skadar Lake Integrated Ecosystem Management" and "Industrial Waste Management and Clean Up", financially supported by funds from the GEF and the World Bank. Moreover, there are large quantities of waste with characteristics of hazardous wastes that are mainly stored temporarily in an adequate way. The project "Industrial Waste Management and Clean Up" has two goals: rehabilitation of sites where the landfills of hazardous industrial waste are: the Aluminium Plant Podgorica (two pools of red sludge and a solid waste landfill), the Adriatic Shipyard Bijela (grit dump), the Thermal Power Plant Pljevlja (ash and slag landfill Maljevac) and Mine "Šuplja Stijena" Pljevlja (Gradac flotation tailings pond) and solving the issue of hazardous industrial waste disposal. Until the end of 2013 the World Bank should grant Montenegro a loan in the amount of 50 million Euros within the project "Industrial Waste Management and Clean Up", for which the preliminary stage has been completed and the necessary Studies made.

#### Protection of nature

The diversity of the geological base, landscape, climate and soil, as well as the very position of Montenegro on the Balkan Peninsula and Adriatic Sea, created conditions for the emergence of bio-diversity with very high values, which puts Montenegro in the biological "hot-spots" of European and world biodiversity. The index of the number of species per unit area in Montenegro is 0.837, which is the highest index recorded in all European countries. Protected natural resources in Montenegro cover 124,964.24 ha, or 9.047% of its territory, most of which (101.733ha or 7.77%) are national parks: "Durmitor", "Skadar Lake", "Lovćen", "Biogradska Gora" and "Prokletije". The remaining area comprises of 47 protected natural resources within the following categories: general and special nature reserves, nature monuments, areas of special natural features and areas protected by municipal decisions.

In accordance with the national legislation 124,929 ha or 9.04% of the national territory is protected, while consistent with protection in respect of the obligations undertaken from relevant international agreements is 237,899 ha or 17.22%, whereas there are areas protected on both basis:

- Ramsar area - of special importance as a waterfowl habitat – the Lake Skadar with the surface of 40,000 ha. This area was recognized as an area of importance for birds (Important Bird Area - IBA). On the territory of Montenegro 5 IBA areas are registered.
- Areas of UNESCO world natural and cultural heritage are the Kotor - Risan Bay and NP Durmitor with the Tara Canyon - 48.895 ha.
- M&B UNESCO Biosphere Reserve - the basin of the river Tara - 182.889 ha.
- Emerald habitat of the Berne Convention, an area of international importance for the protection of birds (IBA) and the habitats of importance for the survival of plants (IPA). On the territory of Montenegro there are 27 IPA areas<sup>3</sup> registered.
- Another level of protection has been added to the Tivat Solila (Salina)- Ramsar habitat. The Secretariat of the Ramsar Convention on April 10th, 2013 notified Montenegro that the Tivat Solila meet the criteria laid down in the Convention, and the Certificate of enrolment on the Ramsar list, as well as the letter of the Secretary of the Convention were forwarded on May 7th, 2013 through the Ministry of Foreign Affairs and European Integration.

The National Biodiversity Strategy and Action Plan for the period 2010-2015 were adopted by the Government of Montenegro, at the proposal of the Ministry of Spatial Planning and Environment (now the Ministry of Sustainable Development and Tourism) in August 2010. At the 10th Meeting of the Parties of the Convention on Biodiversity, held in Nagoya, Japan, from 18-29 October 2010, the Strategic Plan for Biodiversity for the period 2011-2020 was adopted. Having in mind the defined new objectives of the Convention to the year 2020, the Ministry of Sustainable Development and Tourism, in cooperation with the United Nations Office in Montenegro within the project "National Biodiversity Planning to Support the Implementation of the CBD Strategic Plan 2011-2020 in Montenegro", approved by the Global Environmental Fund (GEF), began work on revising the existing National Biodiversity Strategy and Action Plan for the period 2010 - 2015.

#### Land and forests

Forests in Montenegro cover 59.5% (826,792 ha) of the territory, forest land 9.9% (137,480 ha), which together make a total of 69.4% of the territory of Montenegro. Taking into account the area under forests (69.4%), and the ratio of hectare of forest per capita (1.3 ha/capita) Montenegro is among the three most wooded countries in Europe. The large diversity in the dendroflora is shown by the fact that according to the national inventory of forest ecosystems 68 species of trees, 57 deciduous and 11 evergreen species are registered. Forests owned by the state comprise 500,041 ha or 67.25%. Private forests comprise 243,568 ha or 32.75 %. Total state stocks in forests in Montenegro are estimated at about 72,056,699 m<sup>3</sup>, of which evergreen 29,527,555 m<sup>3</sup> or 40.98%, and

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<sup>3</sup> In December 2011 the Secretariat of the Bern Convention nominated 32 areas as potential Emerald sites. The procedure for approval of the same by the Secretariat of the Convention is in process.

deciduous 42,529,144 m<sup>3</sup> or 59.02%. According to the structure, economic forests make 347,581 ha or 81.43 %, protective forests make 66,283 m<sup>3</sup> or 15.53% and the national parks make 12,975 ha or 3.04%. In the past 15 years, over 1,500 major forest fires were registered in Montenegro, when more than 15,000 hectares of forest and about 1.3 million m<sup>3</sup> of timber was damaged or destroyed.

Land is one of the most important natural resources. Forests are particularly important, both for preservation of the natural balance, biodiversity and environmental quality, and for economic development. At the same time, forest ecosystems are exposed to pressures that threaten to lead to unsustainable use, primarily through uncontrolled and unplanned activities and excessive exploitation of natural resources.

Reduction of soil fertility, land degradation and inappropriate use of land resources, which leads to the degradation of ecosystems and threatens the biodiversity, are considered forms of unstable and unsustainable development. Therefore, there is a real need for optimal land management, to ensure adequate protection, rational use and improvement.

According to estimates and preliminary findings by experts from the Forest Administration, in the jurisdiction of the Forest Administration over 5,000 ha "have been affected by fire", mostly in Pljevlja, about 1,300 ha, followed by Mojkovac with about 900 h and Berane with about 300 ha.

Montenegro is committed to the development of an improved forest management system that is economically, environmentally and socially sustainable. In the year 2010, for the first time in the history of forestry in Montenegro, the National Forest Inventory was conducted. Respecting the contemporary methodological principle, relevant information was provided on the state of forest resources at the national level, their spatial distribution, structural characteristics, time development, utilization and changes in the forest fund. All these data were collected by using the most modern technology such as infrared distance meters, GIS, aerial images, GPS navigation, etc. The relevant data which has been obtained will provide a new basis for the development of the forestry sector and wood-related industries and other close sectors, such as agriculture, transport, tourism and the like, which ultimately should contribute to improving the economic situation in our country. The Forestry Development Strategy and the Strategic Environmental Assessment of the document are in the process of being developed.

#### State of the coastal area

A large part of the Montenegrin coast of the Adriatic Sea is still oligotrophic and clean. In the area of the Bokokotorski Bay "algal blooming" has been registered as a result of increased nutrient loads and the beginning of eutrophication. The River Bojana and sewage discharge along the coast have the greatest impact on the concentration of nutrient salts. The largest part of this entry is of anthropogenic origin. Centralized sewage systems were built only in larger cities along the coast, but most of them are out of order. Despite these problems, the marine eco-system can be assessed as satisfactory.

#### Management of Chemicals

According to the Regulation on the organization and manner of work of public administration (OGM 7/09), management of chemicals was transferred to the

jurisdiction of the Ministry in charge of the Environment (Ministry of Sustainable Development and Tourism) and the Agency for Environmental Protection. The Law on Chemicals (OGM 18/12) came into force in 2012, and is applied as of March 1st, 2013. Inspection is performed by the administrative authority in charge of Inspections (Inspection Directorate) through environmental inspections, in accordance with the Law on Chemicals and the law governing inspection. The Law on Chemicals is partially harmonized with EU regulations - Regulation (EC) no. 1907/2006 on the Registration, Evaluation, Authorisation and Restriction of Chemicals ( REACH ); Regulation (EC) no. 1272/2008 on classification, labelling and packaging of substances and mixtures; Regulation (EC) no. 689/2008 concerning the export and import of dangerous chemicals; Regulation (EC) no. 648/2004 on detergents; Directive no. 2004/9/EC on good laboratory practice.

The number of companies that have established systems for environmental protection, HSE programs as well as ISO 9000 and ISO 14000 is growing. There is no database and systematic monitoring of chemicals, and an information system for the exchange of information on trade of hazardous chemicals and hazardous chemical waste is not developed. By the end of 2014 the first National Strategy for the Management of Chemicals will be created.

#### Environment and human health

In may 2011 the Government of Montenegro adopted an Action Plan for improving children's health through improvement of quality of the environment in Montenegro for the period 2012-2016. Four priority goals have been identified for the impact of the environment on human health:

1. To prevent and significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe water and adequate sanitation for children;
2. To prevent and substantially reduce the morbidity and mortality arising from accidents and injuries and pursue a decrease in morbidity from lack of adequate physical activity;
3. To prevent and reduce acute and chronic respiratory diseases due to indoor and outdoor air pollution; and
4. To reduce the risk of disease and disability arising from exposure to hazardous chemicals, physical and biological agents, as well as working environment risks during childhood and reproductive period, especially in youth and women.

With the help of the WHO Montenegro Office, a comprehensive study was developed on the impact of environment on human health in Montenegro (EPHR), which thoroughly considered the impact of various environmental factors on human health (e.g. water and sanitation, air quality, chemicals, UV rays, lack of adequate physical activity, injuries, noise, ionizing and non-ionizing radiation etc.), in the context of the current socio-economic situation. One of the results of this process was defining the priority areas which require urgent action in the area of environmental protection for the purpose of preservation and protection of health of the population of Montenegro:

- Access to safe drinking water in rural areas;
- Access to safe bathing water;
- Access to sanitary facilities;
- Road accidents;
- Air pollution;

- Children's exposure to tobacco smoke in their immediate environment;
- Lead contained in fuel.

It is estimated that between 5 to 10% of the population has no high-quality drinking water throughout the year, which may have an impact on their health. The UNECE report points out that the impact of unintentionally generated POPs on human health of the population in Montenegro should be examined.

## **2 INSTITUTIONAL AND LEGAL FRAMEWORK IN MANAGEMENT OF PERSISTENT ORGANIC POLLUTANTS**

This section shows the current institutional and legal infrastructure that will be the basis and framework in which to implement the NIP. The forms of international and regional cooperation of Montenegro with regard to the area of impact of POPs compounds have been stated above. Strategic Directions for Environmental Protection are accomplished through a number of approved documents, but also through documents that are in different stages of adoption. The National Strategy for Sustainable Development and the National Strategy for Air Quality Management with the Action Plan for the period 2013-2016 have been adopted, as well as a separate action plan for the implementation of the Protocol on Persistent Organic Pollutants (POPs), the Agriculture Development Strategy, the Forestry Development Strategy, the Montenegro Tourism Development Strategy until 2020, the Master Plan for Waste Management, the Master Plan for Wastewater Management and others. The Montenegro Energy Development Strategy until 2030 with the Strategic Environmental Impact Assessment is in the process of being prepared.

### **2.1 The Legal Framework**

POPs compounds are regulated by the Law on Environment (OGM 48/08), the Law on Air Protection (OGM 25/10), the Law on Chemicals ( OGM 18/12 ), the Law on Plant Protection Products (OGM 40/11), the Law on Integrated Pollution Prevention and Control (OGM 80/05), the Law on Waste Management (OGM 64/11), the Law on Waters (OGM 27/07), the Decree on the classification and categorization of surface and underground waters (OGM 02/07), the Decree on emission limit values of air pollutants from stationary sources (OGM 10/11), the Rulebook on waste classification and waste catalogue (OGM 35/12), the Rulebook on waste oil management (OGM 48/12), the Rulebook on handling of equipment and waste containing PCB (OGM 48/12), the Rulebook on the quality and sanitary and technical requirements for discharging wastewaters into the recipient and public sewage, manner and procedure for testing wastewaters quality, minimum number of tests and contents of the report on wastewaters quality (OGM 45/08)

The Law on Environment which was passed in 2008 governs the principles of environmental protection and sustainable development, the actors and instruments of environmental protection, public participation on environmental issues and other issues of importance for the environment. Environmental protection ensures complete protection of the quality of the environment, protection of biodiversity and landscape diversity, rational use of natural resources and energy in the best way for the environment, as a basic condition for healthy and sustainable development. This Law established the Agency for Environmental Protection as an administrative body

responsible for the execution of professional and related activities in the field of environmental protection.

The Law on Air Protection regulates the way of monitoring air quality, protection measures, evaluating and improving air quality, as well as planning and management of air quality. The Decree on emission limit values of air pollutants from stationary sources (OGM 10/11), which was brought on the basis of this Law, determines the general emission limit value of polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (dioxins and furans).

The Law on Waste Management determines the types and classification of waste, planning, requirements and method of waste management and other issues of importance for waste management. This Law defines PBC as a polychlorinated biphenyls (PCB), polychlorinated terphenyls (PCT), monomethyl-tetrachlorodiphenyl methane, monomethyl-dichloro-diphenyl methane, monomethyl-dibromo-diphenyl methane or any other mixture containing any of the abovementioned substances in a total of more than 0,005 % by weight, including equipment, objects, materials or fluids that contain, consist of or are contaminated with PCBs. The National Solid Waste Management Plan must include measures for the extraction of PCBs and the decontamination of equipment and the PCBs contained in it and the deadlines for carrying out decontamination or disposal. It is forbidden to mix waste oil during collection or storage of other hazardous wastes, including waste containing PCBs.

The law prohibits:

1. processing PCB and packaging which contains PCBs;
2. import of equipment containing PCBs;
3. incineration of PCB on board ships and
4. filling transformers and other closed systems (condensers) with liquids containing PCBs.

Also, waste containing PCBs may be processed after the PCB is extracted from the waste. The holder of equipment and waste containing PCBs shall provide waste treatment and decontamination of equipment containing PCBs. Extraction of PCB from equipment, PCB processing and decontamination of equipment can be performed by a company or entrepreneur, provided that it has the appropriate equipment, the facility for temporary storage of PCB and the required number of employees, based on the permit for the removal of hazardous waste. Incineration of PCBs is carried out in waste incineration plants that meet the requirements hereof.

The Law provides that the owner of the equipment and waste containing PCBs shall prepare a Plan for the management of equipment and waste containing PCBs, as well as keep records of the equipment, waste PCB and quantities of PCB and shall submit all the data from the records to the Agency for Environmental Protection.

The Law on Water regulates the legal status and the way of integrated water resources management, water and coastal land and water facilities, the requirements and manner of carrying out water activities and other issues of importance for water management and water resources. The Law, among other things, stipulates the protection of waters from pollution, categorization and classification of surface and groundwater, as well as

the plans for the protection of waters from pollution, the liabilities of wastewater treatment etc.

The Law on Chemicals regulates the procedure of registration and putting on the market of new and existing chemicals, the process of evaluation and risk assessment of chemicals, classification, packaging and labelling of chemicals, import and export, and other issues relevant for the protection of human health and the environment.

On the basis of this Law, the Ministry of Sustainable Development and Tourism issued the following bylaws:

- Rulebook on the criteria and method of classification, packaging and labelling of chemicals and certain products in hazard classes (OGM 53/12);
- A list of classified substances (OGM 58/12);
- Rulebook on the criteria for identifying substances as persistent, bioaccumulative and toxic and vPvB (OGM 13/13);
- Rulebook on determining the list of substances of high concern (OGM 13/13);
- Rulebook on the contents of the security list for chemicals (OGM 13/13);
- Rulebook on the prior informed procedure and procedure on giving consent on the basis of prior notification of export of chemicals (OGM 13/13);
- Rulebook on detailed contents of files and inventory of chemicals (OGM 19/13);
- Rulebook on detailed storage requirements, measures for safe storage or use of hazardous chemicals (OGM 28/13);
- Rulebook on the method of preparation and the content of the report on the safety of chemicals (OGM 28/13);
- Rulebook on the manner of keeping records on chemicals and issued permits for the activity of trading dangerous chemicals (OGM 28/13);
- Rulebook on determining the list of surfactants that can be used in detergent (OGM 36/13)
- Rulebook on the detailed content of requirements and certificates of good laboratory practice (OGM 48/13) and
- Rulebook on prohibition and restriction of the use, putting on the market and manufacturing of chemicals that present an unacceptable risk to human health and the environment (OGM 49/13).

Also, until the end of the 2013 the other bylaws on the basis of the Law on Chemicals will be passed, as follows:

- Rulebook on the methods of testing the biodegradability of surfactants, the manner of labelling and contents of the List on the composition of the detergent;
- Rulebook on the guidelines and requirements for good laboratory practice;
- Rulebook on the methods of examining the basic characteristics of chemicals and
- Rulebook on the classification, packaging and labelling of chemicals and certain products according to the Globally Harmonised System for classification and labelling of the UN.

The aim of the Law on Ratification of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade ("OGM", no, 03/11) is to promote shared responsibility and co-operation between the Parties in the field of international trade in certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to



the use of these chemicals in a way that is environmentally sound through easier flow of information about their characteristics, taking care of the decision making process at the national level on import and export and transfer of these decisions to other signatory countries.

The Law on Plant Protection Products regulates the method of classification, registration, sale and use of plant protection products and active substances, the maximum permissible level of residues for plant protection products, the manner of keeping registers and records, information exchange and other issues of importance for plant protection products. Plant protection products may be put on the market only if they are registered, classified and categorized, packaged, labelled and if they are accompanied by a declaration and instruction for use. The Phyto-Sanitary Administration keeps the Register of plant protection products on the market in Montenegro, also establishes the List of registered plant protection products, List of permitted and List of prohibited active substances, once a year.

The Law on Integrated Pollution Prevention and Control (OGM 80/05) was adopted in 2005, and has been applied since 1st January 2008. The complete IPPC system includes a set of bylaws. According to the Law on Integrated Prevention and Control of Environmental Pollution the Government of Montenegro adopted the Program of harmonization of certain industries with the provisions of the Law on Integrated Prevention and Control of Environmental Pollution on 9th February 2012. This Program listed the existing installations and activities (11) for which an integrated permit is issued and the deadline for receiving an integrated permit is 1st January 2015. So far three IPPC permits have been issued as follows: to "Deponija" Ltd., Podgorica, "Možura" Ltd., Bar and "Pro Gas", Podgorica. In the period between May 2012 and 1st October 2013 nine licenses for the export of hazardous waste and one permit for transit of hazardous waste were issued. Import of hazardous waste on the territory of Montenegro is prohibited. The procedure that is carried out by the Agency for Environmental Protection is implemented in accordance with the Law on Ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, the Law on Waste Management and the Rulebook on the detailed content of documents to be submitted with the request for issuance of a license for the import, export and transit of waste, as well as the list of waste classification (OGM 71/2010).

The Law on Integrated Prevention and Control of Environmental Pollution defines the best available techniques (BAT) as the most effective and most contemporary stages in the development of activities and their methods of operation, which allow more convenient use of certain techniques to meet the emission limit values laid down in order to prevent or, where this is not practicable, to reduce emissions and the impact on the environment as a whole. In a particular industrial production process a variety of techniques can be used to yield the final product. Each of these techniques involves different levels of emissions, as well as different costs and consumption of natural resources.

## 2.2 The Institutional Infrastructure in the Area of POPs Compounds

### POPs pesticides

Management of plant protection products and thus POPs pesticides which are intended for plant protection is the responsibility of the Phyto-Sanitary Administration established in mid 2008.

#### Ministry of Agriculture

The Ministry of Agriculture and Rural Development performs the activities related to: measures of current and development policies in agriculture; protection, utilization and improvement of agricultural land; crop production (farming, fruit growing, viticulture and plant protection); livestock farming (production, breeding, protection and development of all types of livestock); applying modern technique and technology in agriculture; science and technology development; financing of current production and development; protection of plants from plant diseases and pests; the regime of water use and water supply, water protection from pollution, use of water resources, animal health care, prevention and elimination of infectious animal diseases; as well as other activities within its jurisdiction.

The Phyto-Sanitary Administration was established in 2008 and performs administrative and related professional activities relating inter alia to: plant protection products; the registration of plant protection products; evaluation of active substances and plant protection products; the monitoring program of post-registration control of plant protection products; recognition of registration of plant protection products; preparation of expertise basis for preparing the legislation in the field of plant protection products; monitoring the situation in the sector of plant protection products trade; preparation and implementation of protective measures; preparation, coordination and monitoring of prescribed programs related to the measures and proper use of plant protection products and implementation of the program; introducing the principles of good agricultural practices and integrated plant protection; preparation and coordination of activities related to residues of plant protection products and the implementation of the program of monitoring residues of pesticides in food, on plants or plant products, or in plants or herbal products.

The Biotechnical Faculty in Podgorica is responsible for testing the biological efficiency of plant protection products which are used in the fields of agriculture. The Centre for Eco-Toxicological Research is authorized for laboratory testing of plant protection products and residues of pesticides in food, while studies on the effects of pesticide use in veterinary are not performed in Montenegro.

The Agency for Medicines and Medical Devices is the administrative authority for medicines (for use in human and veterinary medicine) and medical devices, including their putting on the market (registration), control and monitoring of safe use and licensing of legal entities performing trade and production of medicines and medical devices.

### PCBs - Polychlorinated Biphenyls

The Ministry of Sustainable Development and Tourism, the Agency for Environmental Protection and the Directorate for Inspection Affairs through environmental inspections

are responsible for the control of hazardous waste treatment, and therefore for the control of waste containing PCBs. Equipment containing PCBs that is excluded from use is defined as waste containing PCBs.

#### Unintentionally produced POPs: PCDD / PCDF, HCB, PeCB and PCB

Control of emissions of PCDD/PCDF (dioxins and furans), HCB (hexachlorobenzene), PCBs (polychlorinated biphenyls) and Pentachlorobenzene PeCB is the responsibility of the Ministry of Sustainable Development and Tourism and the Agency for Environmental Protection.

According to the Law on Air Protection a set of bylaws have been adopted, which in more detail regulate some issues in this area:

- Decree on determining the types of pollutants, limit values and other air quality standards (OGM 25/2012);
- Decree on the establishment of a network of measurement points for monitoring air quality (OGM 44/2010 and 13/2011);
- Decree on emission limit values of air pollutants from stationary sources (OGM 10/11),
- Decree on limit values of pollutants in liquid fuels of petroleum origin (OGM 39/2010 and 43/2010);
- Decree on maximum national emissions of certain pollutants (OGM 3/2012);
- Decree on substances that deplete the ozone layer and alternative substances (OGM 5/2011);
- Rulebook on the manner and conditions of air quality monitoring (OGM 21/2011);
- Rulebook on the content and manner of preparation of the annual information on air quality (OGM 27/2012).

### **3 ASSESSMENT OF THE CURRENT CONDITION OF POPs COMPOUNDS IN MONTENEGRO**

The current situation in Montenegro regarding the POPs compounds management and problems shows that the level of knowledge on POPs compounds and their adverse effects on the environment and human health is satisfactory within the scientific and professional institutions in the country. However, the level of knowledge among the average population is on relatively low level and in the near future it is necessary to initiate national education programmes and programmes for education of citizens.

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

The group of organochlorinated pesticides that have been used in Montenegro includes aldrin, dieldrin, endrin, toxaphene, lindane and endosulfan.

Dichlorophenyl-trichloroethane (DDT) was used for eradication of malaria mosquitoes at the territory of Podgorica Municipality around 1946. This insecticide was used at larger scale during 1956 and 1957 at the territories of the municipalities of Podgorica, Nikšić, Danilovgrad, Cetinje, Ulcinj and Tivat for eradication of gypsy moths in oak woods.

For these purposes in the territory of the municipalities of Cetinje, Podgorica and Nikšić with the area of 21 011 ha, 39 960 kg of DDT (1.9kg/ha) was used in an aerial treatment. These data are relevant for 1956. In 1957 this action was expanded to include the municipalities of Tivat and Ulcinj, and the treated territory included 47 036ha, and 78 070 kg of DDT (1.66kg/ha) was used.

At the territory of Berane Municipality, endrin and toxaphene were used for eradication of voles, while toxaphene was used for eradication of *Tropinota hirta* and *Vespa* sp. as well. In this Municipality applied were aldrin and dieldrin as soil insecticides. The mentioned insecticides were used during the period from 1968 to 1977.

In the publication called Review of Plant Protection Products in Yugoslavia, Plant Protection Voice, no. 3-4 of 1989 there are no preparations from the group of organochlorine compounds, with the exception of lindane and endosulfan. The latest publication of this kind that related to Montenegro (among other states) is called "Pesticides in Agriculture and Forestry in Serbia and Montenegro" of 2004, published by the Plant Protection Society of Serbia, which was published based on the official lists of allowed active matters and preparations. In this publication, the list of organophosphorous preparations only included lindane (used for coating of logs) and endosulfan (applied in agriculture – fruit growing as insecticide).

After 2006 lindane was no longer present in the market. The Ministry of Health, in the period from December 2007 (date when the Law on Chemicals OGM 11/2007 came into force) to March 2013 approved import of 10000 litres of endosulfan (35% concentration); in 2009 (2,000 l); in 2010 (2,000 l); in 2011 (3,000 l); in 2012 (2,000 l); in 2013 (1,000 l), based on the List of Toxins Classified into Groups (OGFRY 012/00-6), adopted based on Article 9 paragraph 4 of the Law on Production and Marketing of Toxic Matters (OGFRY 15/95). The mentioned law was rescinded by the adoption of the Law on Chemicals, which came into force on 1 March 2013. Imported endosulfan (35%) was used for the purpose of disinfection of stables and basements.

As regards the application of pesticides (plant protection products), the Law on Plant Protection Products (OGM 51/08) is in force in Montenegro. It has been harmonised with the Directive of the European Union (EU) 91/414/EEC. Amendments to the Law on Plant Protection Products is under preparation for the purpose of complying with the new Regulation EU 1107/2009/EC.

Based on the Law on Plant Protection Products, a list of active matters allowed to be applied in agriculture in Montenegro is published. The list of active matters is published every year. The first was published in 2009 in the Official Gazette of MNE 70/2009 and every following year since then. The List of active matters is published by Phyto-Sanitary Administration of Montenegro. Pursuant to this List, plant protection products are imported to Montenegro, and in line with the fact that there is no production of the plant protection products, only imported plant protection products are used and they are under strict control. The List of active matters allowed to be used as plant protection products for 2012 (OGM 14/12) includes no active matters that are listed as a POPs pesticide.

The control of the use of plant protection products (pesticides) is carried out through implementation of the Monitoring Programme for Residues of Plant Protection

Products that is adopted every year. The Monitoring Programme of Pesticide Residues in food of plant and animal origin for 2012 is published in the Official Gazette of MNE 21/12. All the mentioned active matters are included in the list for implementation of monitoring of pesticide residues. The Programme is carried out in view of assessing the threat to the health of the population, in accordance with the prescribed levels of pesticide residues established by the Rulebook on the Quantities of Pesticides, Metals and Metalloids and other toxic substances, chemo-therapeutics, anabolics and other substances that may be found in foods (OGFRY 5/92, 11/92 and 32/02) and the Regulation no. 396/2005 of the European Parliament and Council of 23 February 2005 concerning maximum level of pesticide residues in or on food or food for animals of plant or animal origin.

This Programme is based on the Commission implementing regulation (EU) No 1274/2011 of 7 December 2011 concerning a coordinated multi-annual control programme of the Union for 2012, 2013 and 2014 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 and is updated in accordance with the amendments on the EU level. The Programme is developed based on the results of monitoring published in 2009, 2010 and 2011 carried out in Montenegro, in view of observing the exposure of consumers and application of pesticides. Samples are taken by random sampling system, in line with risk analysis and based on previous evidence of impact of pesticide residues on the health of the population.

Table 1 shows active matters whose residues are analysed in food under the Programme for all the mentioned active matters. According to the mentioned monitoring, there is an obligation for the presence of organochlorine pesticides in the food to be monitored. Monitoring has been carried out in Montenegro since 2009 and so far residues of organochlorine pesticides have not been found in the taken samples.

According to the collected data, it can be noticed that POPs pesticides are not produced or applied in Montenegro. Also, there is no import or export of POPs pesticides. In the POPs pesticide inventory there are no contaminated locations or stockpiles of POPs pesticides established. The *Monitoring Programme for pesticide residues in the food of plant and animal origin for 2012* (OGM 21/12) also includes POPs pesticides. The current data are collected through various projects, such as Monitoring Programme for Hazardous and Harmful Matters in the Soil. In Montenegro there are all required capacities to organise monitoring of POPs pesticides in the samples of plants and plant products, food, water and soil with partial supplementing of relevant legislation and ensuring financial resources.

**Table 1.** List of active substances from the group of pesticides classified as persistent organic pollutants and years when their use was banned

Active matter	Allowed since	Banned since
Aldrin	1958	1972
Chlordane	No data about its use in Montenegro	1971
Chlordecone [CAS NO. 143-50-0] Pesticide		
Dieldrin	1958.	1972
Endrin	1957 (since 1971 only as rodenticide)	29 May 1989
Heptachlor	No data about its use in Montenegro	7/1973
HCB	1962 - No data about its use in Montenegro	11 July 1980
Alpha Hexachlorocyclohexan	1944	1972
Beta Hexachlorocyclohexan	1944	1972
Gamma hexachlorocyclohexane - Lindane [CAS NO. 58-89-9]	1944	Pharmaceutical product – used as supplementary product in treatment of lice and mange. After 2006 it has not been present in the Montenegrin market.
Mirex	Was not allowed to be used in Montenegro	
Technical endosulfan and its related isomers	1944	
Toxaphene	1957	27 April 1982

When the decision on cessation of using some of the active substances was adopted, it was approved that the existing stocks could be used as to prevent hazardous waste to be generated.

### 3.1.1 Legal Regulations from the Area of POPs Pesticides

In Montenegro pesticides are marketed in accordance with the Law on Plant Protection Products (OGM 51/08, 40/11). This law regulates the manner of classification, registration, marketing and use of plant protection products and active matters, maximum allowed level of residues of plant protection products, manner of keeping

registers and records, exchange of data and other issues of significance for plant protection products.

The law also regulates the method of registration of plant protection products that contain, are comprised of or are obtained from genetically modified organisms, provided that the release of such organisms to the environment is allowed only based on the environment risk assessment, pursuant to the law regulating genetically modified organisms. Based on this law, a list of active matters allowed to be applied in agriculture has been published.

Plant protection products and active matters as the matters established to be hazardous for life and health of humans and the environment are classified, marked and packaged in accordance with the Law on Chemicals (OGM 18/12).

Classification and marking of waste, treatment of waste from plant protection products and packaging are carried out in accordance with the Law on Waste Management (OGM 64/11).

Currently, as regards pesticides, the phyto-sanitary inspection is applying the following rulebooks:

- The Rulebook on the contents of the list of active matters allowed to be used in plant protection products (OGM 67/2009);
- The List of active matters allowed to be used in the plant protection products;
- Programme of monitoring of pesticide residues in food of plant origin;
- The Rulebook on the methods for testing of pesticides (OGFRY 11/99);
- The Rulebook on the conditions for production line, marketing, import and sampling of pesticides and fertilisers (OGFRY 12/99) and
- The Rulebook on the types of packaging for pesticides and fertilisers and on destroying pesticides and fertilisers (OGFRY 35/99).

### **3.1.2 Previous, Current and Future Production of POPs Pesticides**

On the territory of Montenegro the pesticides have never been produced, nor is their production planned in the near future.

### **3.1.3 Previous, Current and Future Use of POPs Pesticides**

The data on used pesticides and/or active substances are non-existent or non-available. Surveys have been published regarding their use, but the data have not been found. Some data have been obtained from those who have been in contact with the use of pesticides from the POPs group.

### **3.1.4 Import and Export of POPs Pesticides**

Given that POPs pesticides are not produced in Montenegro, there is no their export either. Import of finished plant protection products (pesticides) that are registered for application are subject to approval by the Phyto-Sanitary Administration. On the border crossings there is relevant phyto-sanitary inspection which approves the import of pesticides based on prescribed conditions and the register.

### **3.1.5 Current stockpiles, waste that contains POPs pesticides, landfill sites and sites contaminated with POPs pesticides**

Existence of stockpiles of POPs pesticides has not been identified. Products, also including pesticides, that are currently used do not contain POPs pesticides, therefore there is no possibility for generation of the waste that contains POPs pesticides. Special landfills, where waste containing POPs pesticides would have been deposited, have not existed.

Sites for depositing hazardous waste, i.e. POPs pesticides have not been determined. Given that there are other types of persistent compounds for which landfills will be determined, a possibility should be envisaged to deposit POPs pesticides that might occur during the further inventorying on such sites too.

According to the available data which are often presented differently, sites contaminated with POPs pesticides have not been found so far.

### **3.1.6 Current capacities/potentials for POPs pesticides testing**

In Montenegro there are two laboratories which have the capacities to test POPs compounds: LLC Centar za ekotoksikološka ispitivanja Podgorica (Centre for Ecotoxicological Research) - CETI and Public Health Institute from Podgorica. CETI has accreditation ISO/IEC 17025 to test POPs compounds in the samples from the environment (water, soil, sediment, air) and samples of fish, and it is a party to the UNEP GMN (Global Monitoring Network for POPs compounds). CETI is accredited to do analysis of Dioxin and furan. The existent laboratory capacities in Montenegro can be considered as satisfactory, particularly in view of skilled experts, and adopted work technology.

Public Health Institute, inter alia, carries out the functions of reference laboratory for specific analysis, for whose procedures it has been accredited, carries out chemical, physical-chemical, toxicological and other laboratory analyses, proposes and implements measures for preservation and improvement of the environment and work surroundings. This means that in Montenegro there are all capacities required for organisation of monitoring of POPs pesticides in samples of plants and plant products, food, air and soil with partial supplementing of relevant legislation and ensuring of financial resources.

### **3.1.7 Statements**

1. Use of POPs pesticides has been banned for over 20 years, except for lindane which hasn't been used for the last 6 or 7 years and endosulfan.
2. According to the collected data, it can be noted that POPs pesticides are not produced and are hardly used in Montenegro.
3. Also, import and export of POPs pesticides are almost non-existent.
4. Contaminated sites or stockpiles of POPs pesticides have not been identified.



5. The current data are collected through various monitoring programmes (Monitoring Programme for foods of animal origin since 2007, Monitoring Program for hazardous and harmful matters in soil in Montenegro since 1998) or through analyses of inspection samples.
6. Equipment capacities of laboratories for carrying out the required analyses are high. In Montenegro there are all capacities required for organising monitoring of POPs pesticides in samples of plants and plant products, food, water and soil with partial supplementing of the relevant legislation and ensuring financial resources.

### **3.2 Polychlorinated biphenyls – PCBs, Annex A, Part II of the Stockholm Convention**

Polychlorinated biphenyls (PCB) are organochlorinated synthetic compounds that belong to the group of industrial persistent pollutants, presented in Annex A, Part II of the Stockholm Convention. Chlorinating of biphenyls in the presence of catalysts results in obtaining PCB with different share of Chlorine, which generates 209 congeners, of different characteristics. However, only 130 of the total number of chlorinated biphenyls appear in fluids as a commercial product based on PCB. Out of the total 209 congeners, 78 may exist as enantiomers, of which 19 PCBs are counted into commercial products, because they are stable at room temperature. PCBs have been used for fluids of various use depending on the share of Chlorine from 21% to 68 %. Due to its dielectric features they have been used as fluids in transformers, capacitors (high and low voltage), hydraulic systems, heat transfer systems, eclectic-magnetic, fluorescent lighting connectors, fluid filled cables, gaskets, disconnectors, voltage regulators, vacuum pumps, microwave ovens, electronic equipment, pesticide additives, ink, lubricants, carbonless copy paper, additives for plastics and plastic products. Application of fluids based on PCB may be classified in three categories:

- application in closed systems;
- application in semi-closed systems and
- application in open systems.

Montenegro ratified the Convention on Long Range Trans-Boundary Air Pollution with 3 protocols of which one is the Protocol on Persistent Organic Pollutants. According to the POPs Protocol that has stricter provisions regarding the relevant PCBs the parties are obliged to eliminate the use of PCBs in equipment (transformers, capacitors and the like) containing more than 5 dm<sup>3</sup> or concentration equal to or exceeding 0.005% PCBs no later than 31 December 2015 in case of countries with economies in transition.

PCBs have never been produced in the territory of Montenegro, but there has been production and overhaul of equipment containing PCBs in the factory “19 decembar” in Podgorica (transformers and capacitors), which resulted in import of fluids containing PCBs.

#### **3.2.1 Legislative Regulations from the area of PCBs**

Handling of the equipment containing PCBs, transport of waste with PCBs, in Montenegro are regulated by the following legislation:

- Waste Management Law (OGM 64/11);
- The Law Ratifying the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (OGM - International Treaties 3/2011);
- The Law Ratifying the Stockholm Convention on Persistent Organic Pollutants (OGM - International Treaties 16/2010);
- The Law Ratifying the Protocol on Persistent Organic Pollutants with the Convention on Long Range Trans-Boundary Air Pollution of 1979 (OGM - International Treaties 8/2011);
- The Law Ratifying the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (OGFRY - International Treaties 2/99);
- The Law on Transport of Hazardous Matters (OGM 05/08);
- Decree on the Manner and Procedure of establishing the systems for takeover, collecting and processing of waste from electric and electronic products and work of such system (OGM 24/12);
- Rulebook on handling equipment and waste containing PCBs (OGM 48/12);
- Rulebook on handling waste oils (OGM 48/12);
- Rulebook on classification of waste and waste catalogue (OGM 35/12).

The Law on Waste Management (OGM 64/11) defines the PCB as polychlorinated biphenyls (PCB), polychlorinated terphenyls (PCT), monomethyl-tetrachloro-diphenyl methanes, monomethyl-dichlorodiphenyl methanes, monomethyl- dibromodiphenyl methanes or any mixture containing any of these matters in the concentration exceeding 0.005% of mass portion, including devices, buildings, materials and fluids containing, comprising or contaminated with PCB.

Also, this law prescribes that the National Waste Management Plan includes: the measures for separating PCBs and decontamination of equipment and PCB contained in it and timeframes for completion of decontamination or removal.

Ministry of Interior – Directorate for Emergency Situations is competent to issue consents for transport of hazardous matters on the territory of Montenegro. The new Law on Transport of Hazardous Matters is under the process of drafting.

### **3.2.2 Legislative Framework for PCBs in the Work Environment**

The Law on Safety at Work (OGR 79/04 and OGM 26/10 and 57/11) that is in force in Montenegro does not precisely include the substances that contain polychlorinated biphenyls. JUS.Z.BO.001 is in force concerning maximum allowable concentrations of harmful gases and vapours in the atmosphere of work premises and work sites, which defines the maximum allowable concentrations for PCBs of 1 mg/m<sup>3</sup>. Through adoption of the Law on Safety (and Health) at Work and secondary legislation acts, it is planned to regulate the safety (and health) at work for employees using chemical substances.

### **3.2.3 Legislative framework for handling PCB contaminated devices not in use and waste**

Handling of waste is regulated by the Law on Waste Management, where PCBs are defined as a special type of waste. The Law prohibits mixing of waste oil during the

collecting or stockpiling with other hazardous waste, including the waste containing PCBs, processing of PCBs and packages containing PCBs. Also, the waste containing PCBs may be processed after the PCBs have been separated from the waste. The holders of the equipment and waste containing PCBs are obliged to ensure the processing of waste and decontamination of the equipment containing PCBs. Separating PCBs from the equipment, processing of PCBs and decontamination of equipment may be carried out by a business organisation or an entrepreneur provided that they possess suitable equipment, plants for temporary stockpiling of PCBs and required number of staff, based on the permit for elimination of hazardous waste. Incineration of PCBs is carried out in the premises for waste incineration that meet the conditions stipulated by this law. It is banned to import equipment containing PCBs. It is banned to incinerate PCBs on the docks of ships, or to fill transformers and other closed systems (capacitors) with fluids containing PCBs.

Pursuant to Article 6 paragraph 4 of the Law on Waste Management, the Ministry of Sustainable Development and Tourism has adopted the Rulebook on Waste Classification and Waste Catalogue (OGM 35/12). According to the Rulebook, categories and types of hazardous waste are determined based on the properties of waste or activity under which the waste occurs A – Waste expressing one of hazardous properties from Annex 4 to the Rulebook is the waste containing, inter alia: substances containing PCBs and/or PCT (e.g. dielectrics etc.). Also, transformers and capacitors containing PCBs or PCTs are indicated under the key number: 16 02 09\*, as well as 16 02 10\* equipment stockpiled for disposal that contains or is contaminated with PCBs different from 16 02 09\*. Waste from building and demolishing that contains PCBs (e.g. gaskets containing PCBs, floors on the basis of resin that contain PCBs, glazes containing PCBs and capacitors containing PCBs) 17 08 02\*.

Pursuant to Article 52 paragraph 7 of the Law on Waste Management, the Ministry of Sustainable Development and Tourism, has adopted the Rulebook on Handling Waste Oils (OGM 48/212) that prescribes that the collector of waste oils should handover the collected waste oils to a business organisation or an entrepreneur who have permissions to process the waste oils through regeneration or elimination. The collector of waste oils, on each 200 tons of taken-over waste oils checks the content of water and PCBs in the waste oil. Checking of the content of PCBs in waste oils is carried out in line with the standards EN 12766-1 and EN 12766-2. If based on the checking in line with the standards, it is identified that the mass of PCBs in the waste oil is greater than 0.005% of the mass of waste oil, the collector of waste oil may refuse to takeover such waste oil and inform the competent inspector. Also, waste oils may be regenerated only if the waste oil contains maximum 5 mg PCBs and maximum 30 mg of halogen in 1 kg of oil. Waste oils can be refined only if they contain maximum 50 mg PCBs in 1 kg of oil.

Waste oils with PCB content greater than 50 mg in 1 kg of oil, can be refined only if after the regeneration the obtained oil contains maximum 5 mg PCBs and maximum 30 mg halogen in 1 mg of oil. Waste oils may be incinerated as fuel in the waste incinerators, only if they contain maximum 15% water in relation to the total mass of the mixture of oil and water, maximum 10 mg PCBs in 1 kg of oil, if their flash point is over 63°C and heat of combustion greater than 30 MJ/kg.

Pursuant to Article 57 paragraph 4 of the Law on Waste Management, the Ministry of Sustainable Development and Tourism has adopted the Rulebook on Handling PCB

Containing Equipment and Waste (OGM 48/12). This Rulebook prescribes the manner of developing the plan for managing PCB containing equipment and waste, manner and procedure of keeping records, manner of marking decontaminated equipment, manner and procedure of processing equipment and waste containing PCBs and decontamination of equipment and PCB content in the equipment.

### **3.2.4 Legislative Framework for Transport of Waste PCBs and PCB Contaminated Equipment**

According to the current legislation in Montenegro, import of hazardous waste to Montenegro, including PCB-contaminated waste, is banned. Montenegro is a signatory to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. According to the Basel Convention »waste matters and articles containing or contaminated with polychlorinated biphenyls (PCB) or polychlorinated terphenyls (PCT), or polybrominated biphenyls (PBB)« (marked Y10) are classified as a waste category required to be controlled, i.e. as a hazardous waste (Annex I). According to the Basel Convention it is possible to export the hazardous waste only to countries that have not banned import of hazardous waste provided a competent institution of the importing country has issued a written consent. Also, it is necessary to ensure that trans-boundary movement of hazardous wastes and other types of waste is reduced to the minimum extent possible, and to be carried out in the way that human health and the environment are protected against harmful impact of such movement.

Transport of PCBs and devices with PCBs must be carried out in accordance with the provisions of the Law on Transport of Hazardous Matters (OGM 40/11). The Law is based on the European Agreement concerning the international carriage of dangerous goods by road (ADR). According to the ADR, PCBs are classified as hazardous matters whose transport is dangerous for the participants to carriage, humans and the environment. The vehicle used for transport of contaminated waste must be technically operational, equipped and marked in accordance with the prescribed standards. Transport of PCBs must at any time be carried out with required caution measures, by rule by day, and the shipment itself must be prepared to meet the safe transport requirements. Maritime transport of persistent organic pollutants must follow the provisions of the MARPOL 73/78 Convention and its Annexes in order to prevent and reduce unintentional contamination from ships or pollution that may result from the routine operations of ships.

### **3.2.5 Legally allowable concentrations of PCBs in specific media**

In Montenegro, it is legally determined what maximum allowable concentrations of PCBs are in water, foods and agricultural soil.

#### Waters

The Decree on Classification and Categorisation of Surface and Underground Waters (OGRM 02/07) establishes the classification and categorisation of surface and underground waters on land and coastal sea waters in Montenegro. Limit values from the Decree are shown in Table 2.

**Table 2.** Limit values in surface and underground waters on land and coastal sea waters in Montenegro

Indicators	Measurement units	A	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>
Total pesticides	mg/l	<G.D	<G.D	0.001	0.0025

- class A indicates waters that in natural state, with potential disinfection can be used for drinking
- class A<sub>1</sub> indicates waters that after simple physical procedure of processing and disinfecting can be used for drinking
- class A<sub>2</sub> indicates waters that can be used for drinking after suitable conditioning ( coagulation, filtration and disinfection)
- class A<sub>3</sub> indicates waters that can be used for drinking after the treatment requiring an intensive physical, chemical and biological processing with extended disinfection and chlorination, or coagulation, flocculation, decantation, filtration, absorption on activated carbon and disinfection by ozone or chlorine.

The same Decree envisages that waters used for fishing and shell farming are classified as follows:

- class S – waters that may be used for pure breed fish farming
- class Š- waters that may be used for shell farming
- class C- waters that may be used for less pure breed fish farming (cyprinids)

For the above classes the content of organohalogen components (PCBs and PBBs) is set as follows:

**Table 3.** Content of organohalogen components (PCBs and PBBs) in the waters that can be used for fishing and shell farming

Parameter	Measurement unit	S	Š	C
Organohalogen substances	mg/l	-	0.025	-

*The Rulebook on the quality and sanitary technical requirements for releasing waste waters into recipient and public sewage, manner and procedure of testing the quality of waste water, minimum number of testing and contents of the report on identified quality of waste waters (OGM 45/08)* in details prescribes the quality and sanitary technical requirements for releasing waters into public sewage and natural recipient, manner and procedure of testing quality of waste waters, minimum number of testings and contents of the report on identified quality of waste waters.

**Table 4.** Maximum allowable concentrations of chlorinated substances in waste waters that may be released into public sewage

Parameter	Measurement unit	Concentration
Halogen hydrocarbons	mg/l	1
Chlorinated pesticides	mg/l	0.05

**Table 5.** Maximum allowable concentrations of chlorinated substances in waste waters that may be released into natural recipients

Parameter	Measurement unit	Concentration for water body - category I	Concentration for water body - categories II and III
Chlorinated hydrocarbons	mg/l	0.25	0.5
Chlorinated pesticides	mg/l	0.025	0.05

According to the Rulebook on allowable quantities of hazardous and harmful matters in soil and methods for its testing (OGRM 18/97), the maximum allowable concentration is as follows:

**Table 6.** Maximum allowable concentrations of hazardous and harmful matters in agricultural soil

Parameter	Measurement unit	Concentration
PCB	mg/kg	0.04
Organochlorinated pesticides	mg/kg	0.01

### Foods

As to the POPs pesticides and PCB in foods, the current regulations in Montenegro is the “Rulebook on the quantities of pesticides, metals and metalloids and other toxic substances that may be found in foods (OGFRY 05/92,11/92, 32/02).

**Table 7.** Maximum allowable concentrations of POPs pesticides and PCB substances in foods

Matrix	POPs Pesticides and PCBs	MDK (max. allowable concentrations in mg/kg)
Meat and meat products	Endrin	0.05
Grains	Endrin	0.01
Eggs with no shell	Endrin	0.05
Milk	Endrin	0.001
Meat and meat products, tea, dried herbs	Heptachlor	0.05
Grains, fruit and vegetables	Heptachlor	0.01
Eggs with no shell	Heptachlor	0.02
Milk	Heptachlor	0.002
Meat and meat products, tea, dried herbs	HCB	0.1
Grains, fruit and vegetables	HCB	0.01
Eggs with no shell	HCB	0.02
Milk	HCB	0.002
Vegetables and vegetable oils	HCB	0.05
For all foods	Mirex	Must not be any
For all foods	Toxaphene	Must not be any
Meat and meat products	DDT and derivatives	1.0

Fruit and vegetables	DDT and derivatives	0.1
Eggs with no shell	DDT and derivatives	0.1
Milk	DDT and derivatives	0.04
Grains	DDT and derivatives	0.05
Meat and meat products	HCH-Lindane	0.1
Vegetable oils and products	HCH-Lindane	0.2
Fruit and vegetables and grains	HCH-Lindane	0.02
Eggs with no shell	HCH-Lindane	0.02
Milk	HCH-Lindane	0.002
Cocoa powder, coffee, spices	HCH-Lindane	0.01
Cocoa with no rind, fried	HCH-Lindane	0.03

**Table 7a.** Maximum allowable concentrations of POPs pesticides and PCB substances in foods

Matrix	POPs Pesticides and PCBs	MDK (max allowable concentrations in mg/kg)
Milk and dairy products	PCBs	1.0 (on content of fat)
Poultry and other types of meat	PCBs	2.0 (on content of fat)
Eggs with no shell	PCBs	0.3
Fish, shells, crabs and molluscs	PCBs	3.0 (edible part)
Meat and meat products	Aldrin and Dieldrin	0.2
Eggs with no shell	Aldrin and Dieldrin	0.02
Grains and products	Aldrin and Dieldrin	0.01
Fruit, root-like, bulbous and tuber vegetables	Aldrin and Dieldrin	0.01
Milk	Aldrin and Dieldrin	0.006
Other	Aldrin and Dieldrin	0.01
Meat and meat products	Chlordane	0.05
Fruit and vegetables	Chlordane	0.02
Eggs with no shell	Chlordane	0.002
Milk	Chlordane	0.002
Grains	Chlordane	0.005

### 3.2.6 Quantities of PCB waste and PCB contaminated equipment in use<sup>4</sup>

Kombinat aluminijuma Podgorica a.d. (Aluminium Plant Podgorica JSC)

**Table 8.** Prescribed equipment with PCB in use and deposited in a specially constructed facility for PCB depositing

Name and address	AD Kombinat aluminijuma Podgorica OC Elektroenergetika		
Number and gross mass of all PCB-containing transformers	Number: 51 pieces Mass: 205000 kg(51x4000kg) Location: Processing (15kom), Mill (9pcs), PCR (5pcs, Sealing (2pcs), Casthouse (4pcs), Pump station (1piece), Compressor station (1 piece), OC Anodes (2pcs), Workshops (2pcs), OC Alumina (10pcs)		
Number and gross mass of all capacitors containing PCBs	Number: 167 pieces Mass: 15069kg(101x93kg+66x86kg) Location: Reactive energy compensation plant 35kV.		
Number and gross mass of other equipment containing PCBs and mass of waste PCBs	Number (equipment): -Mass (waste PCB): 12100 kg (piralen) -Mass( waste silicone oils contaminated with PCBs and cleaning products ) 15700kg + 1300 kg Location: Reservoirs in PCB stockpile		
Number and gross mass of stockpiled waste equipment containing PCBs	Transformers: Number/mass 9 pieces/22000kg Location: Plateau in front of the PCB Stockpile	Capacitors: Number/mass 400kom/ 29180kg Location: PCB stockpile	Other equipment and waste PCBs: -PCB contaminated soil 4500kg + 2100 kg Location: -PCB stockpile -Barrels and containers contaminated with PCBs 10800 kg + 2350 kg Location: Plateau in front of the PCB stockpile and PCB stockpile -PCB contaminated sawdust 200 kg Location:- PCB stockpile - Sediment collection -2500kg Location: PCB stockpile

<sup>4</sup> Data from the Administration for Inspection Affairs as of 10 April 2013



### Hemosan LLC Bar

With the LLC “Hemosan” that collects and exports hazardous waste in line with the licenses issued by the Environmental Protection Agency there are the following quantities of PCB waste:

1. Waste transformer that contains oil with PCBs with the total mass of 2160kg;
2. In the storage of the LLC “Hemosan” there are 18.000 litres of oil collected from other legal entities, which is according to the certificate on categorisation issued by LLC CETI categorised as insulating oil and heat transfer containing PCBs with the code from the Waste Catalogue 13 03 01\*.

### Elektroprivreda Crne Gore a.d. Nikšić (Power Plant of Montenegro JSC Nikšić)<sup>5</sup>

Under the possession of this legal entity there are great quantities of equipment that will be subject to testing to the presence of piralen, which is in use, as well as the equipment not is use, but is suspicious to contain PCBs.

1. HPP “Piva” has 9 power transformers in operation. The subject transformers contain around 120 tons of oil and it will be subject to testing to PCBs. Also, HPP “Piva” has 18 measurement transformers in operation and 7 of them are not for further use (waste), and 9 low-oil disconnectors. Also, they have one spare low-oil disconnector. In the coming period, insulating oils in the subject transformers will be categorised in view of establishing if the equipment contains PCB oil.
2. HPP “Perućica” has in operation 21 power transformers, 89 measurement transformers and 3 power transformers and 21 measurement transformers that serve as spare ones. In this plant there are also 6 waste measurement transformers. In the coming period, insulating oils in the subject transformers will be categorised in view of establishing if the equipment contains PCB oil.
3. TPP “Pljevlja” has in operation 19 power transformers, 9 measurement transformers and 8 low-oil disconnectors. Also, they have 4 spare power transformers and 8 spare low-oil disconnectors. Currently the oil from measurement transformers is subject to laboratory testing in view of establishing if it contains PCBs.
4. Elektroprivreda Crne Gore has within FC Distribution a lot of equipment, in use, spare and deposited as waste, that will be subject to inventorying and testing to the presence of piralen in the coming period.

### Željezara Nikšić (Steel Plant Nikšić)

In the sector of Energy of this industrial complex, deposited are capacitors not in use in the quantity of 26 160 kg (674 pieces). The supervision of environmental inspection has established that on the deposited capacitors there are plates placed by the manufacturer with the information that the insulating oil does not contain PCBs (label “NO PCB’S”). On some capacitors there were no plates with the information on the type of insulating oil, thus the checking by authorised laboratory is in process.

### Complex of former plant “Radoje Dakić” in Podgorica

In the complex of former plant “Radoje Dakić” there is a large quantity of transformers and capacitors that are assumed to contain PCBs due to their year of made. According to the data from the environmental inspection, the quantities of this waste are as follows:

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<sup>5</sup> Data from Elektroprivreda Crne Gore, AD Nikšić as of 17 May 2013

1. Engineering, overhaul and servicing hall

- 2 transformers produced in 1982 - Kentler GMBH KC;
- one transformer from 1969, manufactured by Rade Končar- type szo 0.5;
- tank for oil with the volume of 2 m3. In the subject tank there are around 100 litres of oil that is assumed to contain PCBs;
- 11 capacitors manufactured by Iskra Kranj- type KDVK 325 from 1966, or 1970.
- 8 capacitors manufactured by the factory of eclectic equipment Ripani from 1961.
- 7 capacitors manufactured by Minel from 1981.

2. FAKOP Hall

- 58 capacitors with PCB oil, with the total weight of cca 2900 kg.

3. Machine Processing Hall 1

In the Machine Processing Hall 1 there is a substation with three transformers.

**Table 9.** *Overview of transformers in the Machine Processing Hall*

Manufacturer	Type	Manuf. no.	Capacity	Year of made
Transformer	Rade Končar 3TNP20-10	071068	400 KVA	1968
Transformer	Energoinvest Ljublj NTE630710	3595	630 KVA	1965
Transformer	Energoinvest Ljublj NTE630710	1267	630 KVA	1967

In the same hall there are also three transmitters with PCB transformer oil.

In the complex of the plant “Radoje Dakić“ there is a substation with transformers that are assumed to contain oil with PCBs.

The plant “Radoje Dakić“ is not operational. The issue of testing – categorisation and further handling of the subject waste will be an obligation for the future period.

Porto Montenegro – Adriatic Marinas d.o.o.

On the area where the company LLC Adriatic Marinas is implementing the project of constructing the marina and residential tourist complex in Tivat, there are two substations with transformers with PCB oil. The subject substations are currently operational and in the coming period they are planned to be replaced which will result in putting transformers with PCB oil out of use.

Željeznička infrastruktura Crne Gore a.d. (Railway Infrastructure of Montenegro JSC)

Željeznička infrastruktura Crne Gore a.d possesses 4 waste transformers with the mass of 27.5 tons each (in total 110 tons) of which 9 tons are transformer oil (total 36 tons). In the process of determining the character of this waste in oil, the presence of PCBs has been identified, but the concentration is less than 50 mg/litre.

### Adriatic Shipyard “Bijela”

Adriatic Shipyard “Bijela” possesses 20 transformers and 104 capacitors. Out of total 20 transformers 9 have been subject to analysis in view of establishing if the insulating oil is contaminated with PCBs and the results show that in three transformers there is oil with PCBs, and in the remaining 6, the PCB concentration in oil has been below the limit value. The remaining 11 transformers will be tested in an accredited laboratory in the coming period in view of determining if they contain PCBs.

Out of 20 transformers in the Adriatic Shipyard Bijela, 19 are operational, and one is orderly and serves as a spare one.

Adriatic Shipyard Bijela also has 104 capacitors of which 54 are operational, and 50 are not. All capacitors are of the same type and manufacturer (KMPK 5003 – Iskra Semič). In the coming period it will be tested to establish if PCB equipment is in question.

### Electro-industry “Obod” JSC under bankruptcy

In the halls of Electro-industry “Obod” there are 12 transformers in total, of which according to the data of bankruptcy administration 3 have piralen oil. Production has ceased in the plant and transformers have not been used for a long period.

### Coal Mine Pljevlja

Coal Mine Pljevlja has 63 transformers, 209 capacitors and 80 low-level disconnectors that could contain oil with PCBs. Environmental inspection has passed a decision to order the subject of the supervision to carry out categorisation of the subject equipment.

### Luka Bar (Port of Bar)

On the area of Luka Bar there are 13 transformers and 32 capacitors installed with oil containing PCBs. Out of the total number of transformers 10 are operational, and 3 transformers are not operational and are placed in a temporary stockpile. Capacitors under the possession of Luka Bar are not currently in use, but they have not been decommissioned from the plant.

### Plantaže JSC “13. jul”

In this industrial complex there are 28 transformers and 8 oil disconnectors installed. The subject equipment is operational. The environmental inspection has passed a decision to order the subject to carry out analyses in view of establishing the character of this equipment.

## **3.2.7 Previous, current and future production and use of PCBs and equipment with PCBs**

In Montenegro, PCB mixtures have not been and are not produced. Also, production of PCBs and equipment with PCBs are not planned. PCB compounds in Montenegro have been used and are still used mostly in closed systems (as dielectrics in transformers and capacitors). Future use of equipment with PCBs will be limited in line with the ban of import of PCBs and equipment, and the plan for phased replacement of equipment in line with the Stockholm Convention.

### **3.2.8 PCB quantity in closed systems (capacitors, transformers)**

The mentioned data have been collected by environmental inspection – Administration for Inspection Affairs.

### **3.2.9 Application of PCBs in semi-closed systems**

Semi-closed systems that contain PCBs are the ones where PCB oils are not directly exposed to the environment, or hermetically closed. Examples of such semi-closed systems are hydraulic systems, systems for heat transfer, vacuum pumps, disconnectors and other. There is no reliable information regarding the use of PCBs in semi-closed systems of Montenegro.

### **3.2.10 Application of PCBs in open systems**

Polychlorinated biphenyls have been used in open systems as plastificators in colours, adhesives, plastics, and forms of lubricating oils and the like. There are no data on the application of PCBs in open systems.

### **3.2.11 PCB Prevention, Production/Use Measures**

Use of PCBs is legally allowable only in closed systems. According to the Stockholm Convention, which orders elimination of PCB-containing equipment by 2025 it is required to undertake prevention measures in use of PCBs such as:

1. introducing control and supervision of import of equipment and devices that may contain PCBs into the country, and
2. developing schedules for replacement – strategy for replacement of existing equipment in use, taking into account the age of equipment and industrial-economic situation in MNE, as well as European regulations governing the timeframes for replacement of devices with PCBs.

### **3.2.12 PCBs Import and Export**

#### Import of equipment with PCBs

In Montenegro while still a part of the SFR Yugoslavia (until 1991), PCB-containing equipment, capacitors and transformers, were mostly procured/imported from the Slovenian plant ISKRA – Semič, Serbian plant MINEL - Ripanj and AVALA – Belgrade, from former USSR and former GDR and other European and world manufacturers (ASEA - Sweden). The devices procured from Slovenia and Serbia have not been recorded as import of equipment, therefore it is not possible to determine what quantity of equipment was procured/imported to Montenegro at the time. All the data regarding the import of equipment with PCBs were with the Federal Customs Service (until 2003) which controlled import.

For the period since 1991 to nowadays it is not possible to obtain data on possible import of equipment containing PCBs either. Namely, in the customs tariff, which enables obtaining information about import of goods to MNE, there is no special tariff number for transformers/capacitors filled with PCBs, thus there is no data on the quantities of imported equipment with PCBs since 1991 until now. However, there is a customs tariff for waste oils: 2710 91 00 containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs), and for mixtures and preparations containing ethylene oxide, polybromated diphenyl (PBBs), polychlorinated diphenyls (PCBs), polychlorinated triphenyls (PCTs) or TRIS (2,3 - dibromopropyl) phosphate.

#### Import of fluids with PCBs

As regards import of PCBs, due to short time period and complexity of the system of monitoring import of goods by the customs tariff number, obtained are data on imported quantities of polychlorinated bi/terphenyls for the period from 1991 to 2000 which are specified as data on import of PCBs. Namely, in the customs tariff the same tariff number is for polychlorinated biphenyls together with polychlorinated terphenyls (PCT) and polybrominated biphenyls (PBB), so based on this number it is possible to obtain information on the quantities imported to MNE. Import of fluids containing PCBs, since 2000 has been banned given that PCBs are included in the list of toxins whose production, marketing and use are banned (OGFRY 12/00).

#### Import of PCB waste

According to the current regulations of Montenegro, it is banned to import hazardous waste to Montenegro, as well as used electric and electronic equipment, including import of used equipment with PCBs. Waste containing PCB compounds is not imported to Montenegro.

#### Export of PCBs

Given that Montenegro does not produce PCB compounds or equipment containing PCBs, it is evident that there is no export of goods containing PCBs, except in case when they are sent to be destroyed as hazardous waste in accordance with the Basel Convention.

#### Exported quantities of PCB waste<sup>6</sup>

In 2007, the Government of Montenegro through the company Miteko Belgrade exported from Aluminium Plant Podgorica 65 600 kg of waste PCB transformers, 24 020 kg of waste PCB capacitors, 36 080 kg of soil contaminated with PCB oil, 1260 kg of waste metal barrels and 81 200 kg of waste PCB oil. Waste transformers and capacitors have been exported to Germany and they were prepared in the plant for waste processing Envio Recycling GmbH & Co KG in Dortmund. Solid waste and oil contaminated with PCBs have been delivered to the waste processing plant Fernwarme GmbH in Vienna.

In 2009, the Brewery Nikšić “Trebjesa“ JSC exported through the company LLC Miteko Belgrade 1422.50 kg of PCB waste to Germany and it was prepared in the waste processing plant Envio Recycling GmbH & Co KG in Dortmund.

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<sup>6</sup> Data of Administration for Inspection Affairs as of 10 April 2013

In the laboratory of former Rehaul Institute "Sava Kovačević" in Tivat there were significant quantities of chemicals and various chemical waste (concentrated non-organic acids, cyanides and the like) in the quantities of cca 15 000 kg, which were exported to Vienna where they were destroyed-neutralised, in accordance with the Basel Convention<sup>7</sup>.

### **3.2.13 Current stockpiles, waste with PCBs and locations for disposal**

#### Waste with PCBs

Waste with PCBs includes the quantities of:

1. transformers and capacitors and other equipment containing PCBs, put out of operation and not planned for further use;
2. waste fluids containing PCBs and
3. solid waste containing PCBs (metals, non-metals, soil contaminated with PCBs), that may occur due to leakage or damage of equipment and during remediation and cleaning of facilities and locations contaminated with PCBs.

### **3.2.14 Locations for handling and stockpiling of PCBs in Montenegro**

The Law on Spatial Planning (OGM 47/11) prescribes that the competent state administration authority passes decisions regarding the locations for, including but not limited to, sanitary waste landfills and solid and hazardous waste treatment plants.

On the territory of Montenegro there are private companies that collect and transport waste with PCBs. Such waste is exported for final disposal abroad. Investment costs for foundation of the centre for collecting and depositing PCBs would amount to cca 2 million euros<sup>8</sup>.

The places where the waste is currently temporarily stored are: KAP, Hemosan LLC Bar, Željeznička infrastruktura Crne Gore a.d, EPCG, Complex of former plant "Radoje Dakić", Željezara Nikšić, Electro-industry "Obod" a.d. Cetinje, Port of Bar, Adriatic Shipyard "Bijela".<sup>9</sup>

### **3.2.15 National capacities for monitoring PCB status in the environment**

#### Laboratories equipped for PCB analyses

PCB compounds in Montenegro are tested in various media such as air, water, soil, sediment, rainfall, biological material and foods of animal origin. DOO Centar za ekotoksikološka ispitivanja Podgorica (Centre for Ecotoxicological Research Podgorica) (CETI) is dealing with testing of POPs substances.

#### Review of the locations contaminated with PCBs

Based on analyses of previously published works regarding the research and establishing the levels of PCBs in the environment on the territory of Montenegro, the locations contaminated with PCBs, given the level of research and knowledge about locations

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<sup>7</sup> Data of the Army of Montenegro, Arpil 2013

<sup>8</sup> Action Plan for confirmation and implementation of the Protocol on persistent organic pollutants, October 2010

<sup>9</sup> Data from the Administration for Inspection Affairs as of 10 April 2013.

collected through implementation of the Monitoring Programme for toxic and hazardous matters in soil, and based on visits to companies, can be classified to several types of locations contaminated with PCBs if contamination has occurred due to:

1. explosion, overheating, evaporation or leakage from transformers and capacitors,
2. unprofessional handling of equipment containing PCBs, areas where devices with PCBs not in use are deposited without any control,
3. incidents in industrial plants and
4. uncontrolled disposal of devices with PCBs on the existing, non-developed waste disposal locations in Montenegro.

### **3.2.16 Previous experiences in remediation of facilities contaminated with PCBs in Montenegro**

After it was established that there old piralen oil (transformer oil based on PCBs) spilled in KAP in 1989, commenced the implementation of the Study for establishing the level of contamination of the surroundings of the Aluminium Plant with polychlorinated biphenyls. The Study showed a high level of contamination, based on which the "National Committee" prescribed urgent and long-term measures of remediation of the soil in the surroundings of PCR section (maintenance of means of work) where around 1.5 tons of piralen (60% Hexachlorobiphenyls and 40% Hexachlorobenzene) was spilled.

In 2007, the Government of Montenegro through the company Miteko Belgrade exported from the Aluminium Plant Podgorica 65 600 kg of waste PCB transformers, 24 020 kg waste PCB capacitors, 36 080 kg of soil contaminated with PCB oil, 1260 kg of waste metal barrels and 81 200 kg of waste PCB oil. Waste transformers and capacitors have been exported to Germany and they were prepared in the waste processing plant Envio Recycling GmbH & Co KG in Dortmund. Solid waste and oil contaminated with PCBs have been delivered to the waste processing plant Fernwarme GmbH in Vienna.

In 2009, Brewery Nikšić "Trebjesa" JSC through company LLC Miteko Belgrade exported 1422.50 kg of PCB waste to Germany and it was prepared in the waste processing plant Envio Recycling GmbH & Co KG in Dortmund.

Monitoring of potential locations contaminated with PCBs was carried out in 2006 and 2007. After the new owner of "Adriatic Marinas" completed research, a design for remediation of the space was produced, based on which hazardous waste was exported for final disposal.

### **3.2.17 Statements**

Presence of equipment containing PCBs and waste with PCBs is one of the urgent problems in managing POP chemicals in Montenegro.

1. According to the collected data it can be noted that PCBs and PCTs are not produced in Montenegro.
2. Import of equipment and fluids containing PCBs is banned.
3. Contaminated locations on the territory of Montenegro have been identified.
4. The existing data are collected through various projects (Monitoring Program for pesticide residues in the food of plant and animal origin, Monitoring Program for foods of animal origin, Monitoring Program for hazardous and harmful matters

in soil, KAP Monitoring Program, Monitoring Program for surface and underground waters) or analysis of inspection samples.

5. The level of equipment capacities for doing required analyses is high. In Montenegro there are all capacities required for monitoring of PCB substances in samples of plants and plant products, food, water and soil with partial supplementing of relevant legal regulations and ensuring financial resources.

#### Proposed Measures:

In order to further properly manage PCBs and fulfil the obligations of the Stockholm Convention, it is required to:

1. Organize training in order for the equipment to be used in a safe way, then replaced and exported for safe destruction,
2. establish system for collecting data on use of PCBs in the industry of plastics, coatings, paints and varnishes, as well as paints in construction,
3. establish temporary stockpiles for equipment and waste containing PCBs, which the owner has no conditions to safely store until the final disposal,
4. develop Plans for replacement of equipment containing PCBs in accordance with the Law on Waste Management and
5. ensure financial support for resolving PCB elimination.

### **3.3 Hexabromodiphenyl ether and Heptabromodiphenyl ether - Annex A, Part IV of the Stockholm Convention**

Hexabromodiphenyl ether and heptabromodiphenyl ether are used for suppression of flame. Hexa and hepta-BDE are main components of commercial octabromodiphenyl ether.

“Hexabromodiphenyl ether and heptabromodiphenyl ether” means 2,2', 4,4', 5,5'-hexabromodiphenyl ether (BDE-153, CAS no: 68631-49-2), 2,2', 4,4', 5,6'-hexabromodiphenyl ether (BDE-154, CAS no: 207122-15-4), 2,2', 3,3', 4,5', 6-heptabromodiphenyl ether (BDE-175, CAS no: 446.255 - 22-7), 2,2', 3,4,4', 5', 6-heptabromodiphenyl ether (BDE-183, CAS no: 207122-16-5) and other hexa and heptabromodiphenyl ethers present in commercial octabromodiphenyl ether.

Octa-BDE is white powder with 79% content of Br; level of brominating is controlled by stoichiometric or kinetic reaction, so the composition of the product may vary from case to case; octa-BDE is organobrominated flame retardant BFR with the lowest production and was mostly used in ABS-resins that are present in small articles for house and office use.

Octa-BDE has not been produced in Montenegro. There is no information on the presence of octa-BDE in products in the market. However, it is likely that products, such as electrical and electronic devices, foam printing electronic boards and automobile parts (ABS plastic) imported to Montenegro contain octa-BDE. There is no information about waste containing octa-BDE in Montenegro.

Electric and electronic waste and waste vehicles are processed in Montenegro, in recycling centres. Environmental Protection Agency has issued license for processing waste vehicles to the recycling centre LLC Nikšić, landfill Livade LLC Podgorica and Bukumirska Jezera LLC Podgorica. LLC Hemosan is licensed to process and remove



electric and electronic waste with the PCB content less than 0.005 % of the mass of the compound where they are found. Waste vehicles are processed in the way that fluids, tires, lead, metal breaking parts and other are separated, then the body of the cars are pressed, which is further deposited as scrap iron. Electric and electronic waste are also processed by their disassembling and separation of individual parts.

### **3.4 Tetrabromodiphenyl ether and Pentabromodiphenyl ether- Annex A, part V of the Stockholm Convention**

Tetrabromodiphenyl ether and pentabromodiphenyl ether are used for inhibiting or preventing organic matters and therefore they are used as fire fighting additives. Tetra and penta BDE are main components of commercial pentabromodiphenyl ether.

Penta-BDE is viscose fluid containing 70% Br; it is composed of: 41-42% tetra-BDEs (mostly BDE-47), 44-45% penta-BDEs (dominantly BDE-99 and low level of BDE-100) and 6-7% hexa-BDEs (BDE-153 and -154). Penta-BDE has been mostly used in polyurethane foam and textile.

Penta-BDE has not been produced in Montenegro. There are no information on the presence of penta-BDE in the products in the market. However, it is likely that products, such as polyurethane foams, imported to Montenegro and waste occurring with them, are deposited on landfills. There is no information about stockpiling and waste containing penta-BDE.

Polyurethane foam is not recycled in Montenegro. Currently, the production, use, import and export of penta-BDE are not legally regulated.

### **3.5 Dichlorophenyl-trichloroethane (DDT) – Annex B of the Stockholm Convention**

DDT was used for eradication of malaria mosquitoes on the territory of Podgorica around 1946. This insecticide was applied at larger scale in 1956 and 1957 at the territory of the municipalities of Podgorica, Nikšić, Danilovgrad, Cetinje, Ulcinj and Tivat for eradication of gypsy moths in oak woods.

The information on the action of eradication of gypsy moths are found in the magazine "Naša poljoprivreda" (Our Agriculture) from 1957. Therein it is stated that for these purposes in the territory of the municipalities of Cetinje, Podgorica and Nikšić in the area of 21 011 ha, 39 960 kg of DDT (1.9kg/ha) was used in an aerial treatment. These data are relevant for 1956. In 1957 this action was expanded to include the municipalities of Tivat and Ulcinj, and the treated territory included 47 036ha, and 78 070 kg of DDT (1.66kg/ha) was used.

In addition to aerial treatment, in 1956 ground spaying was carried out by motor sprayers on the locations of Crmnica and Ostrog (municipalities of Bar and Danilovgrad). Around 650ha forests were treated and 9 000 kg insecticide Bentox 20 were used. Data: Dimitrije Batrićević (1957): Gypsy moth gradation in Montenegro and measures undertaken for their eradication. Naša Poljoprivreda, no. 5-6, Vol. 3, Podgorica.

DDT has never been produced on the territory of Montenegro. It was applied after the World War II for eradication of malaria mosquitoes in Podgorica, surroundings of Skadar Lake and the surroundings of the Bojana River. In 1950's it was used for eradication of Gipsy moths in forests and orchards, and since 1972 its use has been banned in agriculture. Previous monitoring of soil, water, sea and biological materials has not identified the presence of DDT and its metabolites, except traces from time to time at the verge of detection of instrumental equipment.

### **3.6 PFOS – Perfluorooctane sulfonic acid (CAS no: 1763-23-1), its salts and Perfluorooctane sulfonyl fluoride (CAS no: 307-35-7) Annex B of the Stockholm Convention**

PFOS is produced as a product of unintentional degradation of linked anthropogenic chemicals. This substance is widely used in electric and electronic parts, in production of semi-conductors, production of images, hydraulic fluids and textile.

For example: potassium perfluorooctane sulfonate (CAS no: 2795-39-3); lithium perfluorooctane sulfonate (CAS no: 29.457 - 72-5); ammonium perfluorooctane sulfonate (CAS no: 29081-56-9); diethanolammonium perfluorooctane sulfonate (CAS no: 70225-14-8); tetraethylammonium perfluorooctane sulfonate (CAS no: 56773-42-3); didecyldimethylammonium perfluorooctane sulfonate (CAS no: 251099-16-8)

Use of PFOS and its salts is not known in Montenegro.

Perfluorooctane sulfonic acid is used for the following acceptable purposes, or as an intermediate in the production of chemicals with the following specific uses: copy machines, photo-resist and anti-reflective coatings of semi-conductors, etching agent for compound semi-conductors and ceramic filters, aviation hydraulic fluids, metal plating only in closed-loop systems, certain medical devices (ethylene tetrafluoroethylene copolymer (ETFE) layers and radio-opaque ETFE production and in-vitro diagnostic medical devices and CCD colour filters), fire-fighting foam, insect baits for control of leaf-cutting ants. Specific exemptions are for the following specific uses, or as an intermediate in the production of chemicals with the following specific uses: photo masks in the semiconductor and liquid crystal display (LCD) industries, metal plating, decorative plating, for some parts of colour printers, insecticides for control of red ants and termites, chemically driven oil production, carpets, leather and apparel, textiles and upholstery, paper and packaging, coatings and coating additives and rubber and plastics.

### **3.7 Unintentional production and release of HCB, PECB, PCB and PCDD/PCDF – Annex C of the Stockholm Convention**

The category of unintentionally formed POPs chemicals includes: hexachlorobenzene (HCB), pentachlorobenzene (PeCB), Polychlorinated biphenyls (PCB) Polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans(PCDF) that are unintentionally formed and released to the environment from anthropogenic sources.

The Decree on limit values of emissions of pollutants to air from stationary sources (OGM 10/2011) envisages limit value of emission of polychlorinated dibenzodioxin

(PCDD) and polychlorinated dibenzofurans (dioxins and furans) which is 0.25 µg/m<sup>3</sup> for mass flow and 0.1µg/m<sup>3</sup> for mass concentration, where mass of dioxin and furan is expressed as a product of mass and toxic equivalency factor.

According to the ratification of the Convention on Long Range Trans-Boundary Air Pollution (CLRTAP) Montenegro is obliged to update the Inventory of emissions of gases which includes the evaluation of HCB emissions.

The data from the national inventory of emissions for 2010 show that in Montenegro in 2010, 22.34 tons of persistent organic pollutants were discharged (estimated emissions) of which 4.22g I-Teg PCDD/PCDF , 0.01 tons of HCB, 0.001 tons of PCB.

In Montenegro, the greatest source of emissions is combustion of fuel in energy plants, metal processing (steel, aluminium) in blast and cupola furnaces, alloy casting, uncontrolled burnings on dumpsites of communal and other waste and other uncontrolled burning processes, traffic, meat and tobacco drying facilities and burning of heating wood which is a dominant form of heating in Montenegro during the winter season. In addition to the mentioned sources the following should be mentioned: pulp bleaching procedures (former plant in Berane), production of paints and varnishes, production of pesticides, cement, bricks, asphalt mixture, incineration of sewage sludge, PVC production, incineration of medical waste, fires and explosions of material containing chlorine and emissions from diesel engines.

### **3.7.1 Monitoring of release of PCDD/PCDF to the environment in Montenegro**

Montenegro has prepared an inventory of emissions in accordance with the Convention on Long Range Trans-Boundary Air Pollution (CLRTAP).

Emission inventory is a consistent group of data on emissions, grouped by economic activities. It can be prepared on national or local level, as to show emissions in the whole country or to be used for analysis of a specific local situation. It is prepared and updated on annual level in accordance with international obligations arising from CLRTAP and UN Framework Convention on Climate Change (UNFCCC). Given that the inventory enables characterisation of impact of different emission sources, it also represents a basic tool for selection of a suitable strategy for reduction of contamination of air and adoption of efficient measures under the plans for air quality management.

Inventory of emissions to the air for Montenegro has been produced in accordance with the directions of EMEP/EEA: Air Pollutant Emission Inventory Guidebook 2009 and instruction of IPCC: 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

All the available information and data on significant activities taking place in the country and main emission sources have been used for production of the inventory. The used data have been obtained directly through surveys, and from official statistical data. The activities that are considered during the preparation of the inventory are classified into 11 groups:

1. Combustion in energy and transformation industry;
2. Non-industrial combustion plants;
3. Combustion in manufacturing industry;
4. Production processes;

5. Extraction and distribution of fossil fuels and geothermal energy;
6. Solvent and other product use;
7. Road transport;
8. Other mobile sources and machinery;
9. Waste treatment and disposal;
10. Agriculture and
11. Other sources and sinks.

Emissions have been assessed for a large number of pollutants, including but not limited to: hexachloro-benzene and polychlorinated biphenyls, as well as polychlorinated dibenzo-dioxin and polychlorinated dibenzo-furan.

### 3.7.2 Legal regulation from the area of PCDD/PCDF

Control of emissions of PCDD/PCDF, HCB, PCB and PeCB is under the responsibility of the Ministry of Sustainable Development and Tourism and the Environmental Protection Agency. Air Protection Law (OGRM 25/10) regulates the manner of monitoring the quality of air, protection measures, evaluation and improvement of air quality, as well as air quality planning and management.

### 3.7.3 Assessment of emissions of dioxin and furan to the air in 2006 - 2010<sup>10</sup> based on the data from the inventory of the Environmental Protection Agency

#### Assessment of emissions to the air in Montenegro

Below are presented sectors or sub-sectors for which the emission of dioxin and furan to the air has been assessed. Emissions are presented in a standard format (Nomenclature for reporting-NFR) for reporting according to the CLRTAP for the period 2006-2010.

During this period noted were the emissions of dioxin and furan from energy and industry sectors.

#### 1. Energy sector

According to the instructions for development of emission inventories, energy sector includes all the processes where energy is obtained from burning fossil fuels, including transport.

**Table 10.** Assessment of emission of Dioxin, Furan, PCBs and HCB for 2006

NFR source	PCDD/PCDF (g I - Teq)*	PCB (g I - teq)*	HCB (g I - Teq)*
1 A 1 Thermal power plants, public heating plants and boiler rooms	0.25	0.092	/
1 A 2 Combustion in industry	0.004	0.009	/
1 A3 Road transport	0.066	/	/
1 A 3 National maritime transport	0.429	/	0.001
1 A 4 Combustion in the sector of services, institutions and households	1.804	0.338	0.013
1 A 4 Combustion in the sector of agriculture	/	0.001	/

\*- grams International Toxicity Equivalent

<sup>10</sup> Data from the Inventory of the Environmental Protection Agency.

**Table 11.** Assessment of emission of Dioxin, Furan, PCBs and HCB for 2007

NFR source	PCDD/PCDF (g I - Teq)*	PCB (g I - teq)*	HCB (g I - Teq)*
1 A 1 Thermal power plants, public heating plants and boiler rooms	0.209	0.089	/
1 A 2 Combustion in industry	0.008	0.022	/
1 A3 Road transport	0.034	/	/
1 A 3 National maritime transport	0.442	/	/
1 A 4 Combustion in the sector of services, institutions and households	1.805	0.355	0.013
1 A 4 Combustion in the sector of agriculture	/	0.001	/

**Table 12.** Assessment of emission of Dioxin, Furan, PCBs and HCB for 2008

NFR source	PCDD/PCDF (g I - Teq)*	PCB (g I - teq)*	HCB (g I - Teq)*
1 A 1 Thermal power plants, public heating plants and boiler rooms	0.293	0.086	/
1 A 2 Combustion in industry	0.008	0.021	/
1 A3 Road transport	0.034	/	/
1 A 3 National maritime transport	0.455	/	0.001
1 A 4 Combustion in the sector of services, institutions and households	1.845	0.356	0.014
1 A 4 Combustion in the sector of agriculture	/	0.002	/

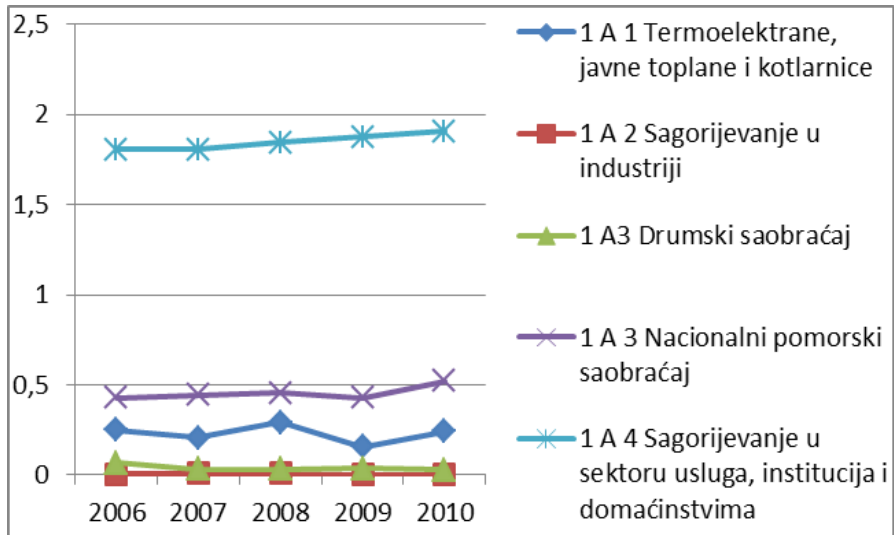
**Table 13.** Assessment of emission of Dioxin, Furan, PCBs and HCB for 2009

NFR source	PCDD/PCDF (g I - Teq)*	PCB (g I - teq)*	HCB (g I - Teq)*
1 A 1 Thermal power plants, public heating plants and boiler rooms	0.155	0.022	/
1 A 2 Combustion in industry	0.002	0.003	/
1 A3 Road transport	0.036	/	/
1 A 3 National maritime transport	0.429	/	0.001
1 A 4 Combustion in the sector of services, institutions and households	1.877	0.38	0.014
1 A 4 Combustion in the sector of agriculture	/	0.002	/

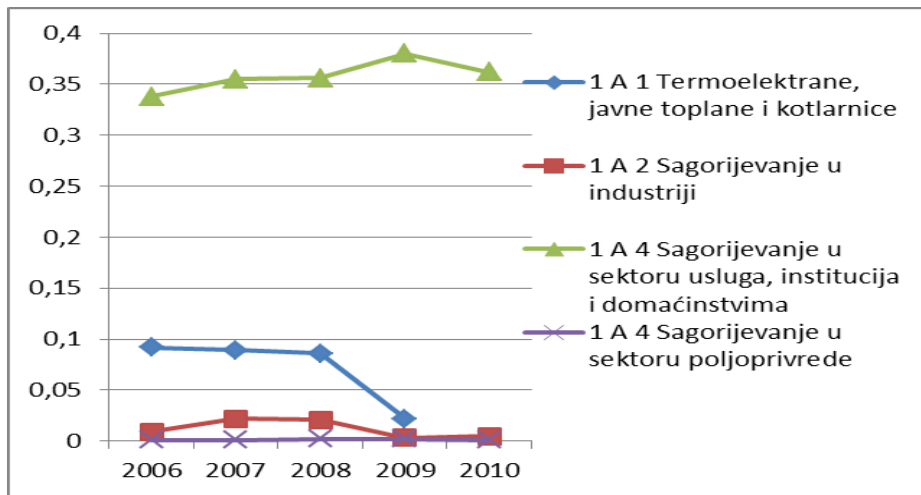
**Table 14.** Assessment of emission of Dioxin, Furan, PCBs and HCB for 2010

NFR source	PCDD/PCDF (g I - Teq)*	PCB (g I - teq)*	HCB (g I - Teq)*
1 A 1 Thermal power plants, public heating plants and boiler rooms	0.244	/	/
1 A 2 Combustion in industry	0.002	0.005	/
1 A3 Road transport	0.03	/	/
1 A 3 National maritime transport	0.52	/	0.001
1 A 4 Combustion in the sector of services, institutions and households	1.907	0.362	0.014
1 A 4 Combustion in the sector of agriculture	/	0.001	/

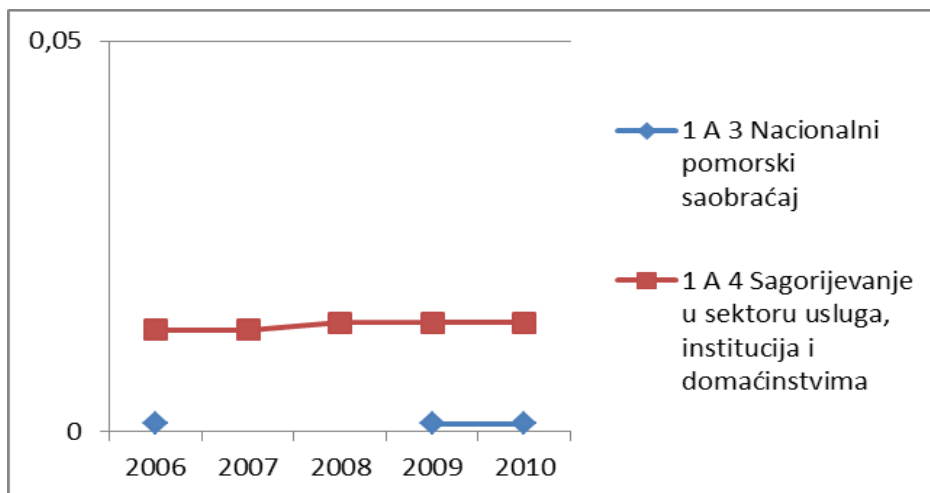
**Graph 1.** PCDD/PCDF emission trend for 2006-2010 from energy sector



**Graph 2.** PCB emission trend 2006-2010 from energy sector



**Graph 3.** HCB emission trend 2006-2010 from energy sector



## 2. Industry sector

In the industry sector assessed are the emissions of dioxin and furan from the production of steel and iron and secondary production of aluminium (plant Silumina and Casthouse).

### 2C1-Production of steel and iron

Steel Company in Nikšić uses a part of domestic raw materials in the production (steel waste, karst, dolomite), and the remaining part are imported raw materials (ferroalloys, steel blocks, hot and cold rolled coils, hot rolled seamless tubes etc.).

**Table 15.** Production of steel and iron:

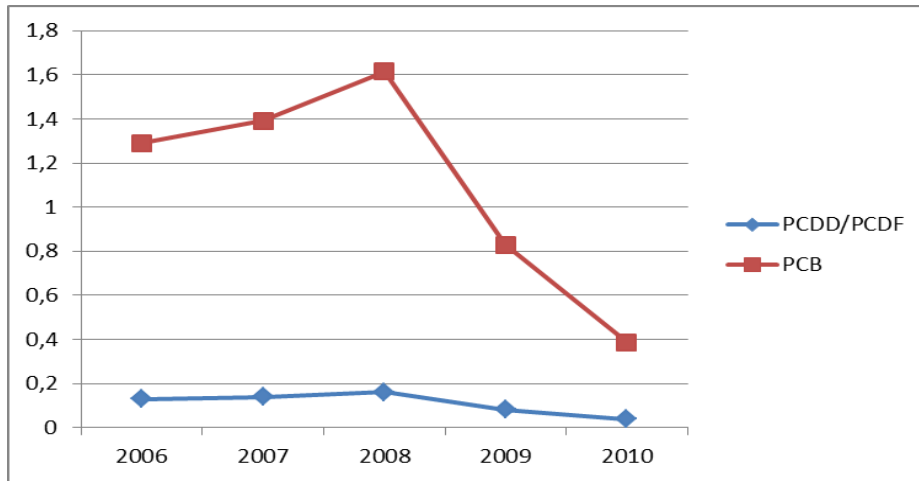
Production of basic metals	Measurement unit	2006	2007	2008	2009	2010
Steel ingots	t	19978	38217	52887	13817	33178
Continuous casting of steel from electric furnace	t	143187	135632	148736	76587	15094
Heavy, light steel and light steel bars	t	136921	137906	157990	82725	31059
Drawn, peeled and ground steel bars	t	893	413	779	380	268
Cold rolled steel coils	t	7534	2928	1398	795	546
Gray iron casting	t	-	-	-	-	-
Steel castings	t	1165	971	126	-	-

Source: Statistical Yearbook for 2011, MONSTAT

**Table 16.** Assessed emissions of PCDD/PCDF and PCB from production of iron and steel for the period 2006-2010

Year	PCDD/PCDF g I – Teq	PCB g I – teq
2006	0.129	1.291
2007	0.139	1.391
2008	0.161	1.614
2009	0.083	0.828
2010	0.039	0.386

**Graph 4.** PCDD/PCDF and PCBs emission trend from production of steel and iron for the period 2006-2009



2C5e-Secondary production of aluminium (plant of Silumina and Casthouse)

According to the data of MONSTAT, the production of aluminium is as follows:

**Table 17.** Aluminium production

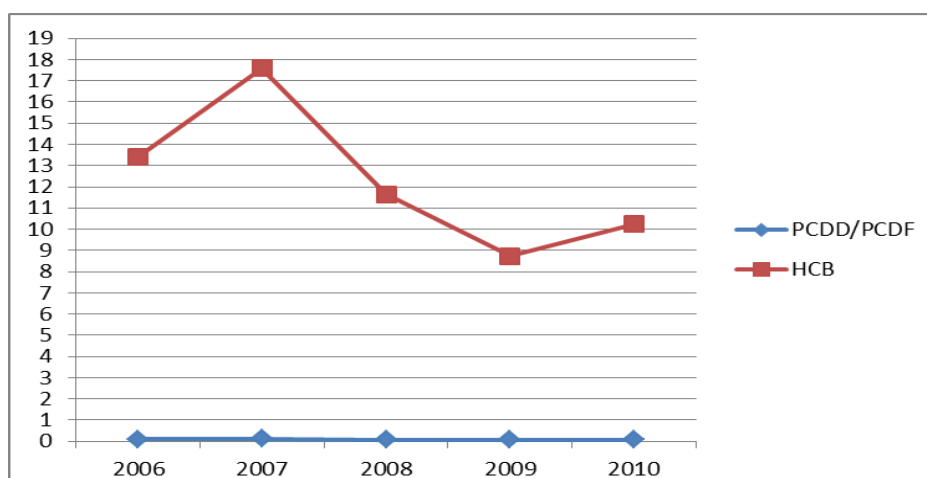
Produced in plants	Measurement unit	2006	2007	2008	2009	2010
Aluminium oxide for production of aluminium	t	236740	240186	220426	58528	-
Aluminium in ingots	t	118403	124060	107457	63960	82043
Aluminium in blocks	t	3359	11091	4056	-	-
Aluminium alloy casting;	t	-	-	-	-	-
Rolled sheet aluminium	t	-	-	-	-	-
Rolled aluminium strips;	t	-	-	-	-	-
Rolled aluminium foil	t	-	-	-	-	-
Aluminium castings	t	4544	4795	3708	2586	2046



**Table 18.** Assessed PCDD/PCDF and HCB emissions from secondary production of aluminium (plant of Silumina and Casthouse) for the period 2006-2010

Year	PCDD/PCDF g I - Teq	HCB g I - teq
2006	0.094	13.42
2007	0.123	17.6
2008	0.061	11.632
2009	0.061	8.741
2010	0.072	10.232

**Graph 5.** HCB PCDD/PCDF and PCB emission trend from secondary production of aluminium (plant of Silumina and Casthouse) for the period 2006-2010



According to the processed data, the greatest emissions of dioxin and furan occur in the production process of steel and iron, combustion of fossil fuels in power plants. It should be noted that data are missing for the quality of consumed fuel in transport which represents one of the most significant sources of PCDD/PCDF emission to the environment, as well as the data on the quantities of uncontrolled burning of waste. In addition, there is no emission factor for aluminium production which must be a significant flaw given the production capacities. Also, contributions of non-regulated waste disposal sites have not been taken into consideration in Montenegro, given that there are no statistical data on their size, number of burning days and other.

### 3.7.4 Pentachlorobenzene PeCB

Pentachlorobenzene is used in PCB products, as a fungicide, as a flame retardant and as a chemical mediator prior to production of quintozene. Also, it is produced during combustion in thermal and industrial processes, and it also occurs as impurity in solvents or pesticides.

The main source of unintentional release may be burning, particularly if uncontrolled.

### 3.7.5 Conclusion

Inventories of PCDD/PCDF, PCB and HCB recognise the sectors, sub-sectors and specific processes where the mentioned pollutants are released to the air.

According to the processed data, the greatest emissions of dioxin and furan occur in the process of production of steel and iron, combustion of fossil fuels and in power plants.

It should be noted that detailed data are missing regarding the quantity of fuel consumed in transport which is one of the most significant sources of PCDD/PCDF emission to the air, as well as the data on the quantities of uncontrolled burning of waste.

According to the provisions of the Stockholm Convention, and given the results of the completed inventories, the following is proposed:

1. Improve keeping of basic information on use of raw materials and energy sources in industry, transport and services.
2. Improve and upgrade the inventory of PCDD/F, HCB, PCB emissions to the air.
3. Develop inventory of PeCB emissions to the air.
4. Develop inventory of PCDD/F, HCB, PCB and PeCB emissions to the water and soil.
5. Enable better insight to the data on activities by individual categories and sub-categories, as well as the data on specific technological processes including the condition of equipment.
6. Ensure measures for prevention of occurring uncontrolled burning in the countryside (waste burning, fires, etc.).
7. Implement educational measures in view of preventing occurring of uncontrolled burning in the countryside (waste burning, fires, etc.).

## 4 LEVEL OF INFORMATION, AWARENESS AND PUBLIC EDUCATION

Information on POPs compounds and their adverse impact on humans and the environment is not sufficiently present among the citizens of Montenegro.

In the course of developing the Study on Establishing the Quality of Zetska Plain <sup>11</sup> at the beginning of 1990's, the public and citizens were in details informed about the found condition of the piralen content in waters, soil, foods of animal origin and potential effects on human health. Several round tables and contact TV shows were organised, as well as public fora in the communities in the vicinity of KAP. The citizens of Zeta who live directly in the threatened area have been further acquainted with this issue.

The issue of POPs compounds in Montenegro is not sufficiently present in the curricula of primary and secondary schools. Sufficient level of information is present only in individual scientific and professional circles whose activity is related to this issue. Curricula at faculties don't pay sufficient attention to significance of POPs compounds.

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<sup>11</sup> Study for establishing quality of Zetska plain I and II, ITI, ZZZZ, 1990, 1992

Information related to POPs substances may be found at web sites of the Ministry of Sustainable Development and Tourism ([www.mrt.gov.me](http://www.mrt.gov.me)), Environmental Protection Agency ([www.epa.org.me](http://www.epa.org.me)), the Stockholm Convention ([www.chm.pops.int](http://www.chm.pops.int)), Basel Convention ([www.basel.int](http://www.basel.int)), Rotterdam Convention ([www.pic.int](http://www.pic.int)), UNEP-Chemicals ([www.unep.org](http://www.unep.org)), GEF ([www.thegef.org](http://www.thegef.org)), WHO ([www.who.int](http://www.who.int)), UNIDO ([www.unido.org](http://www.unido.org)), IFCS ([www.who.int/ifcs](http://www.who.int/ifcs)), UNITAR ([www.unitar.org](http://www.unitar.org)) and FAO ([www.fao.org](http://www.fao.org)).

The Law on Environmental Protection defines that each citizen is entitled to information on the condition of the environment and that information on the condition of the environment is public. Also, the Law on Free Access to Information prescribes the right of access to information under the possession of the authorities. Montenegro ratified the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention).

In the recent years the public began to recognise the environment and its problems as priorities and is showing increasing care of adverse impact of interventions on the environment.

## **5 MECHANISMS FOR EXCHANGE OF INFORMATION AMONG THE PARTIES TO THE CONVENTION**

The responsibility for implementation of the Convention in Montenegro is assigned to the Ministry competent for environmental protection affairs. Therefore, the Ministry of Sustainable Development and Tourism is a contact institution, i.e. through the Ministry enabled is the flow of information towards the Secretariat of the Convention, other international bodies and countries parties to the Convention.

## **6 ACTIVITIES OF NONGOVERNMENTAL ORGANISATIONS**

NGO "Zeleni Crne Gore" were the members of the Task Group for raising awareness and information within the implementation of the project "Development of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs)" – NIP. The Project was approved by GEF on 10 April 2003. The Ministry of the Environment and Spatial Planning appointed the PI Centre for Ecotoxicological Research of Montenegro as Project Implementing Office.

NGO "Zeleni Crne Gore" proposed that the following activities should be undertaken in view of its proper implementation:

- development and distribution of POPs brochures;
- organising questionnaires for representatives of citizens regarding POPs;
- organising three round tables for the North, Central and South region regarding POPs and
- including electronic media and productions of educational shows in cooperation with the Ministry of Education.

As regards the public invitation of the Ministry of Sustainable Development and Tourism to nongovernmental organisations to propose candidates for the Task Group for development of the Proposal National Implementation Plan for the Stockholm Convention, no nongovernmental organisation responded.

## **7 REVIEW OF TECHNICAL INFRASTRUCTURE IN THE COUNTRY IN THE AREA OF MEASURING, ANALYSING, DEVELOPING AND RESEARCHING OF POPs COMPOUNDS**

As previously mentioned, in Montenegro there are sufficient capacities for monitoring and testing of POPs compounds in the environment (CETI and Public Health Institute).

In Montenegro there are possibilities for monitoring of impact on human health. After accidents in 1990's, testing was carried out for the content of PCBs compounds in foods produced in the threatened area of the surroundings of KAP. In addition, analysed was the blood of exposed KAP employees, by the then authorised institution called *Institute for Work Medicine and Radiological Protection* from Belgrade.

It is planned that one of the future priority programs under the implementation of the NIP should be the execution of epidemiological study.

## **8 IDENTIFICATION OF THE POPULATION THAT IS THREATENED BY ADVERSE IMPACT OF POPs COMPOUNDS**

Based on the analysis of the current situation in Montenegro it can be concluded that there is no exact indicator that in a group of persons professionally exposed to organochlorine pollutants there are evidently distinct risky groups. Given that organochlorine pesticides from the group of POPs pesticides in our country are no longer used, it may be claimed with great certainty that there are no professionally exposed persons to organochlorine pesticides.

All the workers working with substations or those working and repairing transformers and capacitors filled with PCBs are a potentially threatened group. In case of potential accidents with transformers and capacitors filled with polychlorinated biphenyls, local contamination may occur at the scale that is difficult to foresee. In such accidents, accidental exposure of a certain part of population usually takes place, and those handling such equipment make a risky group as well as firemen (exposure to PCDD/PCDF) and persons carrying out remediation.

Firemen make a risky group given the exposure to PCDD/PCDF. It is known that at fires of any kind PCDD and PCDF occur, and given the type of work, firemen are persons mostly exposed to smoke after the fire. In Montenegro, there are no data on the level of PCDD and PCDF in the blood of firemen, and such data are missing in the world too.

The property of POPs substances that they are bioaccumulative in fat tissues, primarily is exposing for infants whose mothers have been in contact with any PCBs extracted in milk.

One of the priority monitoring programs that needs to be organised in future is monitoring of daily consumption of POPs substances by population in Montenegro, primarily in case of breast-feeding mothers and population in the surroundings of the sources of POPs substances.

## 9 ACTIVITIES, STRATEGIES AND ACTION PLANS

In the course of developing the NIP, the following objectives and priorities in execution of obligations under the Stockholm Convention have been identified:

1. Establishing institutional responsibilities from the area of POPs compounds and strengthening institutional and sector capabilities for implementation of obligations and reporting.
2. PCB management, elimination of equipment containing PCBs from use by 2020<sup>12</sup> for equipment over 5dm<sup>3</sup>; storing and final disposal.
3. Establishing the systems for POPs waste management, strengthening technical capacities for efficient POPs waste management as to avoid forming and releasing unintentionally produced POPs compounds.
4. Identification and remediation of POPs contaminated locations in an environmentally sound manner.
5. Raising awareness of the public and the level of education, exchange of information on POPs compounds.
6. Creating the base for ensuring funding sources for activities for the area of POPs chemicals, ensuring technical assistance, including defining of mechanisms for implementation of the Stockholm Convention.

Based on the collected data it is established that Montenegro has no issues with POPs pesticides, given that they have not been produced, that they have been used at a very low scale and for a short period of time, and given that there are no their stockpiles, therefore the development of an action plan is not envisaged in line with recommendable activities for prioritisation. The same is relevant for the activities related to DDT elimination which is not present in stockpiles, there are no contaminated areas or polluted environment and food. Therefore, no action plans are envisaged to be developed for the recommendable activities.

The objectives and priorities for execution of the Stockholm Convention are defined in the following action plans in accordance with the recommendations of the Stockholm Convention:

1. Action Plan for institutional and regulatory measures for implementation of the Stockholm Convention and reporting;
2. Action Plan for polychlorinated biphenyls;
3. Action Plan for polybrominated diphenyl ethers (tetra, penta, hexa hepta bromodiphenyl ethers);
4. Action Plan for perfluorooctane sulfonic acid and its derivatives;
5. Action Plan for unintentional formed POPs compounds;

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<sup>12</sup> In accordance with the Law on Waste Management (OGM 64/11).

6. Action Plan for contaminated areas;
7. Action Plan for overall monitoring of POPs chemicals;
8. Action Plan for education, raising awareness and public information and
9. Action Plan for ensuring technical and financial assistance for implementation of the NIP.

### 9.1 Action Plan for institutional and regulatory measures for implementation of the Stockholm Convention and reporting

<b>Establishing institutional responsibility from the area of POPs compounds and strengthening institutional and sector capabilities fro implementation of obligations</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Develop National Chemicals Management Strategy	MSDT, EPA	2014	National Strategy adopted	0.000€
Organising training program for competent authorities for managing and handling waste from pesticides, packagings and PCB waste	MSDT, EPA	2014	Report on completed training	3,000€
Raising awareness of competent state authorities, industry and other entities regarding issues related to POPs equipment, chemicals, waste and unintentionally produced POPs	EPA	2014	Report on completed campaign	0.0€
Raising awareness of MI and EPA and other competent state authorities, industry and other entities regarding issues related to manner of safe final disposal of waste, technique and selection of optimum techniques of remediation of contaminated spaces	EPA	2014	Report on completed campaign	0.0€
<b>TOTAL</b>				<b>3,000€</b>

### 9.2 Action Plan for polychlorinated biphenyls

<b>Establishing the system for phasing out or prevention of release of POPs compounds in the areas of their use</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Development of a manual for identification and safe handling of equipment containing PCBs for persons who perform control and putting PCB and PCB waste out of use	MSDT, EPA	2014	Manual completed	3,000€
Training of persons who maintain equipment containing PCBs	MSDT, EPA, Safety at Work	2014	Training report	3,000€

	Service			
Raising awareness of general population of PCBs and manner of their final disposal	MSDT, EPA	2015	Public campaign report	2,000€
Supplementing of the Law on Safety at Work with the provisions related to PCBs, PCTs and adoption of the rulebook and technical requirements for work with POPs substances	MR, MSDT, EPA,	2016	Published in the Official Gazette	0.0€
<b>Establishing of the system for identification, marking, removal, storing and final disposal of PCB equipment and waste with PCBs</b>				
Development of the brochure on identification of used PCBs in industry of plastics, polymer, paints and coatings and in construction	MSDT, EPA	2015	Brochure completed	1,500€
Establishing of inventory of equipment containing PCBs and PCB waste in Montenegro	MSDT, EPA, EI	2015	Inventory completed	0.0€
Preparation of the report on equipment containing PCBs for EEA in line with the requirements of the SK	MSDT, EPA	2015	Report completed	0.0€
<b>Disposed, decontaminated equipment with PCBs</b>				
Development of the national plan for disposal/decontamination of equipment containing PCBs and PCB waste	MSDT, EPA	2014	Plan completed	0.0€
<b>TOTAL</b>				<b>9,500€</b>

### 9.3 Action Plan for polybrominated diphenyl ethers (tetra, penta, hexa hepta bromodiphenyl ethers)

<b>Preliminary assessment of the situation</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Prescribing ban of the production, use, import and export of octaBDE	MSDT	2015	Regulation adopted	0.0€
Prescribing ban of the production, use, import and export of pentaBDE	MSDT	2015	Regulation adopted	0.0 €
Development of inventory on potential use and stockpiling of octaBDE in the country	MSDT, EPA	2017	Inventory completed	5,000 €
Development of inventory on pentaBDE in the country	MSDT, EPA	2017	Inventory completed	5,000 €

<b>TOTAL</b>	<b>10,000 €</b>
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#### 9.4 Action Plan for perfluorooctane sulfonic acid and its derivatives

<b>Preliminary assessment of the situation</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Prescribing ban of production, use, import and export of PFOS	MSDT	2015	Regulation adopted	0.0 €
Development of the inventory of PFOS in the country	MSDT, EPA	2017	Inventory completed	5,000 €
<b>TOTAL</b>				<b>5,000 €</b>

**9.5 Action Plan for phasing out and elimination of release of unintentionally produced POPs compounds (PCDDS/PCDFS, PeCB, HCB and PCB)**

<b>Phasing out emission of unintentionally produced POPs chemicals in the process of open burning (uncontrolled burning of waste, burning of waste in dumpsters, fires on fields and forest fires)</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Development of regulations for introduction of the fees on production and products that may be potential source of n-POPs	MSDT, EPA	2015	Regulations adopted	0.0€
Review of existing regulations and standards for release of unintentionally formed POPs (n-POPs)	MSDT, EPA, MH, MARD	2016	Review conclusions	0.0€
Information campaign on benefits of replacement of fossil fuel and wood heating by alternative heating systems	MSDT, EPA, MEc, EPCG	2017	Campaign report	3,000€
Establishing and strengthening control over burning on agricultural areas and in forests	AIA; EPA, MIUP, MARD	2017	Penalty prescribed	0.0€
<b>Enhancement of legal, financial and institutional framework in view of preventing / eliminating release of by-products to the environment with application of BAT and BEP</b>				
Tightening the control of work of technical services on control of exhaust fumes from motor vehicles at technical testing	MTMA, EPA, MUP	2015	Control established	0.0€
Improvement of energy efficiency in the sector of transport and construction	MSDT, EPA, MEc, Loc. Self-government	2018	Report completed	0.0€
<b>Raising the level of education and awareness of decision-makers with competent administration authorities, public and its inclusion, decision-making and implementation of measures and reporting system</b>				
Development of the reports on emissions of n-POPs that are submitted to the Secretariat of the Convention.	MSDT, EPA	2014	Report completed	0.0€
Improve and update the inventory of unintentionally formed POPs	MSDT, EPA	2015	Inventory established	10,000 €
<b>TOTAL</b>				<b>13,000€</b>

## 9.6 Action Plan for contaminated areas

<b>Create regulatory and institutional conditions for identification and remediation of contaminated areas</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Training of employees with MSDT, EPA regarding the selection and assessment of efficiency of techniques for remediation of space	MSDT, EPA	2015	Training report	3,000€
Adoption of regulations for acceptable remediation from the aspect of the environment	MSDT, EPA	2015	Regulation adopted	3,000 €
Development of guidelines and instructions for identification and assessment of contaminated locations	MSDT, EPA	2017	Guidelines and instructions completed	3,000€
Identification and assessment of contaminated locations, setting of priorities	MSDT, EPA	2018	Locations identified and assessed, priorities set	10,000€
<b>Develop preliminary studies of areas that are potentially contaminated with POPs substances</b>				
Development of the Study on potentially contaminated locations	MSDT, EPA Expert Team	2018	Study completed	10,000€
<b>Identify, prioritise and remediate contaminated areas</b>				
Development of action plans for treatment of contaminated areas	MSDT, EPA Expert Team	2019	Action Plan	10,000€
Selection of the procedure for remediation of area contaminated with POPs, and remediation technology - BAT/BEP	Expert Team, MSDT, EPA	2020	Procedures defined	30,000€
Remediation of contaminated areas (per location) <sup>13</sup> x 8	Polluter	2021	Location remediation	5- 10,000,000€ (per location)
Assessment and monitoring of effects of remediation of contaminated location	MSDT, EPA	2021	Remediation report	0.0€
<b>TOTAL</b>				<b>≈ 60,071,000</b>

<sup>13</sup> Polluter pays for remediation of contaminated area. The mentioned funds are not allocated from the Budget of Montenegro.

## 9.7 Action Plan for overall monitoring of POPs chemicals

<b>Harmonising, supplementing and developing laws and secondary legislation acts to establish monitoring of POPs compounds in all media of the environment, food and biological matrixes</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Adoption of monitoring program for POPs substances in all media of the environment	MSDT, EPA, MARD	2015	Program adopted	0.00€
Development of the monitoring program for POPs substances in biological matrixes and samples of animal and human origin	MSDT, EPA, MH Institutes and faculties	2015	Program adopted	0.00€
Development of monitoring program for POPs substances in the work environment	MSDT, EPA, MH, ML	2015	Program adopted	0.00€
<b>Implementation of the monitoring program for POPs chemicals in: air, water and sea, soil, biological and human material<sup>14</sup></b>				
Implementation of the monitoring program for POPs chemicals in surface and underground and waste waters	MARD, MSDT, HMSI, EPA	2016	Status report	0.00€
Implementation of the monitoring program for the sea and sediments to the presence of POPs chemicals	MSDT, ZHMS, EPA, Marine Biology Institute	2016	Status report	0.00€
Implementation of the monitoring program for soil to POPs chemicals	MSDT, MARD, EPA	2016	Status report	0.00€
Implementation of the monitoring program for biological material of animal origin (birds and sea mammals) and human origin (breast milk)	MSDT, EPA, MH	2016	Status report	0.00€
Implementation of monitoring of POPs substances in the work environment	MSDT, EPA, MH, ML	2016	Status report	0.00€
<b>Reporting and information to the public and international organisations</b>				
Development of the report on the results of monitoring of the environment and biological material	Institutions that carried out the monitoring, EPA	2017	Report	0.00€
Submission of the report to the line ministry	EPA	2017	Report	0.00€
Development of information on the content of POPs substances in the environment and work environment to the European Environment Agency and the Secretariat of the Convention	EPA	2017	Status information	0.00€
<b>TOTAL</b>				<b>0.00€</b>

<sup>14</sup> Monitoring program for POPs chemicals will be an integrated part of the regular annual Environment Monitoring Program.

## 9.8 Action Plan for education, raising awareness and public information

<b>Development of a detailed program – strategies for public information regarding harmful effects of POPs chemicals</b>				
<b>Measure description</b>	<b>Responsible entity</b>	<b>Timeframe</b>	<b>Indicator/means of verification</b>	<b>Estimated cost</b>
Development and distribution of informative materials for different populations of citizens, children, youth	MSDT, EPA	2014	Material completed	5,000€
Public information on the need to establish storage for hazardous waste and treatment of waste	MSDT, EPA	2015	Report	2,000€
Development of the manual for handling waste from pesticides, packaging and waste from PCBs	MSDT, EPA	2016	Manual completed	5,000€
Public information on the manner of collecting and disposing waste POPs substances	MSDT, EPA	2016	Report	2,000€
Public information on perfluorooctane acid and its derivatives, as well as polybrominated diphenyl ethers	MSDT, EPA	2017	Report	2,000€
<b>Raising awareness of POPs substances</b>				
Organising public polling regarding knowledge of POPs effects	MSDT, EPA	2014	Report	2,000€
Organising television shows with the topic of managing POPs substances	MSDT, EPA	2015	Report	5,000€
Organising public fora or television shows on impact of POPs substances on human health and the environment	MSDT, EPA	2015	Report	5,000€
<b>Defining of the program for continuing education regarding POPs chemicals in administration, industry, schools and faculties</b>				
Organising training and seminars for persons handling POPs substances and waste	MSDT, EPA	2016	Report	10,000€
Development of a manual for identification and safe handling PCB equipment	MSDT, EPA	2016	Manual completed	4,000€
Defining program of continuing education at schools and faculties	MSDT, EPA	2017	Program	0.00€
<b>TOTAL</b>				<b>42, 000€</b>

## **9.9 Action Plan for ensuring technical and financial assistance for implementation of the NIP**

Risks related to implementation of the NIP are mainly connected to financial difficulties that are equally encountered with by polluters and those mostly bearing the costs of improving POPs management and state administration authorities that are responsible to ensure suitable POPs management. The total roughly estimated funds of around 60, 155, 500 million euros for coverage of costs for implementation of obligations under the Stockholm Convention can be provided with the assistance of international sources through donations or very favourable loans for export of waste and procurement of new equipment. For business entities, i.e. polluters whose business affects forming of POPs substances envisaged are costs of around 60 million euros in line with the current regulations to cover the execution of specific measures stipulated by the Action Plan.

The Action Plan for POPs pesticides has not been defined, given that they do not represent problem in Montenegro according to the assessment of local experts.

Assistance for implementation of the obligations under the Stockholm Convention should be ensured from the following funds: GEF (Global Environmental Facility for export of the existing stockpiles of PCBs), UNEP (for financing of strategies), World Bank - WB (for remediation of contaminated areas), UNDP (for structural development, n-POPs).