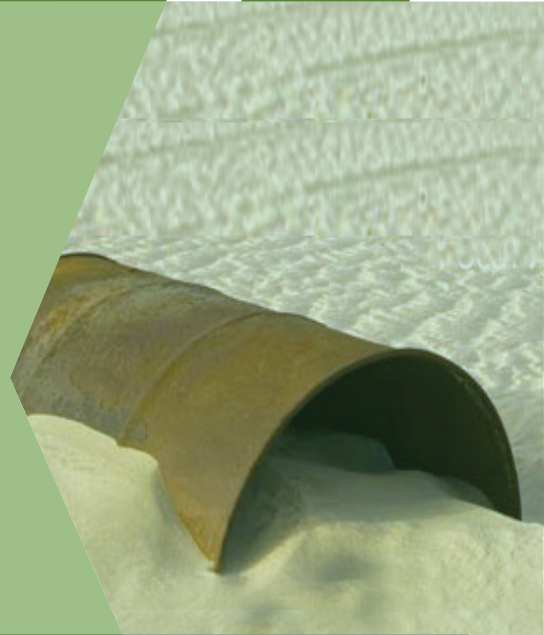




REPUBLIC OF ALBANIA
MINISTRY OF ENVIRONMENT

REPORT

Review and Update of the
National Implementation Plan
for the Stockholm Convention
on Persistent Organic Pollutants
(POPs) in Albania



(Project number: GFL-2310-2760-4E40-2202)

Tirana, 2017



REPUBLIC OF ALBANIA
MINISTRY OF ENVIRONMENT

REPORT

Review and Update of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs) in Albania

(Project number: GFL-2310-2760-4E40-2202)

Tirana, 2017

Background:

Parties of the Stockholm Convention are required to develop National Implementation Plans (NIP) describing how they will meet the obligations set by the Convention. Albanian Government, received through UNEP as GEF implementing agency a support to review and updating of the National Implementation Plan (NIP) for the Persistent Organic Pollutants (PoPs).

National project-executing organization:

Ministry of Environment

Project Director:

Prof.dr. Pëllumb Abeshi

Project Coordinator:

Msc. Rudina Kastrati

Technical Assistance:

Department of Environment and the Sector of Chemical, Noise and Industrial Pollution and Chemicals.

Financing:

This report was financed by the Global Environmental Facility (GEF) through UNEP as GEF implementing agency, and co-financed by the Government of Albania.

For the preparation of this NIP give the contribution:

Prof. Dr. Pellumb Abeshi, Mr. Athanas Karaja, Mr. Mariel Halilaj, Prof.Dr. Sulejman Sulce, Prof. Dr. Ferdi Brahusi, Prof.Dr. Seit Shallari, Dr. Edlira Shahinasi; Msc. Irma Balla; Dr. Erion Laze; Mr. Arben Luzati, Mr. Ismet Bici, Mr. Ilir Belba

Translated:

Msc. Enkelejda Malaj

Design:

petanidesign

CONTENTS

EXECUTIVE SUMMARY.....	7
1. INTRODUCTION.....	23
2. COUNTRY PROFILE OF ALBANIA.....	26
2.1 Country Profile.....	26
2.1.1 Geographic position and natural conditions.....	26
2.1.2. General characteristics of the population.....	27
2.1.3. Political and Administrative Structure.....	28
2.1.4. Profiles of Economic Sectors.....	30
2.1.5. Environmental Overview.....	32
2.2. Institutional, Policy and Regulatory Framework.....	35
2.2.1. Environmental Policy and Legislative Framework.....	35
2.2.2 Roles and Responsibilities.....	39
2.2.3. Relevant International Commitments and Obligations.....	42
2.2.4. Principles of existing Legislation and Regulations addressing POPs....	45
2.2.5. Priority, Problems and Objectives for Institutional and Regulatory Strengthening.....	47
2.3. Assessment of the Current POPs Inventory in Albania.....	49
2.3.1. POPs Pesticides.....	50
2.3.2. DDT and Lindane.....	53
2.3.3. Polychlorinated biphenyls (PCBs).....	54
2.3.4. Unintentionally produced POPs.....	58
2.3.5. PolyBromDyphenyl Ethers (PBDEs): hexaBDE, heptaBDE, tetraBDE and pentaBDE.....	60
2.3.6. The perfluorooctane sulfuric acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF).....	67
2.3.7. Hexabromocyclododecane (HBCD).....	71
2.3.8. Hexabromobiphenyl (HBB).....	75

2.3.9.	Other new POPs (Hexachlorobutadiene, Pentachlorophenol and its salts and esters, Polychlorinated naphthalenes).....	75
2.3.10.	Stockpiles of POPs Waste and Contaminated Sites (SWCS).....	76
3.	STRATEGY AND ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN.....	78
3.1.	Policy Statement.....	78
3.2	Implementation Strategy and Action Plans.....	81
3.2.1.	General requirements for the preparation of action plans on POPs substances.....	81
3.2.2.	Socio-economic assessment for National Implementation Plan (NIP) development and implementation.....	81
3.2.3	Action Plan: Institutional and Regulatory Strengthening Measures....	83
3.2.4.	Action Plan for Polybromodiphenyl Ethers (PBDEs), Perfluorooctane sulfonic acid and related substances (PFOS-PFOSE) and Hexabromocyclododecane (HBCD).....	86
3.2.5.	Action Plan: Other new POPs (Hexachlorobutadiene, Pentachlorophenol and its salts and esters and Polychlorinated naphthalenes).....	87
3.2.6.	Action Plan: PCBs and Equipments Containing PCBs.....	87
3.2.7.	Action Plan: Unintentionally Produced POPs	89
3.2.8.	Action Plan: POPs waste and contaminated sites.....	91
3.2.9.	Strategy for Monitoring, Research and Development.....	92
3.2.10.	Action Plan: Public Awareness, Information Dissemination and Training.....	94
3.3.	Proposals and Priorities for Capacity Building.....	95
3.4.	Summary of Activities and Financial Means needed for the NIP implementation.....	96
4.	ANNEXES.....	98
	Annex 1: POPs listed based on Stockholm Convention.....	98
5.	REFERENCES.....	101

ABBREVIATIONS AND ACRONYMS

APC	Albanian Power Corporation
AUT	Agricultural University of Tirana
BET	Best Environmental Techniques
DCM	Decision of Council of Ministers
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMU	Environment Management Unit
FAO	Food and Agricultural Organization
FID	Flame Ionization Detector
gTEQ/A	gram-Toxic Equivalent/Annum
GoA	Government of Albania
GC	Gas Chromatography
GEF	Global Environmental Facility
GLP	Good Laboratory Practice
HCB	Hexachlorobezene
HPP	Hydro-Power Plant
IAEA	International Atomic Energy Agency
ICCS	International Conference on Chemical Safety
IFCS	Inter-governmental Forum on Chemical Safety
ILO	International Labor Organization
INSTAT	Institute of Statistics
IOMC	International Organization for the Sound Management of Chemicals
IPCS	International Program on Chemical Safety
IPH	Institute for Public Health
IPM	Integrated Pest Management
IPPC	Integrated Pollution Prevention and Control
ISIC	International Standard Industrial Classification of all Economic Activities
LG	Local Government
MoARDWA	Ministry of Agriculture, Rural Development and Water Administration
MoE	Ministry of Environment
MoEI	Ministry of Energy and Industry
MoF	Ministry of Finance

MoH	Ministry of Health
MoTI	Ministry of Transport and Infrastructure
NCC	National Coordination Committee
NEA	National Environment Agency
NEAP	National Environment Action Plan
NGO	Non-Governmental Organization
NIP	National Implementation Plan for POPs
ODS	Ozone Depleting Substances
PC	Personal Computer
PCB	Polychlorinated biphenyl
PCCDF	Polychlorinated dibenzofurans
PCDD	Polychlorinated dibenzo-dioxins
PCP	Pentachlorophenol
PCU	Project Coordination Unit
PIC	Prior Informed Consent
POPs	Persistent Organic Pollutants
ppm	Part per million
PPP	Product of Plant Protection
PUT	Polytechnic University of Tirana
SMEs	Small and Medium Enterprises
SWCS	Stockpiles, Wastes and Contaminated Sites
TPP	Thermo Power Plant
UN	United Nations
UNDCP	United Nations Drug Control Program
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNITAR	United Nations Institute for Training and Research
UT	University of Tirana
VOC	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

This updated National Implementation Plan (NIP) constitutes an important document for the Albanian Government, as it provides an assessment of the current inventory and legal, institutional, technical aspects of Persistent Organic Pollutants (POPs) management in Albania. It was prepared based on UNEP methodology for developing, reviewing and updating NIP. All institutions and stakeholders involved in POPs management in Albania were offered the opportunity to contribute to the preparation of the NIP and integrate their views in the final updated version of the NIP.

Stockholm Convention on Persistent Organic Pollutants was signed in 2001, as an added concerted effort to protect human health and the environment; with the aim to limit and eliminate the dangers originating from POPs. Albania has signed the above Convention on December 05, 2001 and ratified it on October 04, 2004. The POPs Convention sets a number of obligations that all parties should or are encouraged to undertake, including designating a national focal point, fostering information exchange, providing technical assistance, promoting and facilitating public awareness and participation, consultation and education, stimulating research and monitoring, and reporting “at periodic intervals”.

The main objective of current NIP is the identification of the current situation on POPs in Albania, in order to facilitate the possible planning of measures and strategy for reduction, prohibition and elimination of identified POPs.

National General Information

Albania is a small country located in the western part of the Balkan Peninsula, on the eastern coasts of Adriatic and Ionian Seas. Its territory lies between northern geographic latitudes 42°39' and 39°38' and eastern geographic longitudes 21°4' and 19°16'. The total surface of Albania is 28'748 km², of which 27'398 km² land and 1'350 km² water. The geographic position of Albania determines the inclusion of the territory in the subtropical Mediterranean climatic area, characterized by mild and wet winters, and hot and dry summers; with greater precipitations prevailing mainly during the colder half of the year.

The Gross Domestic Product in Albania was last recorded in 2015, at 4541.39 US dollars per capita. Agriculture remains one of the largest and most important sectors in Albania. Agriculture is a main source of employment and income, especially in the country's rural areas. Agriculture contributes to 18.9% of the country's GDP. The industry sector has contributed steadily with about 11% of GDP. The main industrial activities in Albania are the oil and gas extraction industry, processing industry, light industry, food and beverage industry, cement production, metallurgy and mining.

Albania is rich in various energy sources, oil and gas, coal and other fossil fuels, as well as hydro-power, forests natural biomass and other renewable energy sources; with the energy sector contributing to about 10% of GDP. Other GDP contributors include other sectors of the economy, such as: services, construction, transport and communication, etc.

Environmental Overview

Albania has inherited multiple environmental problems from the past, including: soil erosion, deforestation, biodiversity loss, lack of a decent urban waste infrastructure, air pollution in urban and industrial areas, soil pollution caused by hazardous waste from the old industry, etc.

The State of Environment Report (SoER) is annually prepared by the National Environment Agency (NEA). The State of the Environment Report is the major official document which examines the overall state of the environment in Albania, and gives recommendations for environmental policy planning on an annual basis.

Air quality in Albania varies greatly according to the location: in rural and mountainous areas the air is clean, while in main cities, major urban areas, and in the vicinity of industrial areas the air quality is far poorer. The monitoring of urban air quality is focused on indicators for: PM10, PM2.5, O₃, NO_x, SO₂, CO and Benzene. Based on the data assessment over the last years in Tirana, a decrease of about 20% has been observed at the concentration level of PM10 and PM2.5. This is due to infrastructure improvements and to several legislative measures undertaken related to the standardization of used cars and vehicles. At national level, the concentration of CO and Benzene are at levels within the EU standards.

Albania is rich in water resources. Data from the monitoring of surface and groundwater, as well as of the coastal bathing waters show an improvement of the water quality in the last years, as a result of some recent investments in the wastewater treatment infrastructure.

Albania has a high level of biological diversity, in spite of its relatively small surface area; with variations in landscape, ecosystems and species.

Generation of urban solid waste and industrial waste has demonstrated a growing trend over the past years, due to, among other reasons, a radical change in the social behavior, as a consequence of changes in lifestyle and industry growth.

Organic waste constitutes the major component in the overall urban waste. Waste management mainly consists in depositing them in landfills and other collection sites officially approved by the relevant local government bodies.

A new law on environmental protection was approved and entered into force in 2012. Its objective was to raise the level of environment protection by establishing a consolidated network of environmental institutions at national and regional level, linked with environmental policy implementation.

In general, Albania has demonstrated progress in environmental issues, regarding the management of environmental problems; however many more concentrated efforts are required, particularly with respect to the implementation and enforcement of the environmental legislation. In particular, water treatment and waste management are at early stages of their development.

Environmental Policy, Institutional and Legislative Framework addressing POPs

Based on the Albanian Constitution, national institutions are responsible for the maintenance of a healthy environment, ecologically suitable for the present and future generations.

Primarily, environmental policy responsibility in Albania lies with the Council of Ministers. Other main responsible institutions for environmental issues include: the *Ministry of Environment* (MoE), whose mission is to develop and propose policies, legislation and strategies, to coordinate and prepare action plans for the environmental protection, grounded on sustainable development. For certain environmental issues, the responsibility lies with some ministries and state agencies, at central and local levels. The National Environment Agency (NEA) was established in 2014 and is a central public institution, independent in its decision making process and exercising jurisdiction in the entire territory of the Republic of Albania. Also, at local level, subordinate local authorities, such as Regional Environmental Departments and Local Inspectorate Units, are in place, including staff charged with taking respective measures to avoid health and environment damage from chemicals.

In the last decade, and especially since 2001, a number of laws and other legal acts on the environment have been drafted and approved. The Albanian national legal framework is largely harmonized with the EU legislation. The Albanian legal framework regarding environmental issues is based on the Constitution of the Republic of Albania and consists of laws and regulatory acts, such as Decisions of the Council of Ministers (DCM), ministerial acts, regulations, guidelines and standards.

Besides the Albanian legal framework, the Republic of Albania respects the international obligations deriving from international conventions and agreements ratified by the Albanian State, such as the Stockholm Convention on Persistent Organic Pollutants, ratified by Law Nr.9263, dated 29.07.2004.

The legislation concerning chemical substances in the Republic of Albania regulates the management of substances and chemical preparations, plant protection substances, explosive substances, gas and liquid inflammable substances, hazardous substances, ozone depletion substances, persistent organic pollutants, etc.

The first national regulation addressing POPs is the DCM No.860, dated 20.12.2006, "On adopting the national implementation plan on banning of use and elimination of persistent organic pollutants", which aimed the rehabilitation of several environmental hotspots, some of which contaminated with POPs, including the transportation of large amounts of chemicals for incineration to other countries.

Another important national regulation addressing POPs is the DCM. No 360, dated 29.04.2015, "On approval of the list of Persistent Organic Pollutants and the establishment of measures for the production, importation, trade and their use", which is intended to protect both the human health and the environment from Persistent Organic Pollutants (POPs). This DCM is based on the principle of prevention, through: a) the prohibition, the disposal of POPs or restricting the production, placing on the market and use, as set out in this decision; b) reduction of emissions into the environment of POPs up to their elimination; c) waste management, for those products whose composition either contains or are contaminated with POPs.

Also, DCM 387, dated 06.05.2015, "On approval of rules to control the disposal of PCBs, decontamination or disposal of equipment containing PCBs and / or disposal of waste PCBs used", is intended to regulate the disposal of PCBs words, decontamination or disposal of equipment containing PCBs and / or the disposal of used PCBs in order to completely eliminate them in Albania.

The following are identified as issues that call for consideration, with respect to the existing institutional framework in Albania:

- A careful assessment of the existing bodies and structures, as the most important acting mechanisms, to find out their individual relevance with the obligations of the POPs Convention;

-
- Reassessment and update of the concrete obligations, that relevant institutions currently have in relation to POPs management, in accordance with their functions, competencies and responsibilities;
 - The design of the new institutional scheme, which would involve all structures and bodies at central and local level, the definition of roles, functions, responsibilities, competencies and duties of each of them, their relationships and the functioning rules of the whole system;
 - The designation of the contact points and focal points at national and local and/or sectorial level, which altogether constitute the National POPs Network;
 - The contact points and focal points shall build their communication scheme among them, as well as they will prepare operative programs how to perform their respective duties and obligations.

With respect to the responsibilities for the implementation of the Stockholm Convention, we suggest that it is necessary to take a number of steps, such as:

- Improvement of the national legal framework for POPs issues;
- Increased institutional capacity at central and local levels;
- Evaluation and establishment of a national POPs inventory and periodical updating;
- Developing, updating and implementing a national plan for sustainable management of these chemicals, in order to reduce negative impacts on human health and the environment.

Assessment of the Current POPs Inventory in Albania

POPs Pesticides

Current assessment of POPs pesticides inventory was mainly based on new POPs pesticides; since the inventory for other POPs pesticides in Albania, listed in the Stockholm Convention in 2001, was presented during first NIP in 2006.

New POPs pesticides are:

chlordecone, alpha hexachlorocyclohexane, beta - hexachlorocyclohexane, lindane, pentachlorobenzene and endosulfan.

The data on use and trade of these new POPs pesticides is obtained from the Ministry of Agriculture, Rural Development and Water Administration, trade companies, customs offices, and farmer associations. The obtained data show that out of all the new POPs, which are used as pesticides, *Endosulfan* is the only pesticide that was imported, traded and used in our country during the last decade. The import of Thiodan in Albania continued until 2005, the year when its import was banned. The amount of Thiodan used in Albania during the years 2004-2007 was at 7820 liters. Based on this data, it can be presumed that the residues of Endosulfan in the environment are not significant.

DDT and Lindane

DDT and hexachlorocyclohexane/ lindane were removed from Albania in the framework of the Project “Repackaging and removal of pesticides and chemicals from Albania, Bishti i Pallës”, funded by the Dutch Government; and this process was finalized in July 2006.

During inspections of the contaminated sites with possible residues of these pesticides, especially in Porto Romano, it was observed that after waste removal, the former central area of Lindane production was surrounded and encapsulated (cemented); and in principle such an encapsulation prevents further contamination of the surrounding area.

But because of previous emissions of pesticides in the air, water flows and soil, and also taking in consideration the high persistence of these compounds, one comes to the conclusion that it is necessary to undertake monitoring of the surrounding area and sampling of the soils, waters, plants and animal organisms, as well as blood samples, for POPs residues.

Findings and recommendations

- ✓ There are no physical quantities of POPs pesticides in our country and there are no stocks;
- ✓ There is not an evaluation and monitoring of pesticide residues in the environment, or their transport in plant and animal organisms.
- ✓ Analyses of impurity of imported pesticides in our country are not performed; as a result they may contain POPs pesticides.
- ✓ There is a need to undertake studies on the state of POPs pesticides in the environment, in order to take appropriate measures to reduce/eliminate them from contaminated areas;
- ✓ Monitoring of POPs pesticides, especially in contaminated sites and identified

- hotspots, must be included in the program for national monitoring of the environmental state in our country;
- ✓ The qualitative and quantitative analysis of imported/traded pesticides must be performed not only for active substances of pesticide, but also for the impurities or their waste for possible presence of POPs pesticide.

Polychlorinated biphenyls (PCBs)

The state or PCBs inventory in our country mainly covers their presence in transformers/condensers used in the energetic system. The current energy system consists of the Albanian Power Corporation (APC), the Transmission System Operator (TSO) and Operator of Electricity Energy Distribution (OEED). Information on the energy transformers condition and the possibility of PCBs presence was obtained from the above mentioned operators/entities, who report that such presence is found in old transformers/converters produced before 1990.

It is these operators/entities that possess data on the current inventories of energy transformers used in the energy sector in our country. Their data shows that the total number of transformers used in the energy sector is about 12789, while the total quantity of transformer oil is about 8,679,542 liters.

About 47% of the total number of the transformers is manufactured before 1990 (about 6,000 units), and the average age of transformers is much greater than 28 years. About 97% of the transformers are small transformers, placed in electrical cabins, owned by OEED.

From the first inventory data on PCBs, it came out that 5.3% of the expected amount of oil was contaminated with PCBs, mainly found in small transformers, belonging to the OEED. APC has mainly new transformers produced after the year 1990, which are not contaminated with PCBs, and when refilled, oil free of PCBs, is used.

Power facilities in Albania are still using quite old transformers manufactured before 1990, which have caused environmental pollution, especially in soil and water, due to oil spills, spills during maintenance or due to their old age.

Special attention should be paid to the most contaminated areas of oil transformers, such as transformer repairing areas, which are owned and managed by the OEED, and the oil treatment plant area, in Tirana, managed by the TSO.

Findings and recommendations

- Due to the use of very old transformers, their repair and maintenance does not entirely meet standard conditions, and as a result some areas around transformer sites, or repairing workshops or adjacent areas manifest oil spills

and potential contamination with PCBs of the surrounding environment. This fact is observed, especially in transformers' repairing facility in Tirana, which is the central facility for the repair of all damaged transformers, coming from all around the country, and in the Oil Treatment Plant in Tirana.

- According to the inventory data, the presence of PCBs in our country is relatively low, but a comprehensive study should be performed to analyze the presence of PCBs, not only in transformer oils, but also in soil, sediments, water and organisms.
- Necessary measures have to be undertaken for the rehabilitation of oil-contaminated areas from electrical equipment and, potentially, with PCBs.
- Functioning of a monitoring system for controlling equipment with PCBs and analysis of environmental systems on the potential presence of PCBs, seeking to implement measures that lead to the reduction/elimination of PCBs in the environment.

Unintentionally produced POPs

The inventory of PCDD / PCDF is based on the methodology provided by UNEP: "Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs, January 2013". According to this methodology 10 potential sources of unintentionally produced POPs emissions, with emissions in air, water, land, products and waste, are expressed in grams of toxicity equivalent per year.

Data summary of the current inventory of potential emissions of unintentionally produced POPs showed that about 49 g TEQ/year are released in our country.

The uncontrolled open burning of waste is still the main source (with 40%) of POPs emissions that are produced unintentionally into the environment. There is a reduction of contribution of uncontrolled waste open burning on the total emission of unintentionally POPs, compared to the first reported inventory in 2006, from 73.54% to 40%, due to some measures taken on waste management in Albania. Burning waste in combustion plants or incinerators is also an emission source of unintentionally produced POPs in the environment by nearly 13%, with the major contribution coming from hospital waste burning.

Findings and Recommendations

- ✓ Uncontrolled waste burning is considered the main contributor to the emissions of unintentionally generated POPs in the environment.
- ✓ Waste burning in incineration plants is also a source of environmental emissions

of unintentionally produced POPs, where hospital waste burning emits the largest portion.

- Appropriate measures have to be taken on waste management, in order to reduce unintentionally POPs emissions in the environment, especially for uncontrolled urban waste and hospital waste burning.

PolyBromDyphenyl Ethers (PBDEs): hexaBDE, heptaBDE, tetraBDE and pentaBDE

PolyBromDyphenyl Ethers (PBDEs) are a group of aromatic brominated organic compounds, which are widely used in the electronics industry for producing plastic skeletons of computer hardware and in the transportation industry for the production of warheads in vehicles. For the PBDEs inventory development, the PBDEs working team used the UNEP “Guidance for the inventory of polybrominateddiphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants”.

The inventory data showed that a total of about 2130 kg PBDEs are estimated in electronic and electrical equipment (EEE) and the main amount (1999 kg) is on used/sold EEE. The quantity of POPs - PBDEs that passes as waste was higher (128.25 kg) than the amount of POPs -PBDEs entering the country through import (3.22kg).

Inventory data showed that a total amount of 28952 kg PBDEs was in transport vehicles and the major amount of POPs PBDEs comes from cars manufactured before 2005 (about 25,077 kg) compared to vehicles manufactured after 2005 (about 127 kg).

Findings and Recommendations

- The main source emissions of POPs-PBDES in the environment come from old electrical and electronic equipment, mainly computers and CRT TVs, as well as transport vehicles produced before 2005, because these goods have the highest content of PBDEs compounds.
- Reducing the use of computers and CRT televisions and vehicles produced before 2005 is necessary to reduce/eliminate emissions of POPs-PBDES in the environment.

The perfluorooctane sulfuric acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)

PFOS and its salts are used in several economic sectors. Their inventory, first of all, is based on determination of the sources where these compounds are present and after that the collected data is used for calculation of PFOS amounts. For the PFOS inventory

development, the PBDEs/PFOS working team used the UNEP “Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants” (UNEP 2012).

The calculated amount of PFOS varies from 186.75 kg/year to 12552.5kg / year or the average amount of exposed PFOS is 7208 kg/year. The main source of pollution comes from the use of kitchen paper, packaging and various cardboards ranging from 500 kg/year up to 5000 kg/year, followed by synthetic carpets; textiles and tapestry, and leather use, also, at 250-2500kg / year; 200-2000 kg/year and 150 - 1500 kg/year respectively.

Findings and Recommendations

- The main sources of emissions into the environment in our country of perfluorooctane sulfonic acid (PFOS) and its related substances are cartons, packages and plasticized letters, leather products and hydraulic fluids, etc.,; However this compound has not been used as pesticide.
- Quality Control of those products that may contain PFOS is important to reduce/ eliminate emissions of POPs-PFOS and its related substances in the environment.

Hexabromocyclododecane (HBCD)

The main application of HBCD is in polystyrene foams, widely used in construction and buildings for insulation purposes. These types of insulation foam can also be found in transport vehicles, road or railway embankments. This polystyrene foam is found in two forms and contains 0.7 to 3% HBCD. The most important second application is in textile coverings, where HBCD can be found in concentrations ranging from 2.2-4.3%. Another application, though smaller, is in electrical and electronic devices, where the concentration of HBCD ranges from 1-7%.

The inventory of HBCDs, at national level, as in all cases of inventories of persistent organic pollutants is based on the UNEP methodology.

The obtained data shows that the people are widely exposed to HBCD; with the majority of the pollution coming from textiles used in household furniture. Furthermore, it should be noted that the amount of HBCD coming from textiles and furniture is higher than the total amount of HBCD that comes from the construction sector, respectively **11,990 kg** from construction and **76,940 kg** from textiles of household furniture.

Findings and Recommendations

- The greatest HBCD pollution comes from textiles used in furniture and household facilities, followed secondly by the construction sector.
- Filling materials used in the construction sector should be checked for quality of goods, especially with respect to the presence of HBCD.

- Control of textiles and filling materials quality that may contain HBCD is important to reduce/eliminate emissions of POPs- HBCD in the environment.
- Control and continuous monitoring of emission sources of POPs is necessary to preserve the environment and human health, as these compounds are harmful to the environment and dangerous to the human health.

Hexabromobiphenyl (HBB)

Due to the low production and limited use of HBB, most materials containing HBB were disposed off decades ago (PBDEs Guidance, UNEP 2012), therefore this substance is not the subject of the inventory and action plan.

Other new POPs (Hexachlorobutadiene, Pentachlorophenol and its salts and esters, Polychlorinated naphthalenes).

These compounds were never produced in Albania, due to the lack of the appropriate industry, but they could be imported and used decades ago, before their production was stopped, in other countries as well. The working group could not find available data about their import, use and emission in the environment.

However, an inventory and action plan could be planned for these compounds, especially for Pentachlorophenol and its salts and esters (PCP), which are believed to have been used in Albania in the past.

Stockpiles of POPs Waste and Contaminated Sites (SWCS)

Two main tasks were reported in the first national implementation plan to be completed, namely:

- Site investigation and development of remediation plans for the potentially contaminated sites;
- Field studies, sampling and analysis, determination of priorities, data processing and evaluation of the cost for rehabilitation projects of contaminated sites.

As of today, both these tasks are not fully completed and they require the attention of the Ministry of Environment and other responsible institutions to ensure full completion.

Strategy and Action Plan Elements of the National Implementation Plan

Based on the current situation of POPs in Albania, some action plans for the elimination, reduction and management, according to requirements of the Stockholm Convention, were identified, as follows:

- ✓ Define institutional responsibilities at national and regional level for the elimination/reduction and management of POPs compounds, strengthen institutional and capacity building and sector implementation of the Convention and reporting obligations;
- ✓ Create a management system and strengthen technical capacity for elimination / reduction of waste generating POPs substances, in order to avoid unintentional release in the environment;
- ✓ Update all documents (for internal use in Albania) in accordance with the Stockholm Convention List (new chemical substances updated in the Annexes A, B and C) and undertake appropriate measures to control production, transit, import and export of POPs;
- ✓ Draft necessary by-laws, in accordance with the relevant directives of the European Union, (based on the Law on chemicals-2015) on the environmental management of POPs, including the rates of POPs in the environment components, emissions/release from economic activities, monitoring and limits on food products;
- ✓ Assign appropriate institutions for monitoring POPs in the environment (air, water, soil and biota) and other state bodies responsible for carrying out monitoring (sampling and related analyzes);
- ✓ Inform through various forms and means of communication on the state of environment and health consequences of the presence of POPs, by central and local institutions in charge, industrial stakeholders and respective research centers, in particular, on the effects of dioxins and furans;
- ✓ Provide necessary funding to increase institutional capacity, technical assistance, determine the safest mechanisms for the implementation of the Stockholm Convention and necessary environmental monitoring, mainly through Government funds;
- ✓ Strengthen cooperation, enhance exchange of scientific information on POPs for their best management, make use of the Best Available Technologies (BAT) and eco-friendly or Best Environmental Practice (BEP);
- ✓ Eliminate and ban use of PCBs containing equipment.

Objectives and priorities for the implementation of the Stockholm Convention are set out in the following action plans in accordance with the recommendations of the Stockholm Convention:

1. Action Plan for complementary institutional and regulatory measures to implement the Stockholm Convention and reporting;
2. Action Plan for PBDEs, PFOS, PFOSF and HBCD;
3. Action Plan for Other new POPs;
4. Action Plan for PCBs and PCB containing equipment;
5. Action Plan for compounds / processes that generate unintentional POPs substances;
6. Action Plan for the contaminated sites;
7. Action Plan for general monitoring of POPs chemicals;
8. Action Plan for education, awareness and public information.

Based on the current environmental legislation and policy, approved POPs regulations, obligations deriving from the Stockholm Convention and other international environmental agreements, the following measures on **Institutional and Regulatory Strengthening** are suggested:

- POPs chemicals need to be included in the national monitoring program;
- Harmonization of national environmental legislations with EU legislation needs to continue;
- Establishment and full operation of the “Chemicals Office” needs to come about; along with the “National register of imported chemicals”, “Inter-ministerial committee on chemicals” and drafting of other related regulations on chemicals and POPs management.

Action Plan for PBDEs, PFOS-PFOSF, HBCD and other new POPs

NIP for these substances should also include the following measures:

- Inventory of all equipments/machineries, which contain PBDEs; PFOS-PFOSF, HBCD;
- Identification of imported equipments which contain these chemical compounds;
- The establishment of the database according to the specifications of products / equipments;
- The establishment and improvement of the legal framework for their management and elimination/reduction;
- Elimination of industrial and commercial waste that contains these POPs chemicals.

Action Plan for PCBs and Equipments Containing PCBs

The following specific measures for PCBs need be included in the NIP:

- Regulations related to the management, treatment, monitoring, removal and disposal of oil and equipment contaminated with PCBs should be elaborated and enforced;
- Internal rules on transformer management, handling and removal from work should be redefined and implemented;
- Training of staff responsible for handling and maintenance of transformers should be planned;
- Capacities for semi-quantitative analysis (by using test-kite) need to be established in order to estimate PCBs content in old transformers' oil;
- A national laboratory for analysis of PCBs in transformer oil and in different matrix should be established;
- Public awareness increase on the dangers of PCBs substance;
- Identification of contaminated sites and PCBs rehabilitation;
- Disposal of mineral oil contaminated with PCBs;
- Design and put in place a monitoring program of PCBs at national level.

Action Plan for Unintentionally Produced POPs

With respect to the unintentionally produced POPs, the following specific measures regarding their management are suggested:

- Completion of legislation and regulations concerning industrial pollution prevention, control, and waste management;
- Strengthening institutional capacities (human and technical) responsible for waste management, (in particular sound management of landfills and prevention of open burning);
- Adoption of an Action plan to reduce dioxin and furan emissions from landfills and waste combustion;
- The application of the best techniques and best management practices in industrial and construction sector;
- Development and implementation of a national medical waste management system that significantly reduces unintentional POPs emissions;
- Enhancement of public awareness on environmental waste management;
- Regular updating of the emission inventory of unintentionally produced POPs.

Action Plan for POPs waste and contaminated sites

Based on the current situation on POPs waste management and contaminated sites, the proposed measures for better management of waste and rehabilitation of contaminated sites are as follows:

- Strengthening of legal and institutional capacities for POPs waste management at the local and national level;
- Final rehabilitation of contaminated sites with POPs through the development of specific remediation plans for each site, according to their level of contamination.

Strategy for Monitoring, Research and Development

Application of POPs monitoring will allow a better understanding of the situation on the concentration of POPs in main components of the environment, the contribution of various economic activities in the environmental pollution from this category of hazardous chemicals, risk analysis, and based on this a subsequent assessment on the appropriate measures which need to be taken to contribute to the improvement of the environment and achieving better environmental standards.

In this context, the following measures have to be undertaken:

- Monitoring of POPs in different areas, with the media as a part of the national monitoring program;
- Strengthening of institutional capacity for research and development on POPs issues.

Action Plan for Public Awareness, Information Dissemination and Training

The following measures have to be undertaken in order to increase public access to information on relevant POPs compounds and raising their awareness:

- Raising awareness in communities, dissemination of information to the general public, and enabling easy access and engagement of NGOs network in documents and analytical data related to the risks of POPs and their effects on human health and the environment;
- Training of staff who deal directly or are in direct exposure to the use of POPs substances;
- Engaging the media in environmental issues related to POPs compounds;

Introduction of POPs issues in school programs.

Priorities and Proposals for Capacity Building

Priority needs for capacity building to support compliance with Convention provisions and achieving of NIP objectives, are highlighted below as priority areas of particular importance:

1. Establishment of the POPs unit under MoE, whose main responsibilities should be to:
 - Monitor the fulfillment of obligations deriving from the Stockholm Convention and policies related to POPs;
 - Coordinate the activities of various ministries addressing POPs, and ensure exchange of information;
 - Monitor the completion of environmental legislation in line with EU Directives on POPs;
 - Monitor the implementation of consultations among institutions and experts, regarding those activities that are implemented with the goal of banning and eliminating POPs, and rehabilitating polluted areas.
 - Appraise POPs-related projects.
2. The Council of Ministers should identify relevant institutions tasked with the implementation of the POPs monitoring program, in order to fulfill the obligations deriving from the Stockholm Convention.
3. The Ministry of Energy and Industry should ensure the technical capacities for PCBs managing, substituting of oil containing PCBs and the equipments using such oil, and eliminating the oil in an environmentally safe way.
4. Relevant ministries and MoE should draft procedures/regulations for safe storage of POPs (mainly oil containing PCB) and POPs containing equipments until their ultimate elimination.
5. Preparation of studies and projects for the elimination of POPs waste or contaminated materials with POPs.
6. Organization of training events and seminars with various stakeholders on issues related to monitoring, control, safe storage and elimination of POPs.
7. Raising public awareness of POPs impact on human health and the environment.

Financial Means needed for the NIP implementation

Financial means needed for the NIP implementation during the 2016-2021 periods are foreseen to be **618,500.00 EURO**.

The required funds for NIP can be provided by different financial sources as national state budget funds, EU funds, national and international environmental organization or institutions, private donations, etc.

1. INTRODUCTION

Persistent Organic Pollutants (POPs) are chemicals that persist in the environment and pose high risk of adverse effects to human health and the environment. The POPs pesticides are used worldwide in industry, agriculture, communication, etc. well-known

Recognizing the big role of chemicals in improving the quality of life, it is, also, quite well-known that every chemical can have adverse effects, depending on its properties and on exposure level. Thereby, international and national efforts are focused on the control of chemicals related risks through sound management of chemicals throughout their lifecycle, through: (i) finding less hazardous alternatives, (ii) reducing the exposure, (iii) managing their trade and (iv) improving environmental hazard communication.

Since POPs do not easily degrade and can be found in soil, lakes, water, fish, animals, plants, food and people for a long time after they are used, they can easily move through the food chain, from one country to another and from abiotic environmental part to biota environmental part.

Numerous studies confirm the toxicity of different POPs to humans. In addition, scientists recognize that POPs can cause these health problems in animals that are commonly used to predict risk to humans. Dioxin is also internationally recognized as a known human carcinogen.

The pollution of the human body by POPs has occurred together with the appearance of several alarming trends in human health over the past few decades. There has been a precipitous rise in breast cancer, and many studies showing dramatic increases in disorders of the reproductive organs.

The Stockholm Convention was prepared in 2001, as a concentrated effort to protect human health and the environment, with the aim of limiting and eliminating the dangers from POPs. Until today, 152 countries have signed the Stockholm Convention, while 179 countries have ratified it.

Albania has signed the Convention on December 05, 2001 and ratified it on October 04, 2004. The POPs Convention sets a number of obligations that the parties shall or are encouraged to undertake, including designating a national focal point, fostering information exchange, providing technical assistance, promoting and facilitating public awareness and participation, consultation and education, stimulating research and monitoring, and reporting “at periodic intervals”.

The most important measures that the countries which have signed the Convention have to apply for the reduction of the emissions of the above-mentioned pollutants, based on the Convention provisions, are:

- a) The application of Best Available Techniques (BAT) in industrial installations (Article 5).
- b) The promotion of the development and, where necessary, the demand for the use of substitute or modified materials, products and processes for the prevention of the formation and release of the chemicals of Annex C to the environment (Article 5).
- c) The reduction of POPs emissions from pesticide stocks, as well as from waste (Article 6).
- d) The preparation of the National Implementation Plan of the Convention’s provisions from the countries that have signed it (Article 7).
- e) The application of measures for the promotion of public information regarding the Convention’s provisions (Article 10).
- f) The carrying out of a study and control of the sources, emissions and levels of POPs in the environment and human health (Article 11).
- g) The submission of reports to the conference of the member states through the Secretary/Secretariat regarding the implementation of the Convention (Article 15).
- h) The evaluation of the effectiveness of the Convention (Article 16).

The Convention provides also for the procedure to be followed for the classification of other chemicals in the catalogue of POPs in the future.

The main objective of the current NIP is the identification of the situation on POPs in Albania, in order to make it possible for the preparation of measures and a strategy for reduction, prohibition and elimination of identified POPs.

Specific objectives of NIP are as following:

- To identify and gather information on possible options for management of POPs in order to meet the obligations under the Stockholm Convention (and

the respective obligations under Rotterdam and Basel Convention) assessing the limitations, costs and benefits of each option;

- To analyze the inventory data on identifying the main sources, fields and economy sectors related to the use and emissions of POPs from industry, agriculture and other sectors of the economy, as well as from non intentional products;
- To set priorities on actions needed to meet requirements of the Stockholm Convention and the objectives of the country;
- To develop an updated draft of National Implementation Plan (NIP) in order to fulfill the needs and objectives of the Stockholm Convention and specific requirements of country, coordinating with other national activities of sustainable development;
- To identify requirements for needs in order to perform the assessment and the collection of the necessary information and to implement NIP.

2. COUNTRY PROFILE OF ALBANIA

2.1. Country Profile

2.1.1. Geographic position and natural conditions

Albania is a small country located in the western part of the Balkan Peninsula, on the eastern coasts of the Adriatic and Ionian Seas. Its territory lies between northern geographic latitudes $42^{\circ}39'$ and $39^{\circ}38'$ and eastern geographic longitudes $21^{\circ}4'$ and $19^{\circ}16'$.

The surface area of Albania is 28,748 km², of which 27,398 km² land area and 1,350 km² water (figure 1). State border length is 1,094 km, of which 657 km are land borders, 316 km sea borders, 48 km river borders, and 72 km lake borders. Albania shares its northern borderline with Montenegro and Kosovo, the eastern borderline with FYR of Macedonia, and the southern and southeastern borderline with Greece. About 75% of Albania's territory is hilly and mountainous, at more than 300m above the sea level. The highest peak is the Korabi Mountain (2,751 m). The rest of the territory consists of coastal plains or low hills.

The geographic position of Albania determines the inclusion of its territory under the subtropical Mediterranean climatic area, with mild and wet winters, hot and dry summers and precipitations concentrated mainly during the colder half of the year. The influence of the



Figure 1. Map of Albania
(source Wikimedia Commons)

Sea can be felt along the west shore; while further eastwards it gets weaker, with lower temperatures and less precipitation. Generally, the climatic elements differ significantly among different areas of the country, particularly temperatures and precipitations.

Albania boasts a vegetation coverage rich in a high diversity of species, which grouped according to their value, can be divided into: vegetation for timber, firewood, pastures, for industrial use, for medicinal purposes, for decoration purposes, etc. Mediterranean bushes cover about 42% of the country's surface (mainly found in the western and south-eastern parts of the country). Fauna is diverse, too. A number of endemic species are present, as well. Among the carnivores, the following are found: wolf, fox, jackal, brown bear, wild cat, etc. Herbivores, such as: deer, wild goat, wild pig, wild rabbit, etc. are of particular importance. Around 350 bird types exist in Albania. Numerous fish species of considerable economic value are found in both the marine and inland waters. However, fauna has suffered loss, caused by irrational hunting, deforestation, reclamation of wetlands and marshlands, use of chemicals in agriculture, soil and water and air pollution.

2.1.2. General characteristics of the population

Albania reached 3,182,417 inhabitants by 1990s, and this growth in population was the result of natural growth. After 1990s, the total of the population and other demographic processes were greatly influenced by massive migration and social economic conditions. The overall population of Albania is homogenous. During 1960-1990, Albanians constituted 97% of the population. The rest was Greek (1.85%), Macedonian (0.15%), Montenegrin, etc. After the 1990s, the situation was slightly changed, due to a return to Greece of parts of the Greek minority.

Table 1. Data of Albania Demographics

Official language	Albanian
Population (2011)	2 800 138
Urban population	1 498 508
Rural population	1 301 630

Source: INSTAT

The Albanian literacy rate hovers at around 99% and efforts are ongoing to maintain this rate. Although education is only compulsory for the first 9 classes, most young people stay on through to classes 12. The academic year, divided into two semesters begins in September / October and ends in June / July. Primary education lasts for 9 years, following a non-mandatory period spent at preschool. Secondary education known as regular takes a further three years to complete.

2.1.3. Political and Administrative Structure

Albania (Shqipëria in Albanian) is officially known as the Republic of Albania. The Albanian government is a Parliamentary Democracy with 140 members in its legislature. According to the Constitution of Albania, the President of the Republic is the head of state. The President is elected by the Assembly for a five-year term and is eligible for a second term (a candidate needs a three-fifths majority of the Assembly's 140 votes (84 votes) in one of the first three rounds of voting or a simple majority in round four or five to become president.

The legislative power is exercised by the Parliament and the Government. The Prime-Minister is head of Government and is appointed by the president, on the proposal from the party or coalition of parties that has the majority of seats in the Assembly.

The judicial power is exercised by the courts and prosecution, in accordance with the Constitution and powers assigned to them by law. Judges have the power to examine all penal, military penal, administrative cases, as well as any other case defined by law, while the prosecutors have the obligation to participate in penal trials, but not civil ones, etc. The Albanian justice system comprises: Courts of First Instance, Courts of Appeal and the High Court.

Albania is a member of the United Nations, NATO, the Organization for Security and Cooperation in Europe (OSCE), the Council of Europe and the World Trade Organization.

Albania is divided into 12 administrative counties (*in Albanian Qark or Prefekturë*). Since June 2015, these counties are further divided into 61 municipalities. These counties were further divided in 36 districts, which became defunct in 2000. There are overall 2980 villages/communities in all Albania, formerly known as localities¹.

The issues of environmental protection, health and soil use are covered by central government and the local government.

The main responsibilities of the local government on environment protection are: developing local plans for environment protection, integrating environment protection in plans of territorial adjustment, defining sites for collection and processing of industrial and urban waste according to the environmental criteria and development plans, organizing the disposal of waste and hazardous materials and the conservation of vegetation in urban areas and their surroundings, managing the urban waste, plants for waste water treatment and treatment of solid waste, protection and development of forests, pastures and natural resources with local character.

1 https://en.wikipedia.org/wiki/Administrative_divisions_of_Albania

Local government units exert their activity in conformity with the principle of autonomy, while maintaining close relationship with the central government. The autonomy of the local government is at the political, legislative and administrative and financial level.

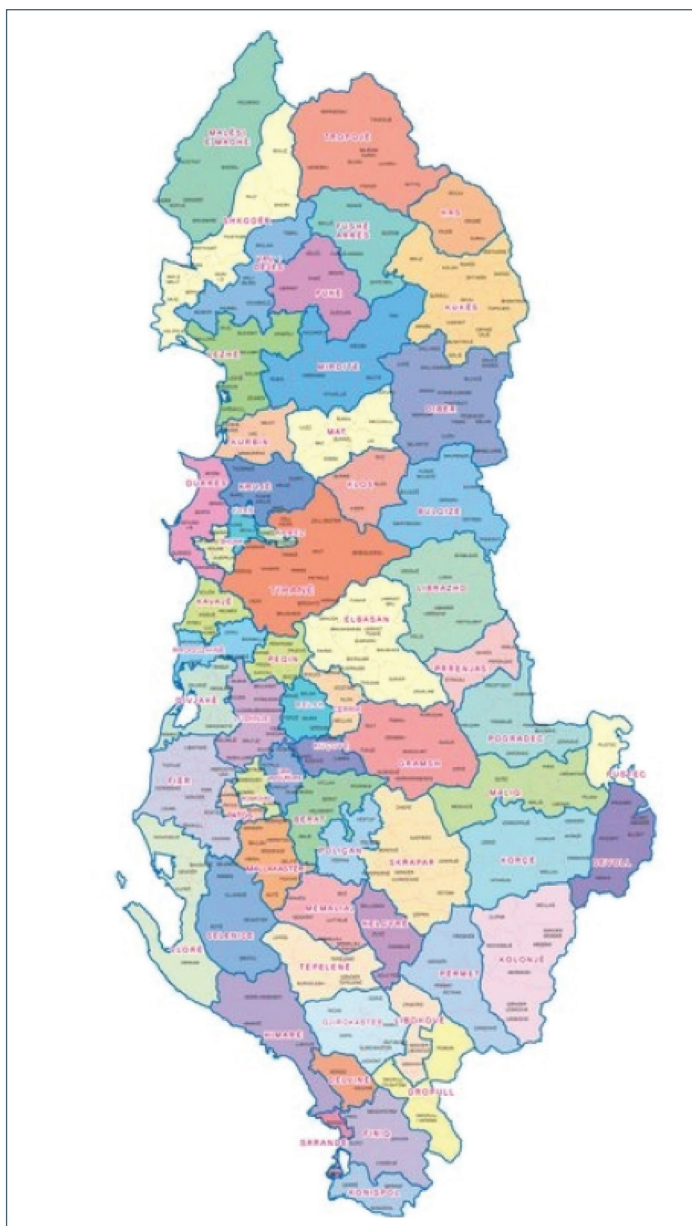


Figure 2. Map of Albanian municipalities structure

2.1.4. Profiles of Economic Sectors

Albania is a middle-income country that has made enormous strides in establishing a credible, multi-party democracy and market economy, over the last two and a half decades. Before the global financial crisis, Albania enjoyed average annual real growth rates of 6%, accompanied by rapid reductions in poverty. However, after 2008 the average growth halved and the macroeconomic imbalances in the public and external sectors emerged. The growth pace was also mirrored in poverty and unemployment: between 2002 and 2008, poverty in the country fell by half (to about 12.4%), but in 2012 it increased again to 14.3%.

The Gross Domestic Product per capita in Albania was last recorded at 4,541.39 US dollars in 2015. The economy of Albania advanced 3 percent year-on-year, in the first three months of 2016, following a 2.15 percent expansion in the previous period. Main contributors to the growth were trade, accommodation and transportation (+5.75 percent); construction (+7.58 percent); information and communication (+14.6 percent); real estate (+3.7 percent) and public administration, education and health (+0.9 percent)².

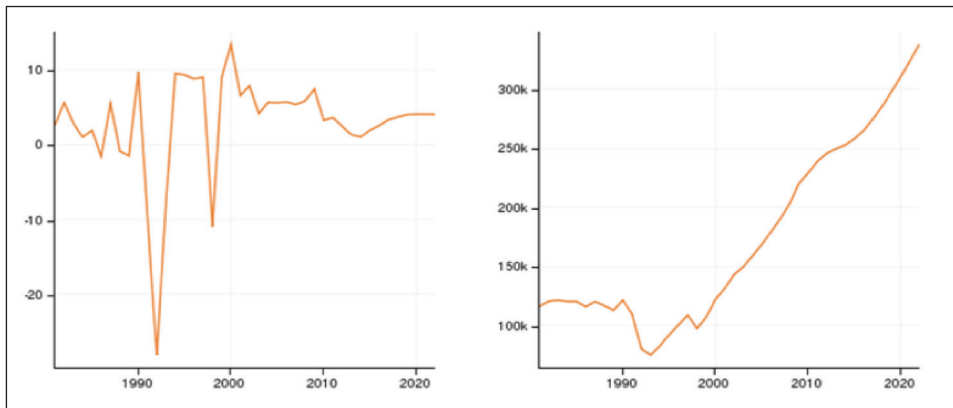


Figure 3. Albania GDP change after 1990³.

Unemployment increased from 12.5% in 2008 to 17.6 % in 2014, with a slight improvement of 17.3% in 2015, while youth unemployment reached 32.1 % in the same period. Table 4.

² INSTAT, 2016

³ <https://www.quandl.com/collections/albania>

Table 2. Data of Albanian macroeconomic indicators

	2011	2012	2013	2014	2015
Population (million)	2.8	2.8	2.8	2.8	2.8
GDP per capita (USD)	4,691	4,359	4,512	4,782	4,151
Economic Growth (GDP, annual variation in %)	2.5	1.4	1.1	2.0	2.6
Unemployment Rate	13.4	14.1	17.1	18.0	17.7
Inflation Rate (CPI, annual variation in %)	3.4	2.0	1.9	1.6	1.9
Exports (EUR billion)	1.4	1.5	1.7	1.8	1.7
Imports (EUR billion)	3.8	3.8	3.7	3.9	3.9

The distribution of active enterprises by economic sector is: trade 47.1%, industry 9.3%, hotels, bars and restaurants 14.8%, transport and communication 9.6%, other services 13.3%, construction 4.6%, agriculture and fishing 1.2%.

Agriculture remains one of the largest and most important sectors in Albania. Agriculture is a main source of employment and income, especially in the country's rural areas. Agriculture contributes to 18.9% of the country's GDP. Field crops production is mainly influenced by cultures that are more representative of this sector, such as vegetables, cereals and potatoes. Vegetable production in 2015 was 1,030,000 tons, an increase by 8.4 % compared to the previous year and an increase by 11.5 % compared to 2 years previously. Potatoes production in 2015 was 245,000 tons, increased by 2.1 % compared to the previous year. The highest level of potatoes production was achieved in the prefectures of Korça with 65,439 tons, followed by Fier with 33,273 tones and Elbasan with 32,457 tones⁴.

Fishing sector is still underdeveloped in Albania. Compared with an average of 15.1 kg per capita per year of fish products consumption for Mediterranean countries, this consumption in Albania is relatively low, with about 3.3 kg per capita per year. Fishing in marine wetlands, which cover about 10,000 ha is frequent and 42-97 kg products per hectare is obtained. The fish processing industry is expanding. Albania's agricultural sector continues to face a number of challenges, however, including small farm size and land fragmentation, poor infrastructure, market limitations, limited access to loans and grants, and inadequate rural institutions.

⁴ INSTAT, 2016

The main industrial activities in Albania are the oil and gas extraction industry, processing industry, light industry, food and beverage industry, cement production, metallurgy and mining. Development in industry and mineral sector in some regions of the country has caused the generation of waste, sterile and chemicals, which are disposed in dumpsites that do not meet the necessary environmental criteria.

The industry sector has contributed steadily with about 11% of GDP. The permanent dependence of Albania on minerals extraction is due to the existence of many deposits that can be used for commercial purposes. Deposits of chromium, copper and nickel have been opened long ago, but the mining equipment and the methods are already outdated and many works have been abandoned; nevertheless Albania retains an important position in Europe for chromium extraction.

Other industrial activities which operate in Albania are the oil and gas extraction industry, processing industry, light industry, food and beverage industry, cement production and metallurgy.

Albania is rich in various energy sources, oil and gas, coal and other fossil fuels, as well as hydro power, forests natural biomass and other renewable energy sources. Hydro-power comprises over 97% of the produced energy. Currently, only 30% of water resources are used. The energy sector contributes with about 10% of the GDP. Energy resources have increased in the last 2-3 years, due to the construction of new concessionary hydroelectric stations (HES). Despite the large number of approved concession contracts and production start in some hydroelectric stations built from the private sector, still the portion of the production from the private sector in the general national electric energy production is at about 20%.

Transport has a direct impact on environmental quality, in general, and on that of urban areas in particular. The transport sector is one of main emission sources of greenhouse gases and contributes considerably to air pollution.

2.1.5. Environmental Overview

Albania has inherited multiple environmental problems from the past, including: soil erosion, deforestation, biodiversity loss, urban waste, air pollution in urban and industrial areas, soil pollution caused by hazardous waste from the old industry, etc.

The State of Environment Report (SoER) is prepared annually by the National Environmental Agency (NEA). The SoER shows the state of the main environmental indicators for air, water, biodiversity, soil, climate change, forests, etc. and is based mainly on the Driving Forces-Pressures-State-Impacts-Responses (DPSIR) framework. The Information published

in the state of the environment makes this report the primary official document, which examines and assesses the overall state of the environment in Albania, and gives recommendations on the environmental policy planning, on an annual basis.

Air quality in Albania varies greatly according to the location: in rural and mountainous areas the air is clean, while in cities and in the vicinity of industrial areas, air quality is far poorer. City air contains dust particles and gases from everyday urban and industrial activities. The most common air pollutants in Albanian cities, listed in order of their quantity and significance, are: road dust, fine particles of unburned fuels (black smoke) emitted from vehicles, CO, VOCs, lead, NO_x, SO₂ and O₃.

The industrial sector also contributes to local pollution. Pollutant concentrations are most problematic in Tirana and Elbasan, where levels of the main pollutants are two to five times higher than the permitted limit values.

The monitoring of urban air quality is focused on indicators for: PM₁₀, PM_{2.5}, O₃, NO_x, SO₂, CO and Benzene. Based on the data assessment last years in Tirana, a decrease of about 20% has been observed at concentration level of PM₁₀ and PM_{2.5}. This is due to improvements made in infrastructure and to several legislative measures undertaken regarding the standardization of used cars and vehicles. At national level the concentration of CO and Benzene are within EU standard levels.

The Albanian cross-cutting Environment Strategy presents a strategy for reducing the emission of atmospheric pollutants in varied ways, which include:

- monitoring of air quality in line with EU requirements;
- control and reduction of discharges of gases in the atmosphere by motorized vehicles;
- control and reduction of discharges of polluting substances from industrial plants;
- control and reduction of dust caused by construction;
- planning for air quality management.

Albania has numerous natural lakes (Shkodra, Ohrid, Prespa, etc.), which are an important water reserve. Part of the country's water, in particular that of the rivers Shkumbin, Fan, Gjanicë, and Lanë, is polluted by industrial discharges.

As, part of this water is used in agriculture, water treatment plants are indispensable.

Groundwater monitoring is made on the main watershed basins for chemical parameters, NO₃, NO₂, NH₄, HCO, Cl, SO₂, Na, Ca, Mg, K, Fe, dissolved oxygen, conductivity and hazardous substances. The levels of monitored chemical parameters are within the

allowed limits. Ground waters in Albania are classified as ‘freshwater’, with neutral and weak alkalinity, and strong average hardness. Content is within the maximum allowed values.

There has been an improvement in the quality of coastal bathing waters during recent years. This is due to investments made in the waste water treatment infrastructure. Up to a few years ago, the main source of pollution for coastal bathing waters has been the discharge of untreated waste water. However, investments made in some of the main cities have significantly changed the quality of bathing water. According to assessments, more than 90% of the coastal bathing water stations in 2016 were classified within the A category and 6 % in B category (A being excellent quality and B good quality)⁵.

Albania has a high level of biological diversity at the landscape, ecosystem and species levels, especially when considering its small land area. Forty habitats are identified as rare and endangered, with the number of endangered species approaching 320. Albania has vegetation coverage of a high diversity of species, which grouped according to their values, fall into: vegetation for timber; for fuel wood; for pastures; for industry, for medicines; for decoration, etc. Fauna is diverse, too. A number of endemic species are present, as well. Among the carnivores the following are present: wolf, fox, jackal, brown bear, wild cat, etc. Herbivores like: the deer, wild goat, wild pig, wild rabbit, etc. are of particular importance. About 350 types of birds exist in Albania. Numerous species of fish of considerable economic value are found in the marine and inland waters, as well. Fauna has been damaged by irrational hunting, deforestation, reclamation of wetlands and marshlands, use of chemicals in agriculture, soil, water and air pollution, etc.

During the last two decades the total forest area decreased by 1.4%. This was due to changing land use categories in forest areas, and directly related to the transformation and modification of forest lands. These quite challenging problems are the cause of illegal logging, demographic movements, increase in the demand for wood and energy, overuse of forests resources, etc.

Managed urban solid wastes have shown a growing trend over the years, explained among other things with the social behavior of people, as a reflection of changes in their lifestyle. In 2015, the amount of managed waste was around 1.4 million tons, in 2014 about 1.2 million tons, and in 2013 the amount of managed waste, financed by public funds, was about 950 thousand tons. The annual amount of waste generated per capita in the whole country has had an increasing trend, respectively: 396 kg/capita in 2015, 355 kg/capita in 2014 and 321 kg/capita in 2013.

The amount of industrial waste mixed with urban waste has had a non-linear growth from

5 <http://akm.gov.al/>

2013 to 2015. In 2015, the amount of managed non-urban waste was 94 kg/capita, in 2014 it was 90 kg/capita, and in 2013 this indicator was assessed at 44 kg/capita.

Organic waste comprises the major portion in the composition of urban waste. In the managed waste total, the amount of organic waste has increased compared to the total amount. In 2015, organic waste constituted about 51.4 % of the total amount of waste, compared to 50.2 % in 2014 and 41.0 % in 2013.

Managed waste is treated mainly by depositing them in landfills and other storage places approved by the relevant local government bodies. Regular deposit of waste has increased, respectively 68.8 % was deposited in 2015, 63.4 % in 2014 and 50.6% in 2013 of the total amount of managed wastes in the country. Waste recycling has maintained approximately the same level of indicators with a slight tendency to increase. In 2015, 25.3 % of the total waste was recycled; in 2014 this indicator was at 21.6 %, and in 2013 at 24.0 %. In 2015, out of the waste total 1.5 % was burned for energy production, while in 2014 only about 0.5 % and in 2013 this figure was only at 0.1 %.

A new law on environmental protection was approved and entered into force in 2012. Its objective was to raise the level of environment protection by establishing a consolidated network of environmental institutions at national and regional level, linked with environmental policy implementation.

In general, Albania has demonstrated progress on environmental issues, regarding the management of environmental problems, but still strengthened efforts are needed, especially with respect to the implementation and reinforcement of the environmental legislation.

In particular, water treatment and waste management are at early stages of their development. The country is susceptible to effects of climate change, in particular flooding and drought, as well as possible electricity shortages, due to a high dependence on hydro-power, which requires seasonal energy imports.

2.2. Institutional, Policy and Regulatory Framework

2.2.1. Environmental Policy and Legislative Framework

The Albanian Constitution demands from national institutions to maintain a healthy environment, ecologically suitable for the present and future generations. The concept of sustainable development is integrated in the Constitution of the Republic of Albania, which contains a particular article on this subject. The relevant article stipulates that “the State aims i) a healthy environment and ecologically sustainable environment for

the present and future generations; ii) a rational use of the forests, waters, pastures, and of the other natural resources on the base of the sustainable development” (Albanian Constitution, Chapter V, Article 59).

The main responsible institution for environmental issues is the *Ministry of Environment* (MoE), established for the first time in 2001. The Ministry of Environment aims to develop and propose policies, strategies and action plans for environmental protection, in view of sustainable development.

The National Environment Agency (NEA) was established in 2014, as a result of the implementation of the Law No. 10431, dated 09.06.2011 “On Environmental Protection”. The National Environment Agency is a central public institution, independent in decision making and exercising its jurisdiction throughout the territory of the Republic of Albania. The National Environment Agency is funded by the state budget and its own resources, and performs its tasks as an independent institution, regarding decision making, and carries out its functions as stipulated by the law⁶.

As presented in this table, other institutions, also, have a role to play in environmental issues and hold institutional responsibilities.

Table 3. Albanian institutions that hold legal responsibility for environmental matters

Ministries:	Agencies and entities that hold legal responsibility on environmental matters in Albania:
Ministry of Environment	National Agency for Protected Areas
Ministry of Agriculture, Rural Development and Water Management	Regional Environmental Departments Forest Service Regional Departments
Ministry of Urban Development	State Inspectorate of Environment, Forestry and Water
Ministry of Industry and Energy	National Agency for Natural Resources
Ministry of Health	Public Health Institute

Source: <http://www.akm.gov.al>

In the last decade and especially since 2001, a number of laws and other legal acts on the environment have been drafted and approved. The Albanian national legal framework is largely harmonized with the EU legislation. The Albanian legal framework regarding

⁶ <http://www.akm.gov.al>

environmental is based on the Constitution of the Republic of Albania and consists of laws and regulatory acts, such as Decisions of the Council of Ministers (DCM), ministerial acts, regulations, guidelines and standards.

The following national Legal Instruments address the management of POPs in Albania, as part of the management of Chemicals:

Environmental legislation is principally governed by the “Law on Environmental Protection” No. 10431, dated June 9, 2011⁷. The new law on Environmental Impact Assessment No 10 440, dated July 7, 2011 is approximated to the Council Directive 85/337/EEC of 27 June 1985, on the assessment of the effects of certain public and private projects on the environment⁸.

This law aims to protect the environment through prevention, minimization and compensation of damages from proposed projects, which may cause direct or indirect significant adverse impacts on the environment, due to their size, nature or location, before the projects are approved.

This law sets out principles, requirements, responsibilities, rules and procedures to ensure a higher level of environmental protection and includes provisions for environmental impact assessment, as a tool for environmental protection, aiming to identify and define the possible direct and indirect effects on the environment, mainly to prevent these adverse effects.

This law regulates national and local policies on environmental protection, requirements for the preparation of environmental impact assessments and strategic environmental assessments, requirements for permitting activities that affect the environment, prevention and reduction of environmental pollution, environmental norms and standards, environmental monitoring and control, duties of the state bodies in relation to environmental issues, role of the public and sanctions imposed in case of law infringements.

This law recognized ‘The National Environment Agency’ as an administrative body, responsible for the execution of professional and related activities in the field of environmental protection. Environmental protection, as put in the law, ensures comprehensive protection of the quality of the environment, biodiversity and landscape diversity protection, rational use of natural resources and energy, in the best way for the environment, as a vital condition for a healthy and sustainable development.

7 This law is harmonized with Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage. Official Journal L 143 , 30/04/2004 P. 0056 - 0075

8 Law No 10 440, dated 7. 7. 2011 “on Environmental Impact Assessment”

Article 5 defines the principle of sustainable development: “Public authorities, through the development, adoption and implementation of normative acts, strategies, plans, programs and projects within their area of competence, promote sustainable economic and social development, using natural resources, in order to meet current needs and preserve the environment, without prejudice, but allowing for the possibility of future generations to meet their own needs”.

Further on, the law determines the guidelines for the environmental impact assessment, parties that must be involved and the obligation of environmental authorities to make available all existing information on the compilation of EIA reports to project developers. A special provision was incorporated for the Specially Protected Areas, where development of projects is generally not permitted, with only special exemptions for very particular cases. Provisions for trans-boundary impacts are also part of this law.

The EIA Law (Law No. 10 440, dated July 7, 2011) determines the type and scale of the projects that require an EIA before implementation. The law distinguishes between two levels of EIA system for projects (i) preliminary EIA and (ii) detailed EIA.

- Preliminary EIA. This concerns projects that are expected to have lesser potential impacts. These projects are listed in Appendix 2 of the Law on EIA.
- Detailed EIA. This concerns projects with expected significant potential impacts, as listed in Appendix 1 of the Law; as well as some projects listed in Appendix 2, which the MoE considers that they could have a significant impact on the environment (including those activities that are to be implemented in a protected area). The detailed EIA procedure involves holding public debates and consultations with relevant authorities.

Law No. 9587, dated 20.07.2006, “On Biodiversity Conservation” and DCM No. 31, dated 20.01.2016, “On the Approval of the Strategic Policy Document on Biodiversity Protection”, established the legal basis for the conservation and sustainable use of biodiversity and for achieving the targets set by the Convention on Biological Diversity. The law and DCM are based on the objectives of the Convention on Biological Diversity and other biodiversity-related conventions which Albania is a Party to, as well as of related EU directives (e.g. Habitat and Wild Bird Directive). The law identifies the instruments for biodiversity planning (Biodiversity Strategy and Action Plan, biodiversity inventorying and monitoring network, emergency plans and trans-boundary impact assessments), as well as three protection categories: protected, specially protected and degraded ecosystems, habitats and landscapes.

The law “On Environmental Permitting”, No. 10448, was approved on 14.07. 2011 and amended by law No. 60/2014, dated 19.6.2014. This law aims at “the prevention and

control of pollution arising from certain categories of activities, in order to achieve a high level of protection for the environment, as a whole, for human health, and for improving the quality of life”. Also, this law establishes “measures for permitting the operation of certain groups of polluting activities, measures designed to prevent or, where that is not practicable, reduce emissions into the air, water and land from such activities, including measures concerning waste disposal in the Republic of Albania.”

Law No.10463, dated 22.09.2011, “On Integrated Waste Management”, amended by law No. 32, dated 14.02.2013, and law No. 156, dated 10.10.2013. The main purpose of this law is to protect human health and the environment and to ensure proper environmental management of waste through: (i) the prevention or reduction of negative impacts from waste generation and management; (ii) reducing the overall impacts of resource use; and (iii) improving the efficiency of their use. This law sets a number of rules and criteria for integrated waste management in Albania, as well as specific criteria for hazardous waste treatment that can be contaminated with POPs. Moreover the law defines the respective responsible institutions, at local and national level, for waste management and monitoring process, in order to enable protection of the environment and human health. Nevertheless, as of today there is no safe system in Albania for the management of hazardous waste generated from industry or household. Hazardous waste generated from industry sector, as well as from municipal waste, is in some cases disposed of together with urban waste in certain landfills, posing high risks to the environment and human health. In the frame of meeting the set objectives for better waste management, MoE has already developed the National Plan for Waste Management 2010 - 2025, in cooperation with the EU-funded project “Implementation of National Plan for Approximation of Environmental Legislation”.

Law No. 8897, dated 16.05.2002, “On Air Protection”, as amended by Law No. 10266, dated 15.04.2010, identifies the sources of air pollution (stationary sources, industrial and energy installations, mobile sources of pollution). The law also sets certain thresholds (i.e. limit values for the air quality and alarming thresholds, limit values for air emissions from stationary sources, limit values for emissions from mobile sources and the content of dangerous substances in fuels). The secondary legislation is also developed. Nevertheless, there are shortcomings in implementing this law, due to lack of equipment and trained staff to control and monitor the limit values. There is, also, a need for training the polluters (operators), through pilot projects on how to manage registers, how to build and implement monitoring programs, emergency plans, etc.

2.2.2 Roles and Responsibilities

The Council of Ministers has the overall responsibility for the environmental policy in Albania; whereas environmental policy coordination is achieved by the Ministry of

Environment. For certain environmental issues, the responsibility also lies with some other ministries and state agencies, at central and local level.

The Ministry of Environment is in charge of drafting national environmental strategies, legislation and policies, monitoring and enforcing the law. The Ministry collaborates with line ministries and takes their views and proposals into account, prior to an eventual submission of a draft document, policy or act to the Council of Ministers.

The implementation of environmental laws and standards is the duty of all governmental and non-governmental actors, as well as of the general public. National Environment Agency, under the Ministry of Environment, is responsible for the implementation of environmental laws and standards.

The responsibility of coordination of the environmental policy and EU agenda, utilizing the European programs and funds, lies with the Ministry of European Integration.

The Ministry of Agriculture, Rural Development and Water Management is responsible for the development of the agricultural sector and for developing legislation on fertilizers and pesticides, as well as for the control of the residues in food products. 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, labeled and if they are accompanied by a declaration and instruction for use.

The Ministry of Health is responsible for the preparation of regulations on poison management. It participates in plant protection substance management, the procedure for classification of substances (new chemicals) in the group of poisons, and their inclusion in the list of approved chemicals. It is also involved in inspections. The analyses are performed by the Institute of Public Health. The inspections are the responsibility of the Sanitary Inspectorate.

The General Directorate of Customs, under the Ministry of Finance, is in charge of control and enforcement of the regulations related to trade, export and import of goods.

National Food Authority, under the Ministry of Agriculture, Rural Development and Water Management is in charge of food control, pesticides and plant material import and export.

Other central institutions, which generally deal with chemicals, are:

Ministry of Energy and Industry, which is responsible for the remediation of hazardous waste, related to hot spots within the country and related pollution from industry and energy sectors;

While, the overall responsibility for the management and destruction of chemical weapons and related waste lies with the Ministry of Defense.

At local level, there are also local authorities lined up with Regional Environmental Departments and local inspectorate, which take measures to avoid health and environment damage from chemicals.

The inter-institutional cooperation is ensured through *Ad'hoc* working groups (with representation from various institutions) for the preparation of draft laws or strategies, project steering committees, inter-ministerial committees, etc.

The following table shows the laws and regulations on environment and implementing Agencies in Albania.

Table 4. Legislation and implementing Agencies

No	Law, Directive, etc.	Institutional Framework for the Law Implementation
1	Law No.10431, dated June 9, 2011, "On Environmental Protection"	Ministry of Environment, National Environment Agency, State Inspectorate of Environment, Forestry and Water, Central and Local government Agencies
2	Law No.10440, dated July 7, 2011, "On Environmental Impact Assessment"	Ministry of Environment, National Environment Agency
3	Law No. 9700, dated 26.03.2007, "On environmental protection from trans-boundary impacts"	Ministry of Environment, Ministry of Foreign Affairs
4	Law No. 8897, dated 16.05.2002, "On air protection" as amended by Law No. 10266, dated 15.04.2010	Ministry of Environment, National Environment Agency, Public Health Institute
5	Law No. 9010, dated 13.2.2003, "On environmental administration of solid wastes", as amended by Law No. 10137, dated 11.05.2009, "On Some Changes in Legislation in Force for Licenses, Permits and Authorizations in the Republic of Albania"	Ministry of Environment, National Environment, Agency, Local government (the municipalities)

6	Law No. 9115, dated 24.07.2003, "On the administration of polluted waters" (amended by Law No. 10448/11 "On Environmental Permits"	Ministry of Environment, National Environment Agency, Local government (the municipalities)
7	Law No. 8906, dated 06.06.2002, "On protected areas" as amended by Law No. 9868, dated 04.02.2008	Ministry of Environment, National Agency of Protected Areas, State Inspectorate of Environment, Forestry and Water
8	Law No. 10463, dated 22.09.2011, "On Integrated Waste Management", amended by law No. 32, dated 14.02.2013 and law No. 156, dated 10.10.2013	Ministry of Environment, National Environment Agency, Local government (the municipalities)
9	Law No. 9048, dated 07.04.2003, "On Cultural Heritage" as amended by Law No. 9592, dated 27.07.2006	Ministry of Tourism, Culture, Youth and Sports, National Council of Archaeology, Institute of Monuments, Centre of Registration of Cultural Property.
10	DCM No. 676, dated 20.12.2002, "On declaring the Albanian Nature Monuments as Protection Zones"	Ministry of Environment, National Agency of Protected Areas, State Inspectorate of Environment, Forestry and Water, Local government

2.2.3. Relevant International Commitments and Obligations

Besides the Albanian legal framework, the Republic of Albania respects the international obligations stipulated in all international conventions and agreements ratified by the Albanian State.

The Stockholm Convention on Persistent Organic Pollutants was ratified by Law Nr.9263, dated 29.07.2004. Initially, 12 POPs were targeted for international action. These include pesticides and industrial chemicals, such as DDT and PCBs, which were or are still being used in Albania.

The Convention principally provides for:

- Measures to reduce/eliminate releases from intentionally and unintentionally produced POPs;
- Registration of specific exemptions;
- Measures to reduce or eliminate releases from stockpiles and wastes;
- Implementation Plans;

- Research and monitoring;
- Information exchange and awareness and education;
- Technical and financial arrangements;
- Reporting and evaluation;
- Non compliance and settlement of disputes.

According to the convention, parties should immediately stop using the following POPs pesticides: Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex and Toxaphene; and severely restrict the use of DDT. Annex B provides for the restriction of DDT to vector control and use in accordance with specified WHO guidelines. Parties using or producing DDT have to sign up to a Register. For other Parties, the use and production have to be eliminated.

However, all exemptions are for a fixed period of time, and subject to review;

- Restrict the use of PCBs to closed systems with the aim of their phasing out and environmentally sound disposal by 2025 (equipment) or 2028 (wastes);
- Measures should be taken to eliminate or reduce releases from unintentionally produced POPs;
- Parties should develop implementation plans for the implementation of their obligations under the Convention;
- Parties should establish mechanisms and schemes for awareness raising and information;
- Parties should encourage the undertaking of research geared towards the elimination of POPs and the finding of alternatives.

The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal and its Amendment III/1, ratified by Albania by Law Nr. 9279, dated 28.10.2004. The Convention is related to trans-boundary movement of hazardous wastes and their disposal. The Stockholm Convention refers to the guidance documents elaborated under the Basel Convention, with regard to environmentally sound disposal of POPs containing/contaminated wastes; Vienna Convention for the Protection of the Ozone Layer and subsequent Montreal Protocol with its four amendments.

The Montreal instrument controls the emissions of Ozone Depleting Substances (ODS) into the atmosphere. Ozone depleting substance study was completed, indicating the types and quantities that were used, sold or stored in Albania.

Albania adhered, also, to the amendments of the Montreal Protocol, respectively: to London amendment (by law no.9484, dated 02.03.2006), to Copenhagen amendment

(by law no.9480, dated 16.02.2006), to Montreal amendment (by law no.9485, dated 06.03.2006) and to Beijing amendment (by law no.9484, dated 02.03.2006).

Albania has signed agreements and is part of the following international organizations:

- Convention on Environmental Impact Assessment in Trans-boundary Context (ESPOO);
- Aarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice;
- Kiev Protocol for Strategic Environmental Assessment;
- Convention on Biological Diversity;
- Convention on the Wetlands of International Importance, especially as Waterfowl Habitat;
- United Nations Framework Convention on Climate Change and Kyoto Protocol on the Climate Change;
- Convention on Long-range Trans-boundary Air Pollution;
- Convention on Protection and Use of Trans-boundary Water-courses and International Lakes, etc.

The following table shows some of the international conventions and agreements, which are related to the environment and have been ratified by the Republic of Albania, over the years.

Table 5. International Conventions and Agreements ratified by Albania

Convention name	Ratification by Albania
Stockholm Convention on Persistent Organic Pollutants, ratified by Law No. 9263	29.07.2004
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal and its Amendment III/1	28.10.2004
Montreal Protocol, respectively: London amendment, Copenhagen amendment, Montreal amendment and Beijing amendment	02.03.2006; 16.02.2006 06.03.2006; 02.03.2006.
UN Framework Convention on Climate Change (UNFCCC)	01/12/1994
Kyoto Protocol	01/04/2005
Ramsar Convention on Wetlands (1971)	29/02/1996
Convention on Biodiversity (Biological Diversity) (1992)	party since 1994; party to the protocol since 2005
Bern Convention (1976): Conservation of European Wildlife and Natural Habitats	13/01/1999

Aarhus Convention (Convention on Access to Information (1998), Public Participation in Decision making and Access to Justice in Environmental Matters)	27/06/2001
Bonn Convention or CMS (1979); Convention on the Conservation of Migratory Species of Wild Animals	01/09/2001
Barcelona Convention (1976); Convention for the Protection of the Mediterranean Sea against Pollution	09/07/2004
Espoo Convention: Convention on Environmental Impact Assessment in a Trans-boundary context, along with the amendment and Protocols (1991)	12/05/2006
Convention on the Protection of Underwater Cultural Heritage (2001)	19/03/2009

Source: MoE, 2016

Albania also participates in several regional environmental agreements, as well as bilateral ones with neighboring countries. Albania is a candidate country to become a member of the European Union.

2.2.4. Principles of existing Legislation and Regulations addressing POPs

The legislation concerning chemical substances in the Republic of Albania regulates the management of substances and chemical preparations, plant protection substances, explosive substances, gas and liquid inflammable substances, hazardous substances, ozone depletion substances, persistent organic pollutants (POPs), etc.

In the Republic of Albania, the principal act that regulates the management of substances and chemical preparations is the Law No. 9108, dated 17.7.2003, "On chemical substances and preparations". This law determines the rights and obligations of any natural or legal person to set out the properties and substances classification and chemical preparations on record, inventory, notification, management and their marketing. Furthermore, this law provides rules for classification and testing of chemical and preparation substances, before placing them on the market. According to this law, testing should include such methods that fulfill the principals of experimental animals' protection, designated as ordered by competent ministries. According to this law, the Ministry of Environment keeps the National Register on substances and chemical preparations and data for this register is obtained from relevant ministries.

DCM No. 824, dated 11.12.2003, "On classification, packaging, labeling and storage of hazardous substances and preparations", aims to regulate production, marketing, preserving and transporting of hazardous substances and preparations in conformity with the Albanian legislation and international rules.

Law No. 27, dated 03.17.2016, “On Chemicals Management”, provides, among others, safety and risk assessment of chemicals, including POPs, as follows:

- ✓ Chemical safety assessment is a procedure that results in the Document Database Security for the Chemical, including recommendations for risk reduction and adequate control of the harmful effects of hazardous substances;
- ✓ Risk assessment of hazardous substances that cause very high concern (SVHC) are properly controlled and that these substances are progressively replaced by less hazardous substances or apply technology, where appropriate, for replacement alternatives, that are economically and technically available;
- ✓ To ensure safe disposal and storage of chemicals placed on the market, in accordance with the requirements and provisions of this law;
- ✓ The manufacturer, importer and professional users of chemicals, that perform the chemical safety assessment, should use the methods described in this law and regulations in its implementation.

Law No. 9362, dated 24.3.2005, “On Plants Protection Service”, amended. Parts of the provisions in this law regulate plant quarantine, whereas other parts regulate plant protection products (PPP) issues. This law was drafted by the Ministry of Agriculture, Food and Consumer Protection and was approved by the Albanian Parliament.

DCM No. 1188, dated 20.8.2008, “On adopting rules on import, marketing, transport, storage, use and disposal of PPP”, amended by DCM No. 462, dated 11.07.2012, clearly defines the rules of import, marketing, transport, storage, use and disposal of PPP into their marketing form, which will be imported and used into the territory of the Republic of Albania.

The procedures for registration and evaluation criteria of PPPs are defined in DCM No.1555, dated 12.11.2008, “On Definition of Rules for Registration and Evaluation Criteria of Plant Protection Products” (amended by DCM No.791, dated 24.9.2010 and DCM No. 32, dated 20.01.2016), which stipulates the following:

- The PPP that are used, produced, exported and imported into Albania have to be recorded in the register of these products from the responsible structures in the Ministry of Agriculture (Plant Protection Department) that indicates all modalities according to EU standards;
- Import of any active substance or PPP, which is not recorded before in one of the EU countries is not allowed;
- Every four years, the Secretariat of the Stockholm Convention is notified on the substances and products that are imported, used, produced, exported and transited in Albania.

The first national regulation directly addressing POPs is DCM No. 860, dated 20.12.2006, “On adopting of the national implementation plan on banning of use and elimination of persistent organic pollutants”, which sought the rehabilitation of several environmental hotspots, some of which contaminated with POPs, including the removal of large amounts of chemicals out of the country for incineration.

An important national regulation addressing POPs is DCM. No 360, dated 29.04.2015 “On approval of the list of Persistent Organic Pollutants and the establishment of measures for the production, importation, placing on the market and their use”, which aims at protecting human health and the environment from Persistent Organic Pollutants (POPs), is based on the principle of prevention, through: a) the prohibition, the disposal of POPs or restricting the production, placing on the market and use as set out in this decision; b) reduction of emissions into the environment of POPs up to their elimination; c) waste management that are composed of or are contaminated with POPs. This DCM clearly establishes the control of production, placing on the market, use, export and transit of POPs / wastes contaminated / which consist of POPs and customs control, respecting all the obligations arising from the Convention of Stockholm. Also, this DCM determines that the Ministry of the Environment is responsible for preparing the National Implementation Plan (NIP) for the removal and elimination of POPs and the NEA is designated as the main institution responsible for monitoring and reporting on POPs.

Also, DCM 387, dated 06.05.2015, “On approval of rules to control the disposal of PCBs, decontamination or disposal of equipment containing PCBs and /or disposal of waste PCBs used”, is intended to regulate the disposal of PCBs words, decontamination or disposal of equipment containing PCBs and/or the disposal of used PCBs, in order to eliminate them completely in our country.

All the chemicals included into the chemical convention of first, second, and third instance, other chemical producing equipment, special ones which are controlled according to this convention, may be inspected at any time by the Organization for the Banning of Chemical Weapons, in the above legal framework implementation. Also, the above chemicals are reported to the Organization for the Prohibition of Chemical Weapons, which could inspect at any time.

2.2.5. Priority, Problems and Objectives for Institutional and Regulatory Strengthening

POPs management in Albania relies on the Stockholm Convention and a set of environmental laws. Based on the Albanian Constitution, article 122 “...any ratified international agreement is part of the internal juridical system” as soon as it has been published in the Official Journal. The international agreement ratified by the Albanian Parliament takes priority over the national legislation.

Based on this constitutional definition, the Stockholm Convention is already part of the national juridical system of Albania. There is no law or by-law in the national legislation that contradicts the provisions of the Stockholm Convention.

The preparation of a specific legal framework to enable the implementation of the requirements of the Convention is part of the general efforts to transpose and harmonize the national legislation with the EU, one in the field of human health and environmental protection.

From the institutional point of view, the Stockholm Convention also presents obligations for the countries, which have already signed/ratified it. Even though, there are no definitions for new agencies or specifically defined job descriptions to replace the existing ones in respective countries, to deal with the provisions of the Stockholm Convention, still the obligations for the countries are clear, and they are free to decide on the setup of their structures and the ways they choose to effectively implement the Convention itself.

However, there is an expressed need for broader involvement, not only of the state structures, but even of the civil society, scientific institutions, universities and laboratories, networks for collection, assessment, processing and distribution of environmental information, etc.

The implementation process of the Stockholm Convention calls for a clear identification of the responsible institutions and greater commitment on their part.

The following are identified as issues that request thorough consideration, with respect to the existing institutional framework in Albania:

- A careful assessment of the existing bodies and structures, as the most important acting mechanisms, to find out their individual relevance with the obligations of the POPs Convention;
- Reassessment and update of the concrete obligations, that relevant institutions currently have in relation to POPs management, in accordance with their functions, competencies and responsibilities;
- The design of the new institutional scheme, which would involve all structures and bodies at central and local level, the definition of roles, functions, responsibilities, competencies and duties of each of them, their relationships and the functioning rules of the whole system;
- The designation of the contact points and focal points at national and local and/or sectorial level, which altogether constitute the National POPs Network;

- The contact points and focal points shall build their communication scheme among them, as well as they will prepare operative programs how to perform their respective duties and obligations.

Standardization and preparation of the documents, registers, inventories, etc., concerning POPs, will enable unified and standard forms; the definition of rules and procedures related to the documentation and safe maintenance ensured at a separate national centre.

Yet, some problems remain as they were:

- Deficiency in implementation of legislation;
- Insufficient information dissemination;
- Lack of responsible structures for POPs management.

With respect to national responsibilities for the implementation of the Stockholm Convention, it is necessary to take a number of steps, specifically the following:

- Improvement of the national legal framework that addresses POPs issues;
- Increased institutional capacity at central and local levels;
- Evaluation and establishment of a national POPs inventory and updating;
- Developing, updating and implementing a national plan to ensure sustainable management of these chemicals, in order to reduce potential negative impacts on human health and the environment.

2.3. Assessment of the Current POPs Inventory in Albania

POPs inventory at national level was based on UNEP methodology, and was performed through steps listed below:

- ✓ Inventory planning (including identification of key stakeholders, determination of the purpose of inventory and development of the work plan);
- ✓ Methodology approach selection;
- ✓ The collection and data compilation from key sectors (according to the use of the specific POPs);
- ✓ Processing and evaluation of obtained data and
- ✓ Drawing up the conclusions and report preparation.

2.3.1. POPs Pesticides

Current assessment of POPs pesticides inventory was mainly based on new POPs pesticides; since the inventory for other POPs pesticides in Albania, listed in the Stockholm Convention in 2001, was presented during first NIP in 2006.

New POPs pesticides are: *chlordecone*, *alpha hexachlorocyclohexane*, *beta - hexachlorocyclohexane*, *lindane*, *pentachlorobenzene* and *endosulfan*.

Chlordecone was synthesized for the first time in 1951 and was traded as pesticide in 1958. The commercial or trade name of chlordecone was Kepone and GC-1189.

Lindane was widely produced and used in our country before 1990. The residues of lindane were identified in the first report on POPs in Albania. During the lindane production or γ isomer of HCH are also α and β isomers of HCH produced, thus for each ton of lindane 6-10 ton α and β isomers of HCH is produced.

Pentachlorobenzene (PeCB) can be used as a fungicide and is as impurity in the pesticide Pentachloronitrobenzene (PCNB) or Quintozene at 10g/kg rate. Thus, the use of Pentachloronitrobenzene (PCNB) or Quintozene in agriculture as pesticides leads to PeCB emission in the environment.

Endosulfan is a chlororganic insecticide and has been used since 1950. This pesticide was used in Albania. The trade name of the product which contains endosulfan as an active substance was Thiodan.

Some of the salts of perfluorooctane sulfonic acid (PFOS) are used as pesticides (insecticide/acaricide), and data about the possible use of these pesticides in our country will be collected.

The data on use and trade of these new POPs pesticides is obtained from the Ministry of Agriculture, Rural Development and Water Administration, trade companies, customs offices, and farmer associations.

The information provided by the Ministry of Agriculture, Rural Development and Water Administration on the use and the situation related to the new POPs is shown below (see table 6).

The obtained data shows that out of all the new POPs, which are used as pesticides, *Endosulfan* is the only pesticide that was imported, traded and used in our country during the last decade.

Endosulfan is not produced in our country, but it is imported and used to control insects on fruit trees, vegetable, potato, vineyards, citrus etc.

The commercial name is Thiodan 35 EC, which contains 32.9 % (or 352 g/l) endosulfan as active compounds, (mixture 70% alpha - and 30% beta-endosulfan).

The import of Thiodan in Albania continued until 2005, and that year its import was banned.

The amount of imported Thiodan was used until 2007 (see Table 6).

The other new POPs pesticides, such as: Chlordecone, Hexachlorocyclohexane, Pentachloronitrobenzene (PCNB) that contain as impurities Pentachlorebenzene and salts of perflorooctan sulfonic, were not imported, traded and/or used in Albania during last decade.

Communications with responsible institutions, importing and trading companies and interviews with farmers confirm that these pesticides were not used during the last decade, while the endosulfan was imported until 2005 and its usage continued till 2007. This pesticide traded in the market as 'Thiodan' contains as active compound of 32.9% (or 352 g/l) Endosulfan. It is used in agriculture in order to protect plants from insects such as aphids, beetles, caterpillars etc.

The amount of Thiodan used in Albania during the years 2004-2007 was 7820 liters.

Taking into consideration the fact that this preparation is used in the range of 0.1 to 0.2% or from 1litre/ha to 1.5 litre/ha and the number of treatment is limited in two/year; the treated area with this pesticide varies from 3000 to 3500ha/4year or approximately 750-850ha/year. This area, compared to the total of the cultivated agricultural land, is too small. Thus, based on this data, it can be presumed that the residues of Endosulfan in the environment are not significant.

The problems are evident particularly in areas used as orchards and greenhouses, where its use has been a priority. Thus, soil analysis in greenhouses and orchards for possible Endosulfan residues have to be performed during the monitoring process of POPs pesticide residues in the environment.

Despite the fact that POPs, classified as pesticides, are not imported and traded in our country, their residues can be present as impurity in pesticides or active substances, which are allowed to be imported and traded. Thus, the POPs pesticide residues that are present in allowed chemicals may constitute a concern, in case of lack of quality control of imported/traded pesticides, not only in terms of active substances, but even the presence of impurities and associated compounds.

Thus, in this context, we need to emphasize the importance of the qualitative and quantitative analysis of active substances that are an essential part of pesticides imported/traded in our county, but also the analysis of impurities and associated compounds.

Table 6. The use and state of new POPs used as pesticides

No.	Chemical name or active compounds	Commercial name(s)	The amount imported from 2006 until the present (liter)	Producer and trader Company/ Association	The amount produced from 2006 till the present (liter)	Unused amount or stock (kg)	Location and packaging
1	Chlordecone	KEPONE; GC-1189	-----	-----	-----	-----	-----
2	Hexachlorocyclohexane	Lindane	-----	-----	-----	-----	-----
3	Pentachlorobenzene (PeCB)	Pentachlorobenzene (PeCB)	-----	-----	-----	-----	-----
4	Pentachloronitrobenzen (PCNB)	Pentachloronitrobenzen (PCNB) ose Quintozen	----	----	----	----	----
5	Endosulfan	Thiodan	The final situation 2003: 680 l 2004: 2000 l 2005: 5140 l 2006: N/A	Producer: Bayer Importer: Agroinput Jazexhi	2004: 2020 l 2005: 1970 l 2006: 1430 l 2007: 2400 l	N/A	N/A
6	Perfluorooctane sulfonic acid (C ₈ HF ₁₇ O ₃ S)		----	----	----	----	----
7	Perfluorooctanesulfonate (C ₈ F ₁₇ SO ₃)		----	----	----	----	----
8	Sulfluramid (C ₁₀ H ₆ F ₁₇ NO ₂ S)	Finitron; Firstline; FluorGuard; Frontline; GX-071; Alstar (pesticide); Mirex S					
9	Total		7 820 liter		7 820 liter	-----	

2.3.2. DDT and Lindane

The data obtained from the Ministry of Health (Institute of Public Health), Ministry of Agriculture, Rural Development and Water Administration and Ministry of Environment regarding the current presence of pesticides, such as DDT and Lindane shows that they do not exist in Albania. As it was reported during the first inventory in 2006, DDT and hexachlorocyclohexane/ lindane were removed from Albania in the framework of the Project “Repackaging and removal of pesticides and chemicals from Albania, Bishti i Pallës”, funded by the Dutch Government; and this process was finalized in July 2006.

During inspections of the contaminated sites with possible residues of these pesticides, especially in Porto Romano, it was observed that after waste removal, the former central area of Lindane production was surrounded and encapsulated (cemented); and in principle such an encapsulation prevents further contamination of the surrounding area.

But because of previous emissions of pesticides in the air, water flows and soil, and also taking in consideration the high persistence of these compounds, one comes to the conclusion that it is necessary to undertake monitoring of the surrounding area and sampling of the soils, waters, plants and animal organisms, as well as blood samples, for POPs residues.

Findings and recommendations

From previous analysis on inventory and the problems related to POPs pesticides, we can conclude that:

- ✓ The Albanian legislation on POPs pesticides is in the process of approximation with that of the European Union;
- ✓ There are no physical quantities of POPs pesticides in our country and there are no stocks;
- ✓ The residues of POPs in environment are reported in few studies, which are performed in our country;
- ✓ There is not an evaluation and monitoring of pesticide residues in the environment, or their transport in plant and animal organisms.
- ✓ There is not an evaluation and monitoring of pesticide residues in the environment, or their transport in plant and animal organisms.
- ✓ Analyses of impurity of imported pesticides in our country are not performed; as a result they may contain POPs pesticides.

Based on the above listed conclusions, we can formulate the following recommendations:

- ✓ The development of legislation on POPs pesticides should continue until full approximation with the European Union legislation;
- ✓ Limit values concerning the content of POPs pesticides in the environment, such as in soil, water, air, etc., should be determined, in accordance with the limit values set by the international institutions;
- ✓ There is a need to undertake studies on the state of POPs pesticides in the environment, in order to take appropriate measures to reduce/eliminate them from contaminated areas;
- ✓ Monitoring of POPs pesticides, especially in contaminated sites and identified hotspots, must be included in the program for national monitoring of the environmental state in our country;
- ✓ The qualitative and quantitative analysis of imported/traded pesticides must be performed not only for active substances of pesticide, but also for the impurities or their waste for possible presence of POPs pesticide.

2.3.3. Polychlorinated biphenyls (PCBs)

The state or PCBs inventory in our country mainly covers their presence in transformers/condensers used in the energetic system. The current energy system consists of the Albanian Power Corporation (APC), the Transmission System Operator (TSO) and Operator of Electricity Energy Distribution (OEED). Information on the energy transformers condition and the possibility of PCBs presence was obtained from the above mentioned operators/entities, who report that such presence is found in old transformers/converters produced before 1990.

PCBs were never produced in Albania; transformer oil was always imported from other countries, either Europe or Asia. Older transformers in the Albanian energy system are Russian, 1950 production. In the past years the main suppliers of transformers were the USSR and China. Transformers produced in the USSR, which are quite small, are expected to have 50 years endurance. Most of the transformers in Albania are manufactured in China, Bulgaria, Macedonia and Romania, and in the recent years many transformers were imported from Italy, Croatia, Switzerland and Belgium, and their number has been steadily increasing.

In 2005, the preparation of the National Action Plan to phase out and eliminate persistent organic pollutants was undertaken. In the framework of the preparation of this plan, a preliminary inventory of PCBs was carried out, with a clear target: identification of

all transformers containing PCBs, that were in use and/or disposal, implementation of the precautionary principle in equipments in use with PCBs, to monitor technical compliance of all equipment with PCBs that were in use, and to ensure the tracking of equipment with PCBs by the end of their lives. During this first inventory, around 5.3% of the transformers or about 320 pieces were identified, that could be contaminated with PCBs, at more than 50 ppm.

Current inventories data for transformers in our country's energetic system are presented in the following table:

Table 7. Data on number of transformers according to Divisions APC/TSO/OEED

No.	KESH/OST/OSHEE	The total number of transformers	The total amount of oil (liter)
1	Production Division	39	459701
2	Transmission System Operator (TSO)	67	1819407
3	Distributor Division/ Cabins	12395	3718500
4	Distributor Division /Electrical substation	288	2648014
5	Total	12789	8679542

The largest amount of transformers, as it results contain mineral oil therein, which is made available from the power system facilities that are OEED, TSO and APC. The data available from the Albanian Army facilities also shows that they have a modest amount of electrical equipment containing oil, but these transformers are of minor power, up to 560 kV, and consequently the amount of oil that these transformers contain is relatively low, ranging from 20 to 1000 liters.

The number of capacitors in APC/OEED is small and mainly found in: Sub/station 220 kV Fier (2x30 MV Ar), in Sub stations 110 kV in Lushnjë and Ballsh, (each one is 25 MVar), property of OEED, whereas the other two operators do not use capacitors (see table below).

Capacitors contain a small quantity of oil, with few link points, and as such so they do not cause environmental pollution; however it is important to take precautionary technical measures to avoid any potential oil leak and contamination of the surrounding environment.

Table 8. The number of capacitors in TSO facilities

No.	TSO/Substations	The total number of capacitors	The total amount of oil (liter)
1	S/station 220 kV Fier	2x30	1800
2	S/station 110 kV Lushnjë	1x30	900
3	S/station 110 kV Ballsh	1x30	90
4	Total	4x30	3600

About 47% of the total number of the transformers is manufactured before 1990 (about 6,000 units), and the average age of transformers is much greater than 28 years. About 97% of the transformers are small transformers, placed in electrical cabins, owned by OEED.

The rest of the substation transformers are placed in HEC of APC and substations of TSO and OEED, about 288 of them belong to OEED, 39 belong to APC and 67 belong to the TSO.

From the first inventory data on PCBs, it came out that 5.3% of the expected amount of oil was contaminated with PCBs, mainly found in small transformers, belonging to the OEED. APC has mainly new transformers produced after the year 1990, which are not contaminated with PCBs, and when refilled, oil free of PCBs, is used. Also, APC has developed an action plan, which includes analysis on the presence of PCBs in oil transformers.

Power facilities in Albania are still using quite old transformers manufactured before 1990, which have caused environmental pollution, especially in soil and water, due to oil spills, spills during maintenance or due to their old age.

A large part of the transformers are placed on the ground or on a platform, but there is not a secondary containment under transformers. The contaminated soil under transformers can be easily recorded, so it is necessary to follow the problem of soil and surface water and groundwater.

Special attention should be paid to the most contaminated areas of oil transformers, such as transformer repairing areas, which are owned and managed by the OEED, and the oil treatment plant area, in Tirana, managed by the TSO.

Despite the work done to raise awareness among all staff involved in operating them, from the executives to the last of the staff, to take precautions to avoid contamination of the environment, mainly of the soil and water from oil leakage, some improvement has been notices, but still a lot remains to be done. For years, these facilities have been operating with such oils and consequently the accumulated pollution is cemented or found in the surrounding soils. Better institutional coordination is required and better funding for their rehabilitation or constructing new premises for the operation and rehabilitation of existing ones.

PCBs are subject to three international conventions related to the treatment of hazardous waste, namely: the Basel Convention, the Rotterdam Convention and the Stockholm Convention, which deal with PCBs and their production, declaration, use, import, export, storage, transport, monitoring, disposal and eventual elimination.

The transformer oil is the main element in all energy system facilities, which can pollute the surrounding environment with PCBs. These objects use very large amounts of mineral oil, about 10,000 tons. Therefore, the monitoring and taking measures to reduce or eliminate oil spills and replacing them with new transformers, is greatly important to protect the environment from PCBs contamination.

The Albanian government approved DCM No. 387, dated 06.05.2015, on “Approval of the rules for control and disposal of PCBs, decontamination or removal of contaminated equipments with PCBs and/or disposal of PCBs waste”. Based on this DCM all equipments, objects, materials and liquids in the Albanian territory that are contaminated or contain PCBs have to be removed until 2018. Thus, all owners of equipments, objects, materials and liquids that are contaminated or contain PCBs must officially submit the inventory information to NEA for all types and quantities, which is tasked with the preparation of the final inventory no later than 2019. NEA, according to this DCM is the responsible institution for monitoring decontamination and the removal process of contaminated equipments with PCBs.

As of today, production and use of PCBs, is extremely limited, however many years have to pass before PCBs cease to be an environmental problem. Therefore, efforts have to be made to use other substances instead of PCBs.

Findings and recommendations

- Due to the use of very old transformers maintenance needs are frequent, and the repairing is not entirely carried out within standard conditions; as a result some areas under transformer installations or repairing areas or stations, oil spills are observed and potential contamination of the surrounding environment with PCBs is assumed. This fact is observed, especially in the transformers’ repairing facility in Tirana, which is the central facility for all damaged transformers, coming from all around the country, and in the Oil Treatment Plant in Tirana.
- According to the inventory data, the presence of PCBs in our country is relatively low, but a full study should be performed to analyze the presence of PCBs, not only in transformer oils, but also in soil, sediments, water and organisms.
- Necessary measures have to be undertaken for cleaning oil-contaminated areas in electrical equipment and, potentially, with PCBs.

- Functioning of a monitoring system for controlling equipment with PCBs and analysis of the environmental systems on the PCBs potential presence, so as to ensure that measures are taken to reduce/eliminate PCBs from the environment.

2.3.4. Unintentionally produced POPs

Unintentionally produced POPs, as defined in the Stockholm Convention, are polychlorinated dibenzofurans (PCDF), polychlorinated dibenzo-p-dioxins and polychlorinated (PCDD), heksaklorobenzeni (HCB) and polychlorinated biphenyls (PCBs), where PCBs are formed as by-products. Also, Pentachlorobenzene (PCB) is included in Annex C of the Convention, in 2009, and Polychlorinated naphthalenes (PCN) and HCB are included in Annex C of the Convention in 2015.

Polychlorinated dibenzofurans (PCDF) and dibenzo-p-dioxins and polychlorinated (PCDD) are environmental contaminants, found in almost all environmental components in small quantities. But due to the high toxicity and their environmental sustainability, they constitute a serious environmental concern.

Dioxins are among the most toxic chemicals known to man. Acute poisoning occurs rarely, but dioxins are persistent and bio-accumulate in humans. Consequently, chronic effects are the main problem, as produced PCDD and PCDF can be transported through the food chain. Other important routes of exposure may be inhalation or ingestion of contaminated particles.

According to the first inventory reported in 2006, 9 category sources of unintentional POPs were identified. It is also noticed that uncontrolled open burning of urban waste is the main source of air emissions, accounting for about 73.54% of the total, and waste incineration is another source of releases, contributing about 23.8% of the national total, while the contribution from other categories remains insignificant.

The necessary data on the current inventory of potential emissions of unintentionally produced POPs, were obtained from the National Environment Agency (NEA), the Environmental State Report and INSTAT.

The inventory of PCDD / PCDF is based on the methodology provided by UNEP: "Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs, January 2013". According to this methodology, 10 potential sources of unintentionally produced POPs emissions are included, with emissions in air, water, land, products and waste, which are expressed in grams of toxicity equivalent per year.

Data summary of the current inventory of potential emissions of unintentionally produced POPs is given in the following table.

Table 9. Emissions of PCDD/PCDF in Albania

Group	Sources	Annual discharge (g TEQ/vit)				
		Air	Water	Soil	Products	Waste
1	Incineration of waste	6.4	0.0	0.0	0.0	0.2
2	Production of ferrous and non ferrous	4.4	0.0	0.0	0.0	1.6
3	Production of electricity and heating	2.4	0.0	0.0	0.0	1.2
4	Mineral production	0.2	0.0	0.0	0.0	0.0
5	Transport	0.2	0.0	0.0	0.0	0.0
6	Uncontrolled waste burning	12.8	0.0	6.5	0.0	0.0
7	The production of chemicals and consumption goods	0.0	0.0	0.0	5.0	0.0
8	Others	0.0	0.0	0.0	0.0	4.4
9	Landfills	0.0	0.1	0.0	0.0	2.5
10	Identification of potential Hotspots				0.6	0.0
1-10	Sum	26.5	0.1	6.5	5.6	10.0
	Total amount			49		

The uncontrolled open burning of waste remains the main source (with 40%) of POPs emissions, which are unintentionally released into the environment. There is a reduction of the contribution of unintentional POPs emissions, due to the uncontrolled open burning of waste, compared to the first reported inventory in 2006, from 73.54% to 40%. This reduction is the result of certain measures undertaken to improve waste management in Albania. The uncontrolled open burning includes all types of burning in the open area, such as burning of urban waste, burning of waste generated from vehicles (tires), accidental burning of cars, goods, different objects, and burning of agricultural and forest residues.

Burning waste in combustion plants or incinerators is also an emission source of unintentionally produced POPs in the environment, by nearly 13%, where the major proportion comes from hospital waste burning.

Chief emissions of unintentionally produced POPs were discharged in the air at about 53%, the rest of the emissions were discharged in produced waste at approximately 20%, whereas emissions in land and products or goods were at 12-13%. The discharged emissions in water have resulted in smaller quantities.

The main sources of dioxins and furans are the processes of urban waste incineration, some tech metallurgy processes, as sintering and synthesis industry of organic materials

and plastics. In developed countries waste burning is allowed in special combustion plants, only. Garbage burning is done at extremely high temperatures, so that organic compounds are destroyed as profoundly as possible. Dioxins and furans are stable up to temperatures reaching as high as 600° to 800° C.

In this context, open burning of waste, especially plastic waste, which happens quite frequently throughout our country, is a source of environmental contamination with dioxins and furans, which comprise a potential danger not only to the human health of surrounding residents, but also to more distant resident areas. Therefore, elimination of open waste burning is a dire necessity to protect the environment and human health from environmental emission of dioxins and furans.

Findings and recommendations

- Uncontrolled waste burning remains the major contributor to the emissions of unintentionally released POPs in environment.
- Burning waste in incineration plants is also a source of environmental emissions of unintentionally produced POPs; in all those cases that hospital waste constitutes the larger portion of the burned waste;
- Appropriate measures have to be taken on waste management, in order to reduce unintentional POPs emissions in the environment, especially for uncontrolled waste and hospital waste burning.

2.3.5. PolyBromDyphenyl Ethers (PBDEs): hexaBDE, heptaBDE, tetraBDE and pentaBDE

PolyBromDyphenyl Ethers (PBDEs) are a group of aromatic brominated organic compounds (Figure 7) which have been used since 1970, as a supplement in many consumer products. PBDEs were produced with three different levels of bromure and have been characterized as c-Penta-; c-Okta-; and c-Deka- BDE.

These chemicals are widely used in many industrial sectors for the production of a large number of products and articles. For example, POP-PBDEs are widely used in the electronics industry for the production of plastic skeletons of computer hardware and in the transportation industry for the production of warheads in vehicles.

Polybromdyphenyl ethers, as all Persistent Organic Pollutants (POPs) have toxic properties, resist degradation and properties to bio-accumulate. They are transported through different countries via air, water and species that migrate, thus depositing far away from the country of origin, and accumulating in terrestrial and aquatic ecosystems.

Polybromdyphenyl ethers, of greater environmental interest, are:

- **c**-pentaBDEs (tetrabromdyphenyl ether, pentabromdyphenyl ether, hexabromdyphenyl ether and heptabromdyphenyl ether)
- **c**-OktaBDEs (hektabromdyphenyl ethers; heptabromdyphenyl ethers; oktobromdyphenyl ethers and nanobromdyphenyl ethers)

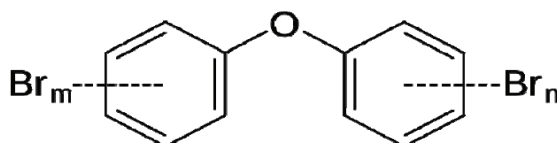


Figure 4. PBDEs structure

Main sectors where POP-PBDEs are used are: (one) manufacturing of electrical and electronic equipment, and the transport sector.

Inventory Methodology of POP-PBDEs

For the preparation of the PBDEs inventory, the PBDEs working team used UNEP's "Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP 2014) - hereinafter referred to as: PBDEs Guidance (UNEP 2014). Equipment or goods that can contain POP-PBDEs are electric and electronic equipments and transport vehicles, therefore the inventory of POP-PBDEs cover these equipment or goods.

Inventory Methodology of POP-PBDEs for electronic and electric devices and their wastes

Electrical and electronic devices are flows of goods that are increasing faster and creating a large influx on waste and recycling. These materials contain a large amount of c-OctaBDE. An inventory of electrical and electronic devices and their waste is an important step for the management of materials containing OctaBDE, mainly c-OctaBDE (hexa-; hepta-; octa- and nona- BDE). The inventory is chiefly based on the presence of octa-BDE, as the main compounds in the group of PBDEs.

The content of POPs-PBDE, which is present in TVs and PCs, will be calculated considering the following data:

- Country Population
- Monitor weight: 25 kg for device (TV or computer average weight)
- Polymer contained in CTR garment: 30%
- c-OctaBDE limit content, 0.87-2.54 kg/ton for polymers used in CRT garment.

A c-OctaBDE limit in CRT devices is calculated as:

$$MPBDE(i) = [\text{No of CRTs/capita}] \times \text{population} \times 25 \text{ kg} \times 0.3 \times [0.00087 - 0.00254] \text{ (ek.1)}$$

Where:

MPBDE(i) quantity of POPs-PBDEs in kg

The inventory of POPs -PBDEs and especially c-OctaBDEs is based on four main categories of electrical and electronic equipment (according to EU Directive 2002/96/EC). During the preparation of this inventory, three steps were followed:

a) Determination of POP-PBDEs on imported electrical and electronic equipments

This definition is made using the following formula:

$$M_{c\text{-OctaBDE};\text{imported EEE}(j)} = M_{\text{EEE}(j);\text{imported}} \times f_{\text{EEE}(j);\text{second-hand}} \times f_{\text{Polymer}} \times C_{c\text{-OctaBDE};\text{Polymer}} \text{ (ek.2)}$$

where:

- $M_{c\text{-OctaBDE};\text{imported EEE}(j)}$ is c-OctaBDE quantity on imported electrical and electronic devices [kg]
- $M_{\text{EEE}(j);\text{imported}}$ is the number of imported electrical and electronic devices (new +and existing) in ton per year
- $f_{\text{EEE}(j);\text{second-hand}}$ is the distribution of imported electrical and electronic devices through importers [% of wieght]
- f_{Polymer} is the general number of polymer fraction located in electrical and electronic devices
- $C_{c\text{-OctaBDE};\text{Polymer}}$ is the c-OctaBDE quantity in general fraction of polymer in electrical and electronic devices [kg/t]

b) Determination of POP-PBDEs on used/sale electrical and electronic equipments

This definition is made using the following formula:

$$M_{c\text{-OctaBDE};\text{EEE}(j)} = M_{\text{EEE}(j);\text{stockpiled}} \times f_{\text{Polymer}} \times C_{c\text{-OctaBDE};\text{Polymer}} \text{ (ek.3)}$$

Where:

- $M_{c\text{-OctaBDE};\text{imported EEE}(j)}$ is c-OctaBDE quantity on used/sale electrical and electronic devices [kg]

- $M_{\text{EEE}(j);\text{imported}}$ is the number of imported electrical and electronic devices (new + existing) in ton per year
- f_{Polymer} is the general number of polymer fraction located in electrical and electronic devices
- $C_{\text{OctaBDE};\text{Polymer}}$ is the c-OctaBDE quantity in general fraction of polymer in electrical and electronic devices [kg/t]

c) Determination of POP-PBDEs quantities on wastes from electrical and electronic equipments

This definition is made using the following formula:

$$M_{\text{c-OctaBDE};\text{WEEE}(j)} = M_{\text{WEEE}(j)} \times f_{\text{Polymer}} \times C_{\text{c-OctaBDE};\text{Polymer}} \quad (\text{ek.4})$$

ku:

- $M_{\text{c-OctaBDE};\text{WEEE}(j)}$ is the c-OctaBDE quantity in wastes of electrical and electronic devices [kg]
- $M_{\text{WEEE}(j)}$ is the quantity of wastes in a year [ton]

Based on the obtained data and the equations 2, 3 and 4, we can determine the amount of c-OctaBDEs in electrical, electronic devices and their waste.

Inventory Methodology of POPs-PBDEs in transport

Transport (cars, trailers, buses, trains, planes and ships) is one of the sectors with the largest number of products that make up the greater flow of waste and recycling.

A large amount of c-Penta BDE has been used in this sector. Its main use is linked with the treatment of flexible PUR foams (seats, the acoustic management systems, car ceilings, etc.) and a very small amount of occupants' wardrobes.

Machines and other devices contain the largest amount POP-PBDEs. Therefore, the methodology that is used focuses on these tools.

To estimate the quality of POP-PBDEs, generated by the transport sector, the following data needs to be collected:

- Number of registered vehicles that are in use and sale
- Production Year

- Number of cars that have become obsolete (de-recognized)
- The amount/number of cars destined for scrap.

In case of determining the amount of PBDEs, generated by the transport sector, a general formula is used for all items presented as follows:

$$\text{Quantity POP-PBDEs vehicle}_{\text{category}} = \text{Number of vehicles}_{\text{category}} \times \text{POP-PBDEs}_{\text{category}} \times F_{\text{regional}}$$

(ek. 5)

Where:

- Number of vehicles_{category} categories produced before 2005 and after 2005;
- POP-PBDEs_{category} is POP-PBDE quantity located in a single vehicle (160g for cars, trailers, agricultural machinery; 1kg for buses);
- F_{regional} is a regional factor for vehicles (F_{regional} = 0.5 for vehicles produced before 2005; F_{regional} = 0.05 for vehicles produced after 2005).

Based on the data obtained and (ek.5), the amount of transport-generated POP-PBDEs is calculated.

The inventory of POPs-PBDEs on electronic and electrical equipments and their wastes

Based on the collected data and the appropriate methodology on the inventory of PBDEs, some results are presented herewith. The inventory focuses mainly on equipment, such as: TVs, refrigerators, washing machines, computers etc., because these products contain a large amount of c-OktaBDE.

a. Preliminary inventory of POPs-PBDEs

The initial assessment of POPs-PBDEs will start with the estimation of the minimum quantity that is present in electrical, electronic equipment (EEE) and their waste, especially TVs and computer monitors and their number per capita.

The formula is as follows:

$$M_{\text{PBDE(i)}} = [\text{Nr i CRTs/capita}] \times \text{population} \times 25 \text{ kg} \times 0.3 \times [0.00087 - 0.00254]$$

It is estimated that the total amount of POPs-PBDEs that comes from EEE is:

$$M_{\text{PBDE(i)}} = 0.08 \times 2\,893\,005 \times 25\text{kg} \times 0.3 \times 0.0017 = \mathbf{2951\text{kg}}$$

Based on the total amount of POPs-PBDEs, main components are calculated. This data is presented in table 14.

Table 10. Preliminary inventory of POPs- PBDEs on monitors and TV-CRT

Homologues	Distribution homologues c-OctaBDE	Total c-OctaBDE (Kg)
HexaBDE	11%	324.61
HeptaBDE	43%	1263.93
c-OctaBDE**	35%	2194.85
NonaBDE**	10%	295.10
DecaBDE-**	1%	29.51
Total		2951.00

b. Detailed inventory of POPs-PBDEs

For a detailed inventory of POPs PBDEs and mainly of c-OctaBDEs, as well as for ease of reference, we will use four main categories of electrical and electronic equipment, following Directive 2002/96 / EC of the EU. Thus, the inventory is based on the following three steps:

- Calculation of POPs-PBDEs in imported electrical and electronic equipment;
- Calculation of POPs-PBDEs in electrical and electronic equipment in use and/or sale;
- Calculation of POPs-PBDEs of electrical and electronic equipment in waste.

Based on the data obtained for 2014 and the above-mentioned methodology, the results of the detailed inventory of POPs PBDEs coming from electric and electronic devices, and their waste, are presented in the following table.

Table 11. Summary of detailed PBDEs inventory in electronic and electrical equipments (EEE) for 2014

Chemical Homologs	Homolog distribution of c-OktaBDE (%)	PBDEs on imported EEE (kg)	PBDEs on used/sale EEE (kg)	PBDEs on EEE as waste (kg)	Total (kg)
HexaBDE	11%	0.35	219.89	14.11	234.35
HeptaBDE	43%	1.38	859.57	55.15	916.10
c-OktaBDE	35%	1.13	699.65	44.89	745.66
NonaBDE	10%	0.32	199.90	12.83	213.05
DekaBDE	1%	0.03	19.99	1.28	21.30
Total*		3.22	1999	128.25	2130.47

*Calculated amounts are based on formulas and collected data.

The results indicate that in the PBDEs inventory, prior inventory data may also be used; however the detailed inventory data presented above is accurate.

The inventory data showed that a total amount of about 2130 kg PBDEs is estimated in electronic and electrical equipment (EEE), and the main amount (1999 kg) in used/sold EEE. The quantity of POPs - PBDEs that passes as waste was higher (128.25 kg) than the amount of POPs -PBDEs entering the country via import (3.22kg). One reason is believed to be the replacement of computer monitors and CRT televisions with screens which have less weight, and the content of c-OctaBDE is lower; respectively, for flat computer monitors this value is 0.225kg/t, while for CRT monitors c-OktaBDE content is 2. 54 kg/t (approximately 10 times higher).

The inventory of POPs-PBDEs in transport

The content of POPs PBDEs is also seen in transport vehicles (cars, trailers, buses, trains, planes and ships); since transport remains one of the sectors with the largest amount of goods and materials, that make up the greatest waste contribution and recycling stream.

A large amount of c-Penta BDE has been used in this sector. Its main use is linked with the treatment of flexible PUR foams (seats, the acoustic management systems, car ceilings, etc.) and a very small amount of seats' wardrobe. Cars and other vehicles contain the largest amount POP-PBDEs. Therefore, the used methodology will focus on these.

Based on the previously described methodology and data on the number of vehicles in our country (according to INSTAT), the results of the inventory calculations for PBDEs-POPs coming from transport are given below (Table 16 and 17).

Table 12. PBDEs inventory according to transport vehicles and production year

Name	Registered Vehicles /Use				Deregistered Vehicles/Waste			
	Produced before 2005	PBDEs amount (kg)	Production 2005 and onwards	PBDEs amount (kg)	Produced before 2005	PBDEs amounts (kg)	Production 2005 and onwards	PBDEs amount (kg)
*Category I	310062	24805	154866	124	58436	4675	5905	5
**Category II	544	272	605	3	136	68	3	-
Total	310606	25077	155471	127	58572	4743	5908	5

* Category I includes all vehicles except buses

** Category II includes buses

Table 13. POPs-PBDEs amount present in transport

	Homolog distribution of c-PentaBDE (%)	NOQ-PBDEs on current use vehicles Σ PentaBDE (kg)	NOQ-PBDEs on deregistered vehicles (or in cemetery) Σ PentaBDE (kg)	The total amount of c-PentaBDE Σ PentaBDE (kg)
NOQ-PBDEs inventory				
tetraBDE	33%	8317.3	1566.8	9884.2
pentaBDE	58%	14618.3	2753.8	17372.2
hexaBDE	8%	2016.3	379.8	2396.2
heptaBDE	0.5%	126.0	23.7	149.8
Others	0.5%	126.0	23.7	149.8
Total		25204	4748	29952

Inventory data showed that a total amount of 28952 kg PBDEs was in transport vehicles and the major amount of POPs PBDEs comes from cars manufactured before 2005 (about 25,077 kg) compared to vehicles manufactured after 2005 (about 127 kg). This is quite logical, since the number of cars imported into our country and produced either in 2005 or onwards, is lower than the number of imported cars that are produced before 2005. Nevertheless, it is observed that for new motor vehicles the regional fraction is 10 times lower than the regional factor for cars with a production date prior to 2005; respectively, the values are: 0.5 and 0.05 for old and new cars.

Findings and recommendations

- The main source of POPs-PBDES emissions in the environment are old electrical and electronic equipment, mainly computers and CRT TVs, as well as transport vehicles produced before 2005, since these goods have the highest content of PBDEs compounds.
- In order to reduce/eliminate emissions of POPs-PBDES in the environment, it is necessary to reduce the use of computers and CRT televisions and vehicles produced before 2005.

2.3.6. The perfluorooctane sulfuric acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)

Perfluorooctane sulfonic acid is an anion which is fully fluorinated and usually used in the form of salts in various applications or used in polymers of higher classes. The purpose of listing the acid, its salts and other compounds in the Stockholm Convention is related to the limitation of the use and production of PFOS and its related substances. The term “substances related to PFOS” is used for all substances containing one or more PFOS groups (identified as $C_8F_{17}SO_2$), which are supposed to be broken down in the environment to PFOS.

PFOS related substances refers to a large group of substances which contain the per- and polyfluorinated sulfates with a string of eight carbons length, which can be simple PFOS salts (ex.; potassium, lithium, ammonium, diethanamine) or polymers containing PFOS. Figure 8 illustrates the structural formula of PFOS (UNEP, 2002).

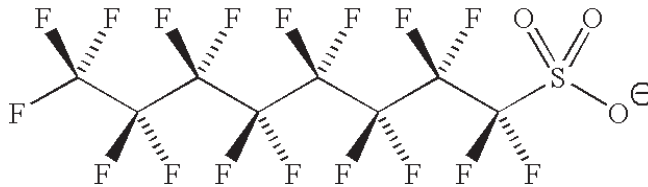


Figure 5. PFOS Structure Formula

The major part of PFOS derivatives is polymers with high molecular weight in which PFOS is only a fraction of the polymer and of the final product. PFOS, its salts and PFOSF belong to the group of chemicals called perfluorinated compounds (PFCs, perfluorinated compounds). The Stockholm Convention qualifies PFOSs as highly resistant and with bio-accumulative properties, although they do not follow the classic pattern of other POPs who are placed in fatty tissues, since PFOSs is related to proteins into blood and liver. They have the ability to be transported to large distances and meet the toxicity criteria established by the Stockholm Convention. PFOS and its derivatives can be released into the environment from industrial processes and their use in industrial and everyday applications.

The inventory of PFOS

The major part of PFOS derivatives is polymers with high molecular weight in which PFOS is only a fraction of the polymer and of the final product. PFOS, its salts and PFOSF belong to the group of chemicals called perfluorinated compounds (PFCs, perfluorinated compounds). The Stockholm Convention qualifies PFOSs as highly resistant and with bio-accumulative properties, although they do not follow the classic pattern of other POPs who are placed in fatty tissues, since PFOSs is related to proteins into blood and liver. They have the ability to be transported to large distances and meet the toxicity criteria established by the Stockholm Convention. PFOS and its derivatives can be released into the environment from industrial processes and their use in industrial and everyday applications.

For the development of the PFOS inventory, the PBDEs/PFOS working team used the UNEP "Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP 2012) - hereinafter referred to as: PFOS Guidance (UNEP 2012).

The main objective of the inventory of PFOS is to obtain the data needed to meet the obligations set under the Stockholm Convention, in terms of developing the National Implementation Plan.

PFOS and its salts are used in several economic sectors. Their inventory, first of all, is based on determining the sources where these compounds are present, and subsequent to that the collected data is used to calculate the amount of PFOS. The total amount of PFOS (and its derivatives) is determined by the following formula:

$$T_c = L \times C \quad (\text{ek.1})$$

where:

T_c = general quantity of PFOS used in industrial processes

L = Concentration in ppm or in % of PFOS in chemical compounds

C = annual consumption of chemical compounds

The same formula will be used to determine the total amount of PFOS (and substances containing even an anion group of this substance).

The total amount of PFOS used in the manufacture of items, such as: furniture, shoes and clothes will be determined by concentrations of PFOS in the material used for the production of those items. Formula to be used:

$$T_s = A \times W \times S \quad (\text{ek.2})$$

where:

T_s = the total amount of PFOS in articles or products sold into the market/ year

A = Amount of PFOS used in the material or fiber (by weight or %)

W = material weight in an article, fiber or product weight

S = average number of articles or products sold out into the market/year.

Inventory of perfluorooctan sulfonic acid and its related substances, is focused mainly on the materials containing this compound and used in household and industry environments. No values for pesticide use of salts of Perfluorooctan sulfonic acid are included in this report, since the information from the Ministry of Agriculture confirms that they are not used as pesticides in our country.

Description of the total PFOS quantity, used in industrial processes through the use of chemical composition, different liquids containing it or chemical formulas, such as: textiles formulas are given above, under methodology.

Based on the above methodology and the approximate data on goods quantities used annually in our country and containing PFOS, the minimum and maximum amounts of PFOS per year have been calculated and are given in the following table.

Table 14. PFOS and its related amount substances

Nr.	Goods category	The estimated annual consumption Kg/year	PFOS amount (mg /kg article)*	PFOS amount (kg/year) (min and max)
1	Hydraulic Liquids (oils) in aviation	10000	500-1000	5 -10
2	Fire Foam	10000	500-1500	5-15
3	Table Letters (coverings) table, cardboard and packaging	1000000	500-5000	500-5000
4	Wall covering (paper)	25000	500-5000	12.5-125
5	Synthetic Carpet	500000	500-5000	250-2500
6	Leather (including bags, shoes etc)	300000	500-5000	150-1500
7	Textile and tapestry	400000	500-5000	200-2000
8	Detergents	5000000	50-100	250 -500
10	Cleaning house Products	1000000	50-100**	50-100
11	Paints and toner printer / photocopy	100000	100	100
12	Spray	200000	50-100	1-2
13	Paints	60000000	50-100	300 -600
14	Stickers (adhesive)	5000	50-100**	0.25- 0.5
16	Generators photo-acid	150000	200-1000	30-150
17	Photoresist substances	50000	200-1000	10-50
18	Total			1863.75-12552.5

*mg/kg = ppm

**PFOS BAT/BEP Guidelines (Secretariat of the Stockholm Convention, 2012)

As seen from the above table, the amount of PFOS varies from 186.75 kg/year to 12552.5kg / year or the average amount of PFOS exposed is 7208 kg/year. The main source of pollution is the use of kitchen paper, packaging and various cardboards ranging from 500 kg/year up to 5000 kg/year, followed by synthetic carpets; textiles and tapestry, and leather use, at 250-2500kg / year; 200-2000 kg/year and 150 - 1500 kg/year, respectively. Adhesive and varnish are polluting sources with lower potential, ranging in limits from 0.25-0.5kg/year for adhesive and 1-2 kg/year for varnishes, followed by hydraulic fluids (oils) used in aviation and firefighting foams, respectively 5-10 kg/year for fluids, and 5-15 kg/year for firefighting foams.

Findings and recommendations

- The main sources of emissions into the environment, in our country, of perfluorooctan sulfonic acid (PFOS) and its related substances are cartons, packages and plasticized letters, leather products and hydraulic fluids, etc., while this compound has not been used as pesticide.
- Control of the products quality that may contain PFOS is important to reduce/eliminate emissions of POPs-PFOS and its related substances in the environment.

2.3.7. Hexabromocyclododecane (HBCD)

Hexabromocyclododekane (HBCD) was added to the list of harmful substances in May 2013. Like all other organic pollutants this substance has toxic properties, resistant to degradation and is bio-accumulative. Transported by air, water and migratory species onto other countries quite far from the country of release, they are bio-accumulated in terrestrial and aquatic ecosystems. Hexabromocyclododecane has a cyclic structure, where atoms of bromine are located (see Figure 3). HBCD is lipophilic; it has low solubility in water and a high affinity for solid particles. Chemical formula of the component is $C_{12}H_{18}Br_6$ and molecular weight is 641 g/mol. Usually there are three stereoisomers that consists of 70-95% γ -HBCD and 3-30% α - and β -HBCD, and in theory 16 stereoisomers can be formed.

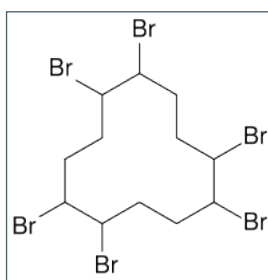


Figure 6. HBCD structure formula

The main application of HBCD is in polystyrene foams, widely used for insulation purposes in buildings and constructions. These types of foam insulation can also be found in transport vehicles and road or railway embankments. This polystyrene foam is found in two forms and contains 0.7 to 3%. The most important second application is in textile coverings, where HBCD is in concentrations 2.2-4.3%. Another application, however smaller is in electrical and electronic devices, where the concentration of HBCD ranges from 1-7%.

Inventory of Hexabromocyclododecane (HBCD)

The inventory of HBCDs at national level, as in all cases for inventories of persistent organic pollutants, is based on UNEP (2015) methodology and is performed through the steps listed below:

- Inventory planning;
- Methodology selection based on UNEP guideline;
- The collection and data compilation from key sectors (electronic devices in use and electronic waste that go into recycling and those that are in warehouses; transport sector and emerging tools out of use; other users such as furniture, textiles etc.).
- Processing and evaluation of obtained data and
- Formulation of the statement.

Inventory of HBCDs in the extended polystyrene (EPS, exclude polystyrene) and the molded polystyrene (XPS; extrude polystyrene)

Extended and extrusion polymers have been the main users of HBCDs at national market. Using of HBCDs into polymers depends on the application and region. In Western Europe, approximately 70% of expanded polystyrene are inhibiting action or flame retardant, while in the Eastern Europe 99% of this type of polystyrene is used for this purpose.

HBCDs uses in various articles

HBCDs are used in furniture and pillows. The extent of this use has not yet been documented. Other uses of polystyrene are also extended in packaging materials.

HBCDs uses in transport Seats' textiles and other textiles

Transport textiles are generally associated with tapestries and other textiles. In the most part of its application in the transport sector, where security is the main national and international aim, there are specific rules that guide fire safety. The use of fixed fire in cars or materials used to slow the flames, as a study conducted in UK suggests, has demonstrated content of high PBDE levels in human blood serum and a high exposure of HBCDs in machine dust. Widespread use of textiles that contain high levels of substances containing compounds that slow the flames is observed in hospitals, prisons, airports and hotels.

Inventory of POPs- Hexabromocyclododecane (HBCD) (Hexabromocyclododecane)

Inventory of HBCD is focused on data for construction materials and household textiles or furniture uses, which are two main sectors that use materials containing HBCD; While the content of HBCD in electrical and electronic equipment and their wastes, as well as other materials, such as: paints, coatings, etc., have a smaller impact, because the content of

HBCD in these materials is very low. Calculation of these values will not be given due to their low significance.

Inventory of HBCD in the construction sector

Insulation materials are widely used in the construction sector, but these materials have HBCD content. Percentage of HBCD in expanded polystyrene (EPS) varies from 0.5-0.7% and those pressed (XPS) varies from 0.8 - 2.5%. The HBCD amount coming from EPS and XPS is difficult to be estimated separately, as EPS and XPS are both integrated in the building structures and occupy about 97% of foams, different insulations etc. In our case, we consider as HBCD calculations in polystyrene expanded (EPS) and to those pressed (XPS), an average of their value at 1.1%.

Taking into consideration the above percentages and the EPS and XPS weight in the construction sector, we make an estimation of the amount of HBCD from the construction sector; the data is presented in the following table.

Table 15. Use of HBCD in EPS/XPS in the construction sector

No.	Source name	Imported amount (ton)	In use / sale			Waste that goes into landfills/ recycle (ton)	HBCD in EPS/XPS (kg)
			Consumer (ton)	Business (ton)	State Institutions (ton)		
1	Foams for ceilings insulation	500	350	100	50	5	5500
2	EPS for insulation of sloped roofs	20	10	5	5	0.5	220
3	Floor isolation	100	50	40	10	2	1100
4	Polystyrene of the inner walls insulation	150	100	35	15	2.5	1650
5	Polystyrene of the external walls insulation	150	100	35	15	2.5	1650
6	Noises Isolation	20	5	14	1	1	220
7	Packaging materials containing PS Foams	50	30	15	5	0.5	550
8	Composite panels and laminates	100	50	40	10	1	1100
9	Total	1090	695	284	111	15	11990

Inventory of HBCD in textile

The second most important sector for using containing HCB materials is the textiles industry, where different articles often have different % of polystyrene contents. These materials, also, contain HBCD, which varies from 2.2 to 15%, according to the material and the polystyrenes % in these textiles. Based on the approximate amount of textile material in our country and the HBCD average content in this material, the HBCD contents are calculated and given in the following table.

Table 16. HBCD use in different articles

No.	Source name	Materials amount (ton)	HBCDs content (%)	Total amount of HBCDs (kg)
1	Textiles used in vehicles upholstery	800	3%	24000
2	Textiles used in household furniture	1200	3%	36000
3	Pillow	150	2%	3000
4	Mattress	550	2%	11000
5	Textiles used in shutters	5	3%	150
6	Extinguishing Uniforms	1.5	8%	120
7	Military uniforms against fire	1.5	8%	120
8	Packaging materials containing polystyrene	15	2%	300
9	Curtains or textile blankets containing HBCDs used in house, prisons and hospitals	75	3%	2250
10	Total	2798		76940

Obtained data showed that people are widely exposed to HBCD and pollution chiefly comes from textiles used in household furniture. Furthermore, it should be noted that the amount of HBCD coming from textiles and furniture is higher than the total amount of HBCD that comes from the construction sector, respectively **11,990 kg** and **76,940 kg** from textiles of household furniture. This is explained by the fact that the use of filling materials in the construction sector is more pronounced in recent years, compared to previous years, when their use was scarcer. High amounts of HBCD can be a potential health risk, primarily for children because they stay for a longer time in contact with these articles and in most cases they put their hands in their mouths, without washing them in advance.

Findings and recommendations

- The greatest HBCD pollution comes from textiles used in furniture and household facilities and secondly from the construction sector.

- The use of filling materials in the construction sector should be checked for quality of goods used, especially in relation to the content of HBCD.
- Control of textiles and filling materials quality that may contain HBCD is important to reduce/eliminate emissions of POPs- HBCD in the environment.
- Control and continuous monitoring of emission sources of POPs is necessary to preserve the environment and human health, as these compounds are harmful to the environment and dangerous to human health.

2.3.8. Hexabromobiphenyl (HBB)

The hexabromobiphenyl (HBB) was added to Annex A of the Convention in 2009, as one of the substances that member states are obliged to prohibit or to apply measures for the elimination of the production, use, import and export of its chemical compounds. Due to the low production and limited use of HBB, most materials containing HBB were disposed of decades ago (PBDEs Guidance, UNEP 2012), therefore this substance is not the subject of the inventory and action plan.

2.3.9. Other new POPs (Hexachlorobutadiene, Pentachlorophenol and its salts and esters, Polychlorinated naphthalenes)

In May 2015, some new chemical compounds were included in the list of POPs, under the Stockholm Convention. These chemical compounds were:

1. Hexachlorobutadiene (HCBD) which were listed under Annex A, without specific exemptions;
2. Pentachlorophenol and its salts and esters (PCP), listed under Annex A, with specific exemptions for use in utility poles and cross-arms; and
3. Polychlorinated naphthalenes (PCNs), listed under Annex A and C, with specific exemptions for use in the production of polyfluorinated naphthalenes, including octafluoronaphthalene.

These compounds were never produced in Albania, due to the lack of industry, but decades ago they could be imported and used, before their production was stopped, years ago in other parts of the world, as well. The working group could not find available data about their import, use and emission in the environment. Although, an inventory and action plan can be planned for these compounds, especially for Pentachlorophenol and its salts and esters (PCP), which we believe were used in the past, in Albania.

2.3.10. Stockpiles of POPs Waste and Contaminated Sites (SWCS)

Two main points or tasks were mentioned in the first national implementation plan to be completed, namely:

- Site investigation and development of remediation plans for the potentially contaminated sites;
- Field studies, sampling and analysis, determination of priorities, data processing and evaluation of the cost for projects of rehabilitation of contaminated sites.

Both these tasks are not fully completed and require the attention of the Ministry of Environment and other responsible institutions to be completed.

Some of the contaminated sites or hotspots that must be investigated and monitored are cited in the State of Environmental Report 2014, which were identified through the UNEP project “The identification of major contaminated sites in Albania”. The contaminated sites are as follows:

- Alba Film, Tirana: this site contains different toxic chemicals, in the amount of 50 kg and spread in an area of 2 ha;
- Textile factory in Berat: this site contains 30 tons of ammonium, and 126 kg of other toxic chemicals, spread in an area of 0.6 ha;
- Storehouse in Rrëshen: this site contains different pesticides and permanganate salts, in the amount of 725 kg, and spread in an area of 0.2 ha;
- Phosphate production factory in Laç: this site has residue of different chemicals, 38 ha;
- Agricultural storehouse - Lushnja: this site has residue of different pesticides, covering an area of 0.2 ha;
- Area of oil regeneration site and repairing station of transformers in Tirana.

The area of PortoRomano Durrës is a major environmental concern, in our country. A pesticide production factory was located there. Until 1990, pesticides such as lindane (γ -HCH), thiram, etc., were produced at this factory. Due to discharges and inappropriate storage conditions of wastes, contamination of the surrounding area was caused.

Therefore, the presence of chloro organic pesticides in water, soil, sediment, as well as in organisms, is detected. Obtained soil samples from the surrounding area where pesticides were once stored, resulted with high concentrations of HCH, which ranged from 1290-3140 mg/kg soil.

The total content of HCH in samples of surface water and groundwater resulted in 0.28 and 1.47 µg/liter, respectively. As we can see, the level of pesticides in the groundwater is 3 times higher than the standard of pesticides total in drinking water (0.5 µg/liter).

Therefore, the presence of chloro organic substances observed in the mussel samples that are obtained near the contaminated areas presented a total amount of DDT isomers that ranged from 45.4 to 448.7 ng/g fresh mass, while the total amount of HCH isomers ranged from 5.7 to ng/g fresh mass.

The area around the former chemical plant in PortoRomano Durrës, showed high amounts of chlorobenzenes, found in soil, water and marine organisms, as well. A sample obtained from the area near the plant, contained approximately 4.4 mg/L chlorobenzene, 4000 times higher than the EU standard for drinking water.

The concentrations of TeCBs and HCB detected in soil samples were at 1.86 and 3.7 ng/g, respectively. HCB was found even in mussel samples taken near the PortoRomano sea and the concentration went up to 22.4 ng/g fresh mass.

3. STRATEGY AND ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

3.1. Policy Statement

From the first POPs inventory up to 2016, progressive steps have been made in Albania in implementing the Stockholm Convention and approximating legislation on POPs management with the EU legislation. These progressive steps on POPs management are listed below:

- ✓ The stockpile of DDT and Lindane, as two of the most important POPs pesticides are eliminated, but their residues on different environmental components must be assessed;
- ✓ Production, import and use of POPs pesticides in Albania is prohibited and does not exist;
- ✓ Import, transit and use of other pesticides is based on standard procedures and in conformity with international best practices;
- ✓ The use of materials and equipments that contain POPs residue is under control and environmental protection measures are taken for their management;
- ✓ The sources of unintentional POPs have been identified and some measures are taken to reduce their emission caused by fires of different waste in the open air and other industries;
- ✓ Public awareness on the dangers of POPs on health and the environment has increased significantly.

Based on the current situation of POPs in Albania, some action plans for their elimination, reduction and management according to requirements of the Stockholm Convention were identified, as follows:

- Define institutional responsibilities at national and regional level for elimination/reduction and management of POPs compounds, strengthening institutional and capacity building and sector implementation of the Convention and reporting obligations;

- Create a management system and strengthen technical capacities for elimination/ reduction of waste that generates POPs substances, in order to avoid unintentional release in the environment;
- Update all documents (for internal use in Albania) according to the Stockholm Convention List (new chemical substances updated in the Annexes A, B and C) and undertake the measures to control producing, transitting, import and export of POPs;
- Develop in accordance with relevant directives of the European Union, by-laws (based on the Law on chemicals-2015) for the environmental management of POPs, including the rates of POPs in the environment components, emissions/ release from economic activities, monitoring and limits in food products;
- Designate institutions for monitoring POPs in the environment (air, water, soil and biota) and state bodies responsible for carrying out monitoring (sampling and related analyzes);
- Inform on the environment situation and health effects of the presence of POPs, through various forms and means of communication, by the central and local responsible institutions, industrial stakeholders and respective research centers, in particular on the effects of dioxins and furans;
- Provide necessary funding to increase institutional capacity, technical assistance, determining the safest mechanisms for the implementation of the Stockholm Convention and their environmental monitoring, mainly through Government funds;
- Strengthen cooperation, exchange scientific information on POPs for best management, use of the Best Available Technologies (BAT) and friendly or Best Environmental Practice (BEP);
- Elimination from use of equipments containing PCBs.

Based on data analysis and the inventory carried out so far in Albania, it turns out that almost all compounds containing POPs are imported. They are used in different quantities, but they are not produced in the country.

Since 2007, pesticides containing POPs have no longer been imported or used in Albania. The former site of production, mixing and storage pesticides in Durrës is encapsulated in concrete and all the remains of waste are destroyed. Pesticides that may contain impurities, such as POPs, were used some years ago as Endosulfan (Thiodan), but all these categories are banned for use as pesticides. The List of banned pesticides and national registry of chemical compounds (hazardous or not) is efficient. However, due to environmental sustainability, we must note that often the level of chemical purity is not

checked, for those pesticides that are used in agriculture and require monitoring and a specific Action Plan to meet the Stockholm Convention, which is presented below.

Substances such as DDT and Lindane, which were used prior to 1990, it currently turns out that they do not exist. As reported in the first report, the amounts identified during the first inventory in 2006, DDT and hexachloroethane / Lindane were removed from Albania in the framework of the project “Repackaging and removal from Albania of pesticides and other chemicals from the Bishti i Pallës”, funded by the Dutch Government, which terminated in July 2006. Therefore, there is no reason to include these compounds in the National Action Plan.

PCBs are mainly contained in transformers/condensers used in the electrical power system and, according to NIP-2006 about 5,3% of their oil was contaminated with PCBs. Currently, a good part of them are still in function, therefore the action plan for PCBs management is presented here below.

POPs produced unintentionally, as defined in the Stockholm Convention, are polychlorinated dibenzofurans (PCDF), polychlorinated dibenzo-p-dioxins and polychlorinated (PCDD), hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs), which are formed as by-products. In Albania, unintentionally produced POPs are released via different sources, mainly because of poor environmental waste management (management of different categories of waste, especially its unsafe burning); therefore it is necessary to design a specific plan for unintentionally produced POPs.

PolyBromdiphenyl ethers (PBDEs) are a group of brominated aromatic organic compounds that are generated by the electronics industry to manufacture plastic skeletons of computer equipment and in the transportation industry for the manufacture of warheads in vehicles. Albania does not produce PBDEs, but it uses tools and equipment that contain these substances. Perfluorooctanesulfonate (PFOS), its salts, Perfluorooctanesulfonyl fluoride (PFOSF) and Hexabromocyclododecane (HBCD), as well as PBDEs are not produced in Albania, but they are in composition of goods and equipments which are currently used. Therefore, for the four groups above (PBDEs, PFOS, PFOSF and HBCD) it is essential to prepare a special Action Plan.

Objectives and priorities for the implementation of the Stockholm Convention are set out in the following action plans, in accordance with the recommendations of the Stockholm Convention:

1. Action Plan for complementary institutional and regulatory measures to implement the Stockholm Convention and reporting;
2. Action Plan for PBDEs, PFOS, PFOSF and HBCD;
3. Action Plan for Other new POPs;

4. Action Plan for PCBs and PCB containing equipments;
5. Action Plan for compounds / processes that generate unintentional POPs substances;
6. Action Plan for the contaminated sites;
7. Action Plan for general monitoring of POPs chemicals;
8. Action Plan for education, awareness and public information.

3.2 Implementation Strategy and Action Plans

3.2.1. General requirements for the preparation of action plans on POPs substances

For the classification, registration and severity of any chemical substance generation of information on them is needed via:

- (a) Self-declaration of the technical data of the product (by the standards described in legislation) based on certificates of origin of the substance;
- (b) Analysis of the product, complementary or not, of the active substance or impurities therein;
- (c) Through tests, if possible, with foreign assistance or inspectorates bodies on relevant fields. Each new toxicological and ecotoxicological test and other tests carried out in accordance with analogous specific legislation, and therefore, other equivalent international standards.

3.2.2. Socio-economic assessment for National Implementation Plan (NIP) development and implementation

For the preparation of NIP of POPs, at the beginning of the process, a socio-economic assessment was prepared based on UNEP methodology (2007) for NIP development and implementation under the Stockholm Convention.

The main stakeholders, such as: decision makers, the economic sectors that are directly or indirectly related to POPs and use of chemicals, companies related to production, transport and the use of substances that contain POPs were identified and were met. Consultation of strategies and policies related to implementation of Plan, as well as consultations with the public who is directly affected (on the contaminated areas and/ or potentially affected by the use of pesticides and other substances that contain POPs) were held, in order to get their opinion and comments on application of best practice on POPs management. Thus, these consultations included the most important sources

of information. Based on the reporting obligations derived from Stockholm Convention, three key groups of stakeholders are engaged:

1. The Ministry of Social Welfare and Youth; during meetings held at this ministry, discussions focused on environmental impact on the livelihood of people that live in the areas surrounding the identified contaminated sites with POPs and in the area where POPs have been used. The identification of the environmental issues that are related to the potential contamination from the use of POPs in their regions and if the livelihood level is affected or not from the use of POPs substances.
2. The Ministry of Health; where discussions were about the possible human health impact of POPs waste or waste disposal on the residents who live close to the area of identified contaminated sites or waste disposal sites.
3. The Ministry of Agriculture, Rural Development and Water Administration; during meetings information was collected about the rules and laws for the protection of the consumers and environment, as the consequence of POPs pesticides use in the past, possible use of POPs pesticides in the last years and legal basis for registration, import and use of pesticides in our country.

During the preparation phase of the NIP three workshops were organized, with qualified participants from different relevant institutions on environmental and POPs issues. The workshops were held on three different thematic POPs areas: (i) legal and institutional framework on new POPs chemicals; (ii) current state of POPs pesticides and remediation of contaminated sites; and (iii) current state of PCBs and action plan for elimination of contaminated transformer oil and equipments with PCBs.

All obtained information, data and comments during the meetings with stakeholders and workshops are included in the prepared NIP.

After the NIP was prepared and presented like a draft (October, 2016), the information was disseminated to relevant stakeholders, in order to get their comments until the end of November. The corrections made in draft NIP, based on feedback from the stakeholders consisted on: (i) simplification of actions plans related to POPs and with smaller budget and (ii) the public awareness plan should be more detailed, especially on the actions related to the POPs risk.

3.2.3 Action Plan: Institutional and Regulatory Strengthening Measures

Albanian National legislation is complete with all provisions necessary to ensure compliance with the Stockholm Convention. Bylaws (DCM, regulations and instructions) must be developed to ensure the management of POPs, in particular on:

1. Import, export, production and use of Annex A chemicals (pesticides);
2. Handling, use (from 2025) and disposal (by 2028) of Annex A II chemicals (PCBs);
3. Minimizing or eliminating the chemicals in Annex C (unintentionally POPs produced by products / processes and technology);
4. Elimination according to best practices for environmental compliance of POPs waste.

These specific targets become mandatory since Albania is a EU candidate. It must implement, among other things, the *acquis communautaire* in the field of waste management and specifically on dangerous chemical substances. After NIP on POPs (2005) progress was made, specifically on the institutional plan for elimination, phase out of the use and monitoring. Through DCM No. 860, dated 20.12.2006, "On the elimination and removal by the use of POPs", elimination of hazardous waste pesticides and encapsulation of the main focal manufacture/storage of pesticides is made possible. According to the above DCM, all POPs waste substances will be eliminated from the territory of Albania and since 2006 there is no chemical containing POPs (even as an impurity).

Law no. 10431, dated 9.6.2011, on "Protection of Environment ", article 32 determined the establishment of the "Registry of Emissions and Pollutant Transfer to fulfill, among others, the obligations arising from international agreements", including monitoring of POPs. While article 34, of the same law states that "...protection from the harmful effects of chemicals, compounds and preparations involves measures and procedures for protection from the impact of their effects on the environment and human health" and "...measures for enabling safety from the harmful effects of chemicals are determined by a special law." This last task is fulfilled by law no. 27/2016, 03.17.2016 "on Chemicals", with POPs as an important target therein.

An important regulation on POPs management is DCM No. 360, dated 29.04.2015, on "Approval of Persistent Organic Pollutants list and definition of measures for their production, import, marketing and use". This regulation clearly defines management measures for production, marketing, use export and transit of POPs chemicals/contaminated waste, their customs control, based on obligations deriving from the Stockholm Convention. Also, MoE is defined as the responsible institution for the preparation of the National Implementation Plan for elimination and removal of POPs chemicals and NEA as the responsible institution for monitoring and reporting on POPs issue.

Based on the current environmental legislation and policy, approved POPs regulations, obligations set in the Stockholm Convention and other international environmental agreements, the following measures on **Institutional and Regulatory Strengthening** are suggested:

- POPs chemicals have to be included in the national monitoring program;
- Continuous harmonization of national environmental legislations with EU legislation;
- Establishment and operation of the “Chemical Office”, “National register of imported chemicals”, “Inter-ministerial commission of chemicals” and other related regulations with chemicals and POPs management.

Harmonization of national legislation with EU

Certain laws and DCMs, which directly or indirectly determine the rules and procedures of management of POPs, were approved and started implementation in the last decade. The law “On Environmental Protection”, No. 10431, dated 9.6.2011, is approximated with several directives, including the Integrated Pollution Prevention and Control of Large Combustion Plants, Seveso II, the discharge of pollutants and Pollutant Transfer Register etc. This law is in full conformity with EU directives on environmental protection. The aforementioned Directive requires that specific environmental components be designed and implemented as a separate law. Law No.10440, dated 07.07.2011, on “Environmental Impact Assessment” includes a number of directives, including Directive 85/337/EC on the assessment of the effects of certain public and private projects on the environment, Directive 97/11/ EC and 2003/35/EC. Law No. 10448, dated 14.7.2011, “On Environmental Permitting” has incorporated the guidelines of the Integrated Pollution Prevention and Control of Plant Defense. The draft Law on “Major Industrial Accidents” related with SEVESO Directive II, Law No. 10463, dated 22.9. 2011, “On Integrated Waste Management” approximates the EU Framework Directive on Waste, 2009. Law no. 27/2016, for “Chemicals Management”, dated 17.03.2016, is partially aligned with: Regulation (EC) 1907/2006 of the European Parliament and the Council, dated December 18, 2006, “On the registration, evaluation, authorization and restriction of chemicals (REACH) and Regulation (EC) 1272/2008 of the European Parliament and the Council, dated December 16, 2008. Also some draft Decisions of Council of Ministers are being developed regarding “Waste and treatment for electronic waste”, “For the polystyrene waste from the construction industry”, which are expected to discipline and standardize procedures of plastic waste handling.

Although Albania has ratified the Basel Convention on the control of trans-boundary movement of hazardous wastes and their disposal, there are still legislation gaps, which are indispensable for an effective control on the import of chemicals / waste.

Table 17. Action Plan for complementary institutional and regulatory measures to implement the Stockholm Convention and reporting

Approximation with EU Legislation				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Drafting and approval of a specific Law “For POPs”, in accordance with directives 75/439 / EC, 91/157 / EC, 93/86 / EEC, 98/10 / EC, 2001/68 / EC and EC Decision 96/59 / EC for disposal of PCB / PCT.	MoE, NEA	2018	Approved Law	15,000
Drafting and adoption of the act “For active substances and POPs” in accordance with directives 79/117 / EEC, 83/131 / EEC, 85/298 / EEC, 86/214 / EEC, 86/355 / EEC, 89/365 / EEC, 90/335 / EEC, 90/533 / EEC, 91/188 / EEC and EC Decision 2004/850 / EC	MoE/MoEI/MoH	2017	Acts transposed	25,000
Drafting and approval of Guidelines for standards in management / control PCBs throughout their life cycle	MoEI / APC/ Chemical office	2018	Guide	2,000
Determining rules/regulations for definitions and obligations to use BAT (Using the best techniques “for a Limited number of important industry in Albania, for example, oil refineries, cement production, treatment and recycling of waste)	MoE	2018	Acts transposed	40,000
Transposition of the relevant directive regarding volatile organic substances (VOC)	MoE	2017	Acts transposed	40,000
Institutional responsibilities on management of POPs compounds				
The development of the National Strategy for the Management of Chemicals	MoE& NEA	2017	Strategy approved	10.000
Establishing the Chemicals Office	MoE/APC/OEED/ MoEI	2016	Opening office	20,000
The employment of two full-time specialists at the office of chemicals	MoE	2017	Operational office	45,000
The opening of the office of the Inter-Ministerial Commission of POPs. A coordinator employed	MoE/APC/OEED/ MoEI	2017	Office and Commission	30,000
Organizing a training program of specified authorities for the management and treatment of waste from pesticides, packaging and other PCB waste	MoE & NEA	2017	Modules	10,000
Raising awareness of the specialized state bodies, industry and other entities in connection with issues related to equipment containing POPs, chemicals, waste and unintentionally produced POPs	MoE/APC/OEED/ MoEI	2017	Number of Meetings	12,000

3.2.4. Action Plan for Polybromodiphenyl Ethers (PBDEs), Perfluorooctane sulfonic acid and related substances (PFOS-PFOSE) and Hexabromocyclododecane (HBCD)

Substances containing PBDEs generate POPs, as by-products after their use in the electronics industry and the carcasses of cars. They are not produced in Albania, neither recycled; they are only collected and deposited in landfills, just as any solid material. The Stockholm Convention requires inventories on their collection and recycling (where technology is available) and secure placement. In Albania, NIP for these substances have to be include following measures:

- Inventory of all equipments/machineries, which contain PBDEs; PFOS-PFOSE, HBCD;
- Identification of imported equipments which contain these chemical compounds;
- The establishment of the database according to the specifications of products / equipments.
- The establishment and improvement of the legal framework for their management and elimination/reduction;
- Elimination of industrial and commercial waste that contains these POPs chemicals.

Table 18. Action Plan for PBDEs, PFOS, PFOSE and HBCD

Initial assessment of current situation of chemicals - PBDEs on the environment				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Description of protocols / procedures to stop the production, use, import and export of PBDEs	NEA	2017	Procedure	0,000
Development of inventory in the country on the possible use and dispose of the waste PBDEs	MoE	2018	Inventory report	10,000
The initial assessment of the Perfluorooctane sulfonic acid and related substances (PFOS-PFOSE) and Hexabromocyclododecane (HBCD)				
Identify industries and human activities that use equipment / products containing PFOS, PFOSE and HBCD	MoE	2017	List	5,000
Description of protocols / procedures to ban the production, use, import and export of PFOS, PFOSE and HBCD	MoE & NEA	2018	Procedure	0,000
Development of inventory on the possible use and storage of waste PFOS, PFOSE and HBCD in place	MoE & NEA	2019	Inventory report	5,000

3.2.5. Action Plan: Other new POPs (Hexachlorobutadiene, Pentachlorophenol and its salts and esters and Polychlorinated naphthalenes)

Other new POPs as Hexachlorobutadiene, Pentachlorophenol and Polychlorinated naphthalenes present high environmental importance, due to their adverse health effects. At the moment, these POPs are not supposed to be widespread in Albania, since they were never produced here and based on the fact that their production in the world was stopped years ago.

Nevertheless, an action plan is planned for these compounds, especially for Pentachlorophenol and its salts and esters (PCP), which has been used in the past in Albania.

Tabela 19. Action Plan for chemicals as Hekzaklorobutadiene, PCP dhe PCNs

Assessment of present levels, as entire substances or impurity of new POPs				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Establishing an integrated control system (Customs, Ministry of Agriculture, Ministry of Environment) to prevent the import of pesticides containing new POPs compounds (including their impurities)	MoE /MoARDWA/ MoEI	2017	Guide	0.000
Identification of industrial and human activities that are using equipments/material containing other new POPs	MoE/NEA	2018	List	5.000
Inventory of other new POPs in use and stockpiles	MoE/NEA	2019	Report	5,000

3.2.6. Action Plan: PCBs and Equipments Containing PCBs

For substances of PCBs and equipment containing PCBs, the Stockholm Convention stipulates the following objective: taking effective security measures that all equipment containing PCBs are replaced at the very least until 2025, and eliminate all waste with PCBs until 2028.

Therefore, specific measures for PCBs have to be planned within the NIP:

- Elaborate and enforce regulations related to the management, treatment, monitoring, removal and disposal of oil and equipment contaminated with PCBs;
- Redefine and implement internal rules to transformer management, handling and removal from their work;

- Training of staff responsible for handling and maintenance of transformers;
- Establish capacity for semi-quantitative analysis (by using test-kite) to estimate PCBs content in oil of old transformers;
- Establish a national laboratory for analysis of PCBs in transformer oil and in different matrix;
- Increase public awareness about the dangers of substance PBC;
- The identification of contaminated sites and their rehabilitation PBC;
- Disposal of mineral oil contaminated with PCBs;
- Design and put in place a monitoring program to PCBs at national level.

Table 20. Action plan for PCBs management

Creating and implementing a system for the identification, marking, removal, storage and final disposal of equipment containing PCBs and PCB wastes				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (EURO)
Creating an inventory of equipment containing PCBs and PCB wastes in Albania	NEA/AUT-Department of Environment	2017	List of detailed inventory	15,000
Preparation of Report on equipment containing PCBs for the NEA, in accordance with the requirements of the Stockholm Convention	NEA/AUT-Department of Environment	2017	Report	8,000
Designing and Implementing an internal guideline for the removal of oil transformers and rehabilitation of surfaces contaminated by oil leaks	APC/OEED/TSO/METE/ MoE	2017	Guide	5,000
Compilation of the booklet for identification of PCBs used in the plastics industry, polymer, paints, coatings and construction	MoE / MoEI / MoTI	2017	Brochure	3,000
Prepare and implement a Specific training for crews/teams involved in the repair and maintenance of transformers	APC/OEED/TSO	2017	Training Modules	2,000
Accreditation of PCBs Laboratory and Performance Validation	NEA/MoE	2020	Accreditation certificate	3,500
The plan to gradually remove from use equipment containing PCBs remaining (especially transformers and power capacitors)	APC/OEED/TSO/MoE/NEA	2018	Number of machineries/ equipment removed	0.000
Approval and implementation of the national monitoring program of PCBs	MoE/NEA	2018	Monitoring plan	0.000
Develop a national plan for the disposal / decontamination of equipment containing PCBs and PCB wastes	MoE/NEA	2017	Elimination Plan	0.000

3.2.7. Action Plan: Unintentionally Produced POPs

For those POPs produced as by-products or unintentionally, the Stockholm Convention sets the objective of minimizing and, where feasible, ultimate elimination of products / devices that emit/produce unintentionally POPs produced from anthropogenic sources.

For the unintentionally produced POPs, the following specific measures have been identified to ensure effective management:

- Completion of legislation and regulations concerning industrial pollution prevention, control, and waste management;
- Strengthening the institutional capacity (human and technical) responsible for waste management (in particular sound management of landfills and prevention of open burning);
- Policy action to reduce dioxin and furan emissions from landfills and waste combustion;
- The application of the best techniques and best management practices in industrial and construction sector;
- Development and implementation of a national medical waste management for reduction of unintentional POPs emissions;
- Increase public awareness for environmental waste management;
- Updating regular emission inventory of unintentionally POPs.

Table 21. Action plan for unintentionally produced POPs

The elimination of POPs chemicals produced unintentionally in the process of open burning of waste and other processing industries				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
The development of regulations and the establishment of tariffs on manufacturing and products that could be a potential source of unintentionally generated POPs compounds	MoE &NEA	2018	Tariffs of specific activities	0,000
Review existing regulations and standards for the release of unintentionally generated POPs (POPs)	MoE &NEA	Continuously	Updated regulation	0,000
The information campaign on the benefits of replacing fossil fuels and wood heating with alternative heating systems	MoE/AKM/AUT-Department of Environment	2017-2021	Number of workshops	6,000

Drafting an instruction or regulation for burning of agricultural waste and forest fires	MoE & MoRDWA	2018	Prepared regulation	3,000
Develop an action plan (Model) on local level for domestic waste management to reduce emissions of dioxins and furans, as well as the enhancement of dialogue between Central and local governments municipal waste for effectiveness management and in particular uncontrolled burning of waste	MoE	2018	Local action plan	3,000
Develop a scheme for the identification of economic instruments, in order to increase the recycling of plastics and reduce the flow of waste as a source of dioxin	MF & MoE	2018	Subsidies/ differentiated tariffs, according the sectors	5,000
Improving the legal financial and institutional framework for the prevention /elimination /release of POPs from products applied as BAT and BEP				
Strengthening the control of technical services for controlling emissions from vehicles, according to the European emissions standards	NEA	2017- and continuously	Controls number	0,000
Cleaner production of Ferro-chrome and steel industry	NEA	Continuously	Additional installation in the industry	0,000
Cleaner production in the cement industry Specifically temperatures that control dioxin emissions	NEA	Continuously	Additional installation in the industry	0,000
Increased knowledge, building capacity and carrying out self-monitoring Unintentional POPs emissions in the construction industry and waste recycling	MoE & NEA	2017 and continuously	Self monitoring number	5,000
Guide for risk of medical waste and training support staff in all hospitals and clinics for waste reduction and their division	MoH / MoE	2017	Guide	8,000
Establishment of reporting system, gathering data about production and emission of unintentional POPs	NEA	2017	Emission data on the National Report of Monitoring	5,000
Continued reporting of data on emissions of unintentionally produced POPs submitted to the Secretariat of the Convention.	NEA	Continuously	Data reporting (frequency, parameters)	0,000

3.2.8. Action Plan: POPs waste and contaminated sites

For POPs waste and contaminated surfaces, the Stockholm Convention provides the following objectives: waste and surfaces containing or contaminated with POPs compounds included in Annex A, B or C should be managed in such a way that it ensures protection of human health and the environment.

Based on the current situation on POPs waste management and contaminated sites, the proposed measures for better management of waste and rehabilitation of contaminated sites are as follows:

- Strengthen legal and institutional capacities for POPs waste management, at the local and national level;
- Final Rehabilitation of POPs contaminated sites, through the development of specific remediation plans for each site, according to their level of contamination. The identified POPs contaminated sites are listed in the initial setting of Albania NIP (2006) and are located in Durrës (former chemical plant in Porto Romano), Vlora (former PVC), in Elbasan (former coke plant), in Lushnjë (former PVC processing factory) and Shkodra (Bajza railway station).

Through the measures taken, as they have been described herewith, the areas are clear and surrounded within a sufficient perimeter, in order to protect the environment and especially the human health. However, analysis and monitoring is required for each site.

Table 22. Action plan for waste and stockpile management

Assessment of POPs level contaminated of surfaces and their rehabilitation				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Identification of contaminated areas, sampling and analysis of soil samples to determine the level of pollution	NEA & AUT (Department of Environment)	2017-2019	Number of sites and their surface	15,000
Training of NEA structures and Regional Inspectorate for law enforcement to prevent pollution	AUT (Department of Environment)	2017	Module training and participants	10,000
Approval of the regulations for the rehabilitation of environmentally acceptable levels	MoE & MoARDWA	2018	Rules - Guide	0,000
Assessment of the concentration of POPs in potentially contaminated area and their ranking by the level of pollution	NEA & AUT (Department of Environment)	2018-2021	Report	20,000
Reporting data in the secretariat of the Stockholm Convention	MoE	2017-2021	Data series	0,000

Selection and implementation of adequate methods for environmental rehabilitation of contaminated sites (beyond the standard rates)	MoE AUT (Department of Environment)	2018	Methods/study	
Evaluation and monitoring of the effects on the selected site for rehabilitation	MoE AUT (Department of Environment)	2019-2021	Rehabilitation site	80,000

3.2.9. Strategy for Monitoring, Research and Development

Chemical compounds classified as POPs are a highly toxic group threatening human health and animals. They are also more resistant to time and therefore constitute a threat to the environment, almost constant, throughout its global components: soil, water and air. Performing monitoring of their concentrations, classification and effects in daily life, in short and long terms, according to the Stockholm Convention requirements is essential. DCM no. 360, dated 29.04.2015, determined that NEA should include monitoring indicators of POPs in its monitoring program for the state of environment in Albania. So far, the monitoring of POPs has not been included. It is imperative for NEA to include the monitoring of POPs in the environment in the National Monitoring Plan.

Application of POPs monitoring will allow a better understanding of the situation on the content of POPs in main environment components, the contribution of various economic activities in the environmental pollution caused by this category of hazardous chemicals, risk analysis, and on these basis, the determination of appropriate measures, which should contribute to improving the environment and achieving better environmental standards.

In this context, these main measures have to be undertaken:

- Monitoring of POPs in different areas and media has to be involved in the activities related to the national monitoring program;
- Strengthening of institutional capacity for research and development on POPs issues.

Table 23. POPs management and environment, food and biodiversity protection

Harmonization, fulfillment and development of laws and rules to set the monitoring of POPs compounds in all environmental action plans, food and biodiversity				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Approval of the monitoring program for POPs substances in all strategies and environmental action plans	MoE &NEA	2017	PBC indicators	0,000
Include monitoring of POPs, PCBs particularly, as part of the National Environmental monitoring program	MoE &NEA	2017	PBC indicators	0,000
Develop a monitoring program for POPs substances in work environments	MoE & MoH	2017	Monitoring programme	0,000
Implementation of the monitoring program for POPs chemicals content in: air, water and the sea, land, biological organisms and humans				
Performing analysis of the current level of POPs in pesticides in former storage and contaminated sites, including risk assessment	MoE &NEA/ AUT/PUT/UT	2017	Report	15,000
Implementation of the monitoring program for POPs chemicals in surface water, groundwater and waste in landfills	MoE &NEA/ AUT/PUT/UT	2018- 2021	Report	30,000
Implementation of the monitoring plan to soils near the former contaminated sites	MoE &NEA/ AUT/PUT/UT	2018- 2021	Report	25,000
Implementation of the monitoring plan in marine waters and in coastal sediments	MoE &NEA/ AUT/PUT/UT	2019- 2021	Report	15,000
Implementation of the monitoring plan in biological material (birds and marine mamifers/mammals)	MoE &NEA/ AUT/PUT/UT	2019- 2021	Report	10,000
Implementation of the monitoring plan of POPs compounds in work environments	MoE &NEA/ AUT/PUT/UT	2019- 2021	Report	5,000
Reporting and informing the public and international organizations				
Reporting information on the content of substances in the environment and the working environment in the European Environment Agency and the Secretariat of the Convention	MoE &NEA/ MoH	2017	Data series	5,000
Develop a results report on the state of the environment and biological materials and online publication in Ministry website	MoE &NEA/ AUT/PUT/UT	2019	Report	20,000

3.2.10. Action Plan: Public Awareness, Information Dissemination and Training

On Public information and awareness, the Convention stipulates the necessity for public access to information relevant to POPs compounds and raising awareness on them.

Because POPs compounds and especially waste materials that are daily used in many human activities are not easily distinguishable from the general public, the information on these compounds is necessary. Public awareness is a great pressure tool for political making and managers to eliminate/reduce the risk posed by POPs. Training and the increased professional competence of persons who deal directly with the POPs improve their management.

The following measures have to be undertaken, in order to increase public access in information on relevant POPs compounds and raise their awareness:

- Raising awareness in communities, public information, and accessing engagement of NGOs network in documents and analytical data on the risk of POPs and their effects on human health and the environment;
- Training of staff who are directly engaged in the use of POPs substances;
- Engaging the media on environmental issues related to POPs compounds;
- Introduction of POPs issues into school programs (brief information included in optional subjects, in the 9-year elementary school system).

Table 24. Action Plan for Public Awareness, Information Dissemination and Training

Develop a detailed program - Strategy for informing the public about the harmful effects of POPs chemicals				
Description of the measure	Responsible Institution	Time	Indicators / verification tools	Cost of measures (in €)
Awareness campaign in industrial areas and in the vicinity of landfills and on pollution effects on soil, water and air to PCBs, dioxins and furans from burning waste	MoE &NEA/ MoH/AUT/ PUT/UT	2017	Leaflet number	3,000
Preparation of brochures containing information on POPs and their effect on human health and the environment	MoE &NEA/ MoH/AUT/ PUT/UT	2018	Brochure	5,000
Design Manual for treatment of waste pesticides, packaging and waste from PCB	MoE &NEA/ MoH	2018	Manual	0,000
Public information on the method of collection and storage of waste POPs compounds	MoE &NEA/ MoH	2017	Manual	0,000

Articles in the daily newspapers on POPs: their status and the risk of environmental	AUT/PUT/UT	2018	Number of papers	0,000
Raising awareness about the dangers of POPs compounds				
Engaging and integrating the public opinion regarding the situation and effects of POPs (meetings, questionnaires)	AUT/PUT/UT	2020	Meeting number	4,000
TV programs/roundtables where organizations dealing with management of POPs compounds discuss issues	AUT/PUT/UT	2017-2021	Number of TV shows	0,000
Preparation of a documentary and television spots on the use / waste of POPs for the most affected localities	AUT/PUT/UT	2018	Documentaries and spots number	0,000
Development of a program of lifelong learning about POPs chemicals: in administration, industry, schools and universities				
Drafting and implementation of a syllabus for secondary schools and universities	AUT/PUT/UT	2020	Programme	0,000
Organization of trainings and seminars for persons dealing with compounds and Residues of POPs	MoE & NEA/ MoH	2017-2021	Number of Seminars and trainings	2,000
Drafting a manual for the identification and safe handling of PCB compounds, including equipment containing PCB compounds	MoE & NEA/ MoH	2017	Manual	3,000

3.3. Proposals and Priorities for Capacity Building

Capacities for chemicals and specifically for POPs management should be strengthened, in accordance with the objectives of the NIP.

Current available capacity and capability for POPs management in Albania needs to be strengthened, in order to achieve the objectives of the NIP. Priority needs for capacity building to support compliance with Convention provisions and achieving of NIP objectives, are highlighted below for particular priority areas.

1. Establishment of POPs unit under MoE:
 - Monitor the fulfillment of obligations deriving from the Stockholm Convention and policies related to POPs.
 - Coordinate the activities of ministries addressing POPs, and ensure exchange of information.
 - Monitor the completion of environmental legislation in line with EU Directives on POPs.

- Monitor the implementation of consultations with institutions and experts regarding those activities that are implemented with the goal of banning and eliminating POPs and rehabilitating polluted areas.
 - Appraise POPs-related projects.
2. The Ministry of Energy and Industry should ensure the technical capacities for PCBs managing, substituting oil containing PCBs and the equipments using such oil, and eliminating the oil in an environmentally safe way.
 3. Relevant ministries and MoE should draft procedures for safe storage of POPs (mainly oil containing PCB) and POPs containing equipments until ultimate elimination.
 4. Preparation of studies and projects for the elimination of POPs waste or contaminated materials with POPs.
 5. Organization of training events and seminars with various stakeholders on issues related to monitoring, control, safe storage and elimination of POPs.
 6. Raising public awareness of POPs impact on human health and the environment.

3.4. Summary of Activities and Financial Means needed for the NIP implementation

Financial means needed for the NIP implementation during 2016-2021 periods are predicted to be **618,500.00 EURO**, as detailed in the table below.

Table 25. Financial needs for the 2016-2021 period

<i>I. Measures for Strengthening Institutional and Regulatory Framework</i>		<i>(euro)</i>
1	Setting up and making operational the national unit for implementation of the Stockholm Convention	87,000
<i>I. POPs and POPs containing equipments</i>		
1	Preparation and implementation of an internal APC/OEED/ TSO/ guide on management, treatment, and phasing out of contaminated oil transformers with PCBs	69,000
2	Field studies and gradual rehabilitation and remediation of contaminated sites with POPs	191,000

3	Disposal of mineral oil, POPs waste and other contaminated materials with POPs	99,500
4	Preparation and implementation of a national POPs monitoring programme	84,000
<i>III. Public Awareness, Informing and Information Dissemination, Training and Development</i>		
1	Enhance information dissemination and awareness in the communities where POPs are present, briefing the public on POPs impact on human health and environment	25,000
2	Strengthen environmental NGOs capacities for awareness raising among the general public and information dissemination on POPs issues	46,000
3	NGOs engagement in information dissemination, and awareness raising campaigns	17,000
TOTALI		618,500.00

The required funds for NIP can be provided by various financial sources, such as: national state budget funds, EU funds, national and international environmental organization or institutions, private donations, etc.

Ministry of Environment should take measures to provide these funds, in order to implement NIP as an obligation to eliminate/reduce the occurrence or emissions of POPs chemicals in the environment, thereby ensuring a clean and healthy environment for all.

4. ANNEXES

Annex 1: POPs listed based on Stockholm Convention

Based on article 3 of the Convention, member states signatory to the Convention, are obliged to prohibit or to apply measures for the elimination of the production, use, import and export of the chemical compounds included in Annex A of the Convention, which are:

- ✓ Aldrin - *pesticide used to protect crops from soil insects.*
- ✓ Chlordane - *pesticide used to protect crops from termites.*
- ✓ Dieldrin - *pesticide used to control of insects and disease vectors.*
- ✓ Endrin - *herbicide used on field crops and to control rodents.*
- ✓ Heptachlor - *pesticide used against soil insects and termites.*
- ✓ Hexachlorobenzene - *biocide by-product from the production of other chemical substances trace/residue in other chemical substances product from burning.*
- ✓ Mirex- *pesticide additive in plastics and rubber for the reduction of burning rate.*
- ✓ Toxaphene - *pesticide used on cotton, grains, fruits, nuts and vegetables, and to control ticks and mites in livestock.*
- ✓ Polychlorinated Biphenyls (PCBs) - *chemical substances used as oils in heat exchangers, transformers, capacitors, as additives in paints and plastics as well as additives in carbonless copy paper. They are also produced unintentionally during the burning processes.*

The following new chemical substances are included in the Convention:

- α -Hexachlorocyclohexane - *pesticide and by-product from the production of other chemicals.*

- - Hexachlorocyclohexane - *pesticide and by-product from the production of other chemicals.*
- γ - Hexachlorocyclohexane or Lindane - *pesticide.*
- Chlordecone - *pesticide.*
- Hexabromobiphenyl - *industrial chemical substance.*
- Hexabromobiphenyl ether - *industrial chemical substance.*
- Heptabromobiphenyl ether - *industrial chemical substance.*
- Pentachlorobenzene - *pesticide, industrial chemical substance and by-product from the production of other chemicals.*
- Tetrabromodiphenyl ether - *industrial chemical.*
- Pentabromodiphenyl ether - *industrial chemical.*

In Annex A of the Convention, the chemical substance Endosulfan and its isomers (insecticides) were included in 2011, while in 2013 the chemical Hexabromocyclododecane (HBCD), a flame retardant was, also, added.

Pentachlorophenol, its salts and esters as pesticides, Hexachlorobutadiene (HCBD) and Polychlorinated naphthalenes, were included on May 2015, in Annex A of the Convention, as industrial chemicals.

Another provision of article 3 of the Convention refers to the limitation of the production or use of the chemical substances included in Annex B of the Convention, such as: the 1,1,1-trichloro-2,2-di (4-chlorophenyl) ethane, known as DDT.

In Annex B of the Convention, two new chemical compounds were added in 2009, i.e. the Perfluorooctane sulfonic acid and its salts, and the Perfluorooctane sulfonic fluoride, which are industrial chemicals.

The countries signatory to the Convention must also, under article 5 of the Convention, implement measures for the prevention of the formation and release of the unintentionally emitted POPs, included in Annex C of the Convention.

These pollutants are: Dioxins and Furans “Dioxins are the name of a group of very toxic, polychlorinated chemical substances, which are produced mainly from combustion”. The group of dioxins consists of 75 types of polychlorinated dibenzo-p-dioxins (PCDD) and 135 types of polychlorinated dibenzofurans (PCDF). These substances are not produced in industrial scale, but only in lab scale for research. However, they are produced during the combustion process (fuel and waste), as well as by-products from various industrial processes. The dioxins can accumulate in the human and animal fat.

In Annex C of the Convention, we find Hexacholobenzene and Polychlorinated biphenyls, which are also included in Annex A of the Convention, as stated before. They are produced during the combustion process of fuels and wastes, as referred above for the dioxins. Pentachlorobenzene is included in Annex C of the Convention in 2009, and Polychlorinated naphthalenes are included in Annex C of the Convention in 2015, but they are also included in Annex A, as mentioned above.

5. REFERENCES

- Brahushi F., A. Guri and V. Vorpsi 2005. Environmental Impact of Persistent Organic Pollutants (POPs). *Albanian Journal of Agricultural Science*, Nr. 6, Vol. 4, 34-39;
- Brahushi F., 2015. "Organic pollutants and Ecotoxicology", *Text book for students*, AUT, Tirana. 324p.;
- EPA 2009. (Environmental Protection Agency) -*Toxicological review of Chlordecone (Kepone)* (CAS No. 143-50-0). In Support of Summary Information on the Integrated Risk Information System (IRIS). September 2009;
- EPA 2013. America's Children and the Environment; Third Edition EPA 240-R-13-001 January 2013. Biomonitoring Polybrominated Diphenyl Ethers (PBDEs) pp. 159-167;
- EPA 2010. U.S. Environmental Protection Agency: Hexabromocyclododecane (HBCD) Action Plan 18/8/2010;
- Philip H. Howard 1991. Handbook of Environmental Fate and Exposure Data: For Organic Chemicals, pp. 110- 115;
- Koste K., E. Marku, A. Nuro, D. Topi 2006. Distribution of Organochlorinated pesticides and polychlorinated biphenyls in Mussels tissue from Albania coast. Chemistry Department, Faculty of Natural Sciences, Tirana University;
- UNEP 2003. Regionally Based Assessment of Persistent Toxic Substances. Global Report, UNEP Chemicals, Geneva;
- UNEP 2006. Risk profile on hexabromobiphenyl. Report of the Persistent Organic Pollutants Review Committee on the work of its second meeting; Geneva, 6-10 November 2006;
- UNEP 2007. Draft guidance on socio-economic assessment for national implementation plan development and implementation under the Stockholm Convention;
- UNEP 2007. Risk management evaluation on hexabromobiphenyl. Report of the Persistent Organic Pollutants Review Committee on the work of its third meeting Addendum, Geneva, 19-23 November 2007;
- UNEP 2012. Guidance for the inventory of PFOS and related chemicals;
- UNEP 2012. Guidance for the control of the import and export of POPs.;
- UNEP 2013. Risk management evaluation on chlorinated naphthalenes. Report of the Persistent Organic Pollutants Review Committee on the work of its ninth meeting Addendum; Rome, 14-18 October 2013;
- UNEP 2013. Risk management evaluation on hexachlorobutadiene. Report of the Persistent Organic Pollutants Review Committee on the work of its ninth meeting Addendum Rome; 14-18 October 2013;
- UNEP 2014. Guidance for Developing, a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants;

- UNEP 2014. Risk management evaluation on pentachlorophenol and its salts and esters. Report of the Persistent Organic Pollutants Review Committee on the work of its tenth meeting Addendum Rome, 27-30 October 2014;
- UNEP 2014. Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants;
- UNEP 2014. Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants;
- UNEP 2015. Guidance for the inventory, identification and substitution of Hexabromocyclododecane (HBCD);
- UNEP 1999. Guidelines for the Identification of PCBs and Materials Containing PCBs and PCB Form Inventory;
- UNEP 2013. Toolkit for Identification and of Releases of Dioxins, Furans and Other Unintentional POPs under Article 5 of the Stockholm Convention, January 2013 (and in excel file);
- UNEP 2010. Risk profile on hexabromocyclododecane. UNEP/POPS/POPRC.6/13/Add.2;
- Van Agteren et al., 1998. Handbook on Biodegradation and Biological Treatment of Hazardous Organic Compounds. Kluwer Academic Publishers, Dordrecht;
- VKM Nr. 860, date 20.12.2006. "Për Miratimin e Planit Kombëtar të Veprimit për Heqjen nga Përdorimi dhe Eliminimin e Ndotësve Organikë të Qëndrueshëm" (in Albanian);
- Walker C. H., 2009. Organic Pollutants: An Ecotoxicological Perspective, Second Edition, CRC Press, Boca Raton, USA;
- Walker C.H., R.M. Sibly, S.P. Hopkin & D.B. Peakall 2012. Principles of Ecotoxicology, Fourth Edition, CRC Press; 386 p.