National Implementation Plan

on Persistent Organic Pollutants

Republic of Lebanon
Ministry of Environment
2017

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National Implementation Plan on Persistent Organic Pollutants

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

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FOREWORD

This is the second “National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs)” that has been published to date.

This publication offers an opportunity to reaffirm Lebanon’s commitment towards sustainable development and management of Persistent Organic Pollutants, in words and in deeds, through the adoption by the Lebanese state of a series of objectives and actions set out in the National Implementation Plan, and the constant endeavors to implement them efficiently.

Ever since the Government of Lebanon ratified the Stockholm Convention on Persistent Organic Pollutants in 2001, the Ministry of Environment has deployed extensive efforts in promoting its implementation.

Over the last years, Lebanon made considerable progress in shaping the legal, institutional and technical framework related to the chemicals management. However, it became clear to the Ministry of Environment that a new way of working and of addressing this sector should be sought.

This 2017 National Implementation Plan is a rich snapshot to date of the developments that have taken place in Lebanon on the chemicals management (including POPs). This publication is a culmination of the efforts made by different Lebanese institutions in addressing one of the key environmental priorities in Lebanon. Therefore, it has aimed at providing a strategic basis for addressing the chemicals management (including POPs) in Lebanon.

Through the official submission of this report, we now have the opportunity to pave a new path for better chemicals management and further compliance to Stockholm Convention. Yet, we count on our partners, within the public and private sectors, in orienting their decisions, actions, and research towards a better environmental sound management of chemicals especially POPs.

Tarek El Khatib

Minister of Environment

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Finally, the Ministry of Environment would like to thank UNEP / GEF for funding the development of the second national implementation plan and its related assessments.

ABBREVIATIONS & ACRONYMS

ACTS	Advanced Construction Technology Services
AFFF	Aqueous Film Forming Foams
ALI	Association of Lebanese Industrialists
AQMS	Air Quality Monitoring System
AR-AFFF	Alcohol Resistant - Aqueous Film Forming Foams
AUB	American University of Beirut
BAT	Best Available Technology
BEP	Best Environmental Practice
BIA	Beirut International Airport
BMI	Body Mass Index
CAS	Central Administrative for Statistics
CBA	Cost Benefit Analysis
CDR	Council for Development and Reconstruction
CDW	Construction and Demolition Waste
CEPF	Critical Ecosystem Partnership Fund
CO_2	Carbon Dioxide
CoM	Council of Ministers
COP	Conference of Parties
CRT	Cathode Ray Tube
DAS	Data Acquisition System
DDT	Dichlorodiphenyltrichloroethane
DGO	Directorate General of Oil
DGUP	Directorate General of Urban Planning
DSST	Doctoral School for Science and Technology
EBML	Establishment of the Water of Beirut and Mount Lebanon
ECD	Electron Capture Detector
EDL	Electricité Du Liban
EEE	Electrical and Electronic Equipment
EIA	Environmental Impact Assessment
ELV	Emission Limit Value
Elv	End of Life Vehicle
EPS	Expanded Polystyrene

ERML	Environmental Resources Monitoring in Lebanon Project
ESIA	Environmental and Social Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization
FFFP	Film-Forming Fluoro-Protein Foams
FHS	Faculty of Health Sciences
FP	Fluoro-Protein Foams
GC	Gas Chromatography
GCC	Gulf Cooperation Council
GDP	Gross Domestic Products
GEF	Global Environment Facility
GHS	Global Harmonized System
GoL	Government of Lebanon
HBB	Hexabromobiphenyl
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCF	Health Care Facility
HCH	Hexachlorocyclohexane
HCW	Health Care Waste
HCWT	Health Care Waste Treatment
HFO	Heavy Fuel Oil
HIP	High Impact Polystyrene
HS	Harmonized System
IBA	Important Bird Area
IDAL	Investment Development Authority for Lebanon
IEE	Initial Environmental Examination
IP	Implementation Package
IPM	Integrated Pest Management
IRI	Industrial Research Institute
ISIC	International Standard Industrial Classification
KCN	Potassium Cyanide

KSA	Kingdom of Saudi Arabia
LAAS	Lebanese Association for the Advancement of Science
LAOC	Laboratory of Analysis of Organic Compounds
LARI	Lebanese Agricultural Research Institute
LAU	Lebanese American University
LCA	Lebanese Customs Authority
LIBNOR	Lebanese Standards Institution
LP	Lebanese Parliament
LU	Lebanese University
MAB	Man and Biosphere
MASCO	Middle East Airlines Maintenance Department
MEA	Middle East Airline
MEAs	Multilateral Environmental Agreements
MJ	Megajoules
MoA	Ministry of Agriculture
MoC	Ministry of Culture
MoE	Ministry of Environment
MoEHE	Ministry of Education and Higher Education
MoET	Ministry of Economy and Trade
MoEW	Ministry of Energy and Water
MoI	Ministry of Industry
MoIM	Ministry of Interior and Municipalities
MoL	Ministry of Labor
MoPH	Ministry of Public Health
MoPWT	Ministry of Public Works and Transport
MoSA	Ministry of Social Affairs
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
MW	Medical Waste
NAOH	Sodium Hydroxide
NBSAP	National Biodiversity Strategy and Action Plan
NCSR	National Council for Scientific Research

NDU	Notre Dame University
NGOs	Non-Governmental Organizations
NIP	National Implementation Plan
NIU	National Implementation Unit
O	Objective
OCFTC	Office des Chemins de Fer et des Transports en Commun
OCPs	Organochlorine Pesticides
ODS	Ozone Depleting Substances
OEA	Order of Engineers and Architects
OP	Operational Policy
PA	Protected Areas
PAH	Poly-aromatic Hydrocarbons
PBDE	Polybrominated Diphenyl Ethers
PCB	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzodioxins
PCDF	Polychlorinated Dibenzofurans
PCE	Perchloroethylene
PCNs	Polychlorinated Naphthalenes
PCP	Pentachlorophenol
PeCB	Pentachlorobenzene
PFOS	Perfluorooctane sulfonic acid, its salts and perfluorooctanesulfonyl fluoride
PMU	Project Management Unit
POPs	Persistent Organic Pollutants
POPRC	POPs Review Committee
PPE	Personal Protective Equipment
PRASE	Platform for Research and Analysis in Environmental Sciences
PUR	Polyurethane Foam
PVC	Polyvinyl Chloride
PVOH	Polyvinyl Alcohol
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
SAICM	Strategic Approach to International Chemicals Management
SC	Stockholm Convention

SES	Sanitary Engineering Service
SO	Strategic Objective
SOER	State and Trends of the Lebanese Environment Report
SPA	Specially Protected Areas
SPAMI	Specially Protected Areas of Mediterranean Importance
STPP	Sodium Tripolyphosphate
TEQ	Toxic Equivalency Factor
TGAI	Technical Grade Active Ingredient
TJ	Terajoule
ToRs	Terms of References
UAE	United Arab Emirates
UK	United Kingdom
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations Higher Commissioner for Refugees
UNIDO	United Nations Industrial Development Organization
UNRWA	United Nations Relief and Works Agency for Palestine Refugees
UOB	University of Balamand
UPOPs	Unintentionally Released POPs
USA	United States of America
USEK	Université Saint Esprit de Kaslik
USJ	University Saint Joseph
WEEE	Waste of Electrical and Electronic Equipment
WWTP	Waste Water Treatment Plant
XPS	Extruded Polystyrene

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EXECUTIVE SUMMARY

Recognizing the importance of the management of Persistent Organic Pollutants (POPs), the Government of Lebanon (GoL) signed the Stockholm Convention on POPs on May 23, 2001 and became Party to it on January 3, 2003 through the Law 432 dated July 29, 2002.

Parties to the Stockholm Convention are committed to design, establish and implement effective and efficient legal frameworks to ensure the environmentally sound management of chemicals.

Among others, the provisions of the Convention require each party to:

a. Prohibit and/or eliminate the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex A to the Convention (Article 3);
b. Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention (Article 3);
c. Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention (Article 5);
d. Ensure that stockpiles and wastes consisting of, containing or contaminated with POPs are handled, collected, transported, stored and disposed in an environmentally sound manner and endeavor to develop appropriate strategies for identifying sites contaminated by POPs listed in Annexes A, B and C to the Convention (Article 6);
e. Target additional POPs (Article 8);
f. Develop implementation plans (Article 7), information exchange (Article 9), public information, awareness and education (Article 10), research, development and monitoring (Article 11), technical assistance (Article 12), financial resources and mechanisms (Article 13), reporting (Article 15), effectiveness evaluation (Article 16) and non-compliance (Article 17).

To comply with its commitments toward the SC, in 2006, Lebanon completed its first National Implementation Plan (NIP). Since then, new POPs chemicals were included as part of the Convention and Parties are requested not only to include information on these new POPs but also to update existing information on the twelve (12) initial POPs.

In that regard, the Lebanese Ministry of Environment did execute (May 2015 – April 2017), the Project "Review and Update of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants in the Republic of Lebanon" funded by GEF and implemented by UNEP.

The goal of the NIP updating exercise is to protect human health and the environment from the risks posed by the unsound use, management and release of POPs. The purpose of this updated 2017 NIP is to reassess national priorities and update earlier action plans to reflect progress made in implementation and to account for newly listed POPs in the Convention.

Major milestones during the development of this 2017 NIP included:

1. Three (3) Inventories covering:
   a. Unintentionally released POPs (Dioxins, Furans, PeCBs, HCB and PCBs)
   b. Industrial POPs (PFOS and related chemicals, POPs- PBDEs, HBCD and PCBs)
   c. POPs Pesticides
2. Assessment of regulatory and institutional framework
3. Assessment of socio-economic impacts of POPs
4. Assessment of national laboratories infrastructure
5. Assessment of previous NIP implementation status
6. Development of implementation action plan and prioritization of objectives

The process was driven by a highly participatory approach whereby a steering committee was involved in every critical step and other stakeholders were also engaged through various meetings and participatory workshops.

The development of this NIP has also taken into con-

sideration the main challenges that were identified with stakeholders in the implementation of the 2006 NIP:

- Insufficient financial resources for the implementation of different projects and the application of certain actions;
- Need to enhance collaboration among concerned stakeholders including MoA, Customs, MoE, MoI and MoPH on executing certain actions;
- Low priority of certain actions in ministerial goals resulting in their abandonment;
- Need to increase awareness on decision-makers level on the importance of executing certain actions;
- In some cases, weak legislation prevented the execution of certain actions;
- Lack of effective data management has affected the ability of ministries to implement certain actions;
- Lack of communication mechanisms with concerned stakeholders such as industries, farmers, distributors and traders made it difficult to disseminate the necessary information and as result interfered with the implementation of certain actions;
- Insufficient institutional knowledge and capacity also prevented some actions from being implemented.

The 2017 NIP includes (i) the measures that need to be adopted by the GoL through each of the responsible parties and (ii) the necessary resources (human, financial and technical) required for its proper implementation in order to fulfill the provisions of the Stockholm Convention and to protect the Lebanese environment and population from exposure to POPs.

The activities in the NIP are aimed at improving management of POPs while fully taking into consideration the need to address hazardous chemicals and wastes at large. The NIP addresses different aspects of managing and monitoring POPs throughout their entire life cycle, thus enabling the fulfillment of all the specific requirements of the Stockholm Convention.

The NIP action plan includes information on the strategic objectives, objectives, activities, responsible parties (lead implementer and supporting agencies), anticipated outcomes, timeframe for implementation, human and technical resources, financial resources and potential sources of funds. The Action Plan articulates six (6) main Strategic Objectives (SO):

- Strategic Objective 1: Strengthening the legal and institutional framework for POPs chemicals management in Lebanon
- Strategic Objective 2: Managing the import and export, production, use, recycling and disposal of Industrial POPs
- Strategic Objective 3: Controlling and gradually reducing unintentionally released POPs
- Strategic Objective 4: Managing the import, trade, use, and disposal of POPs pesticides
- Strategic Objective 5: Promoting research related to POPs chemicals
- Strategic Objective 6: Monitoring, Evaluation and Reporting

Based on specific six (6) prioritization criteria (i.e. feasibility, financial, health and environment, socio-economic impacts, efficiency and effectiveness, and urgency), the steering committee, thematic task teams and other related stakeholders prioritized the objectives included in the six (6) Strategic Objectives and reviewed their recommended activities.

The results of the prioritization exercise showed that nearly all objectives were identified as medium to high priority. The highest considered priority for each POPs category is as below:

- POPs Pesticides- O4.1 “Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides”;
- UPOPs- O3.1 “Controlling and gradually reducing unintentionally released POPs”;
- IPOPs- O2.1 “Improve control of import / trade of IPOPs”.

Noting that, during the mentioned-above prioritization exercise the Objective O3.1 included the following activities (1.1.10, 1.1.16, 1.1.13 and 2.2.3). But after

the final review and compilation of the action plan, and in accordance to the feedback of steering committee members, these activities were integrated in the Objectives O1.1 and O2.2.

In order to effectively implement the NIP, the GoL is to establish a National Implementation Unit (NIU) at the Ministry of Environment (MoE), through a funded technical assistance project, to provide oversight for implementation of the NIP as a near-term priority. The NIU is to be supervised by a Steering Committee including representatives from key ministries and their agencies involved with chemicals management (including POPs). The Steering Committee members are proposed to be representatives from the MoE, MoI, MoA, MoL, MoPH, Customs Authority, MoIM, MoET, MoEW, EDL, and MoPWT. Representatives from other stakeholders and donor agencies will be invited to attend specific meetings based on the progress of implementation and their roles.

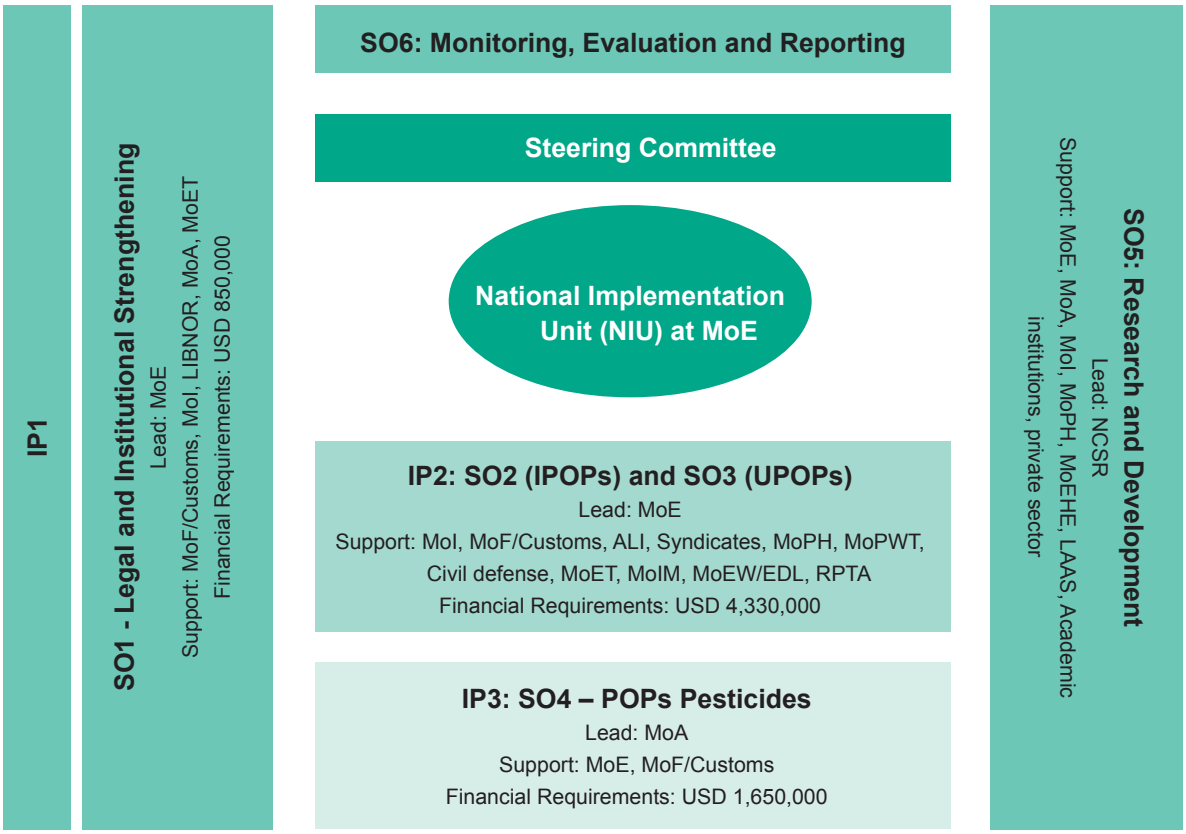
NIU will be staffed with a team dedicated specifically to implement the NIP. This will ensure that NIP implementation is not hindered for reasons of understaffing of certain ministries or lack of dedicated personnel to manage its implementation. This is a main lesson from the previous NIP implementation, which suffered from lack of sufficient resources.

The NIU's responsibilities will include among others the following tasks:

- Resource mobilization to implement the NIP;
- Preparation of Terms of References (ToRs) for the various activities;
- Supervision of NIP activities and coordination with different stakeholders;
- Support in integration of POPs relevant actions in ministerial plans and projects;
- Acting as secretariat to the steering committee to ensure it is operational;
- Compilation of databases relevant to assessing and controlling POPs;
- Upgrading POPs inventories and NIP on regular basis as prescribed by the Convention including the POPs newly listed in 2015 (PCP, PCN, HCBD) and upcoming 2017;
- Integrating POPs management activities with general hazardous chemical management activities including synergies with SAICM emerging issues, mercury and ODS were appropriate;
- Promoting green and sustainable chemistry;
- Evaluating progress of NIP implementation every three (3) years;
- Dissemination of information about POPs;
- Leading implementation of the research component of the NIP;
- Arrangement for training of appropriate specialists (e.g., customs officer, border control officers, engineers, technicians) responsible for management of POPs;
- Monitoring and evaluation of NIP implementation and reporting to the Secretariat as well as NIP updating as required.

The NIP will be implemented through three (3) main Implementation Packages (IPs) as follows:

- IP1: Technical assistance package including implementation of SO1 (Legal and Institutional Framework), SO5 (Research and Development) and SO6 (Monitoring, Evaluation and Reporting);
- IP2: IPOPs and UPOPs implementation package (SO2 and SO3);
- IP3: POPs pesticides implementation package (SO4)



NIP implementation shall be distributed into three 3-year plans addressing the identified short-term actions, medium-term actions and long-term actions. This will allow a gradual approach to NIP implementation as follows:

- First NIP Implementation Period: 2018-2020 (Short Term);
- Second NIP Implementation Period: 2021-2023 (Medium Term);
- Third NIP Implementation Period: 2024-2026 (Long Term)

The overall estimated budget for the proposed NIP is USD 8,503,000 including the activities budget, operational budget, management budget and contingency. NIP implementation can be gradually rolled up starting with the short-term activities under IP1 for a budget of about USD 620,000. This will enable mobilization of further resources to start implementing the other implementation packages.

1 INTRODUCTION

1.1 Country Commitment to Stockholm Convention

Recognizing the importance of the management of Persistent Organic Pollutants (POPs), the Government of Lebanon (GoL) signed the Stockholm Convention on POPs on May 23, 2001 and became Party to it on January 3, 2003 through the Law 432 dated July 29, 2002.

Parties to the Stockholm Convention are committed to design, establish and implement effective and efficient legal frameworks to ensure the environmentally sound management of chemicals.

Among others, the provisions of the Convention require each party to:

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b. Restrict the production and use, as well as the import and export, of the intentionally produced POPs that are listed in Annex B to the Convention (Article 3);
c. Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention (Article 5);
d. Ensure that stockpiles and wastes consisting of, containing or contaminated with POPs are handled, collected, transported, stored and disposed in an environmentally sound manner and endeavor to develop appropriate strategies for identifying sites contaminated by POPs listed in Annexes A, B and C to the Convention (Article 6);
e. Target additional POPs (Article 8);
f. Develop implementation plans (Article 7), information exchange (Article 9), public information, awareness and education (Article 10), research, development and monitoring (Article 11), technical assistance (Article 12), financial resources and mechanisms (Article 13), reporting (Article 15), effectiveness evaluation (Article 16) and non-compliance (Article 17).

To comply with its commitments toward the SC, in 2006, Lebanon completed its first National Implementation Plan (NIP). With grant funding from the Global Environment Facility (GEF/UNEP), Lebanon was one of 12 countries participating in a pilot project for the "Development of National Implementation Plans for the Management of POPs".

According to the 2006 NIP, Lebanon's top priorities in POPs management were (i) awareness raising, (ii) institutional and regulatory strengthening, (iii) Polychlorinated Biphenyls (PCB) management, and (iv) management of emissions of dioxins and furans.

Thus, between 2004 and 2006, the country prepared and issued the following:

a. Preliminary Pesticides Inventory (2005)
b. Preliminary PCB Inventory (2005)
c. National Inventory on Persistent Organic Pollutants: Dioxins & Furans Releases (2005)
d. National Profile on Management of Chemicals in Lebanon (2005)
e. Persistent Organic Pollutants Health and Environment Profile (2005)

Throughout the past ten (10) years, the POPs Review Committee (POPRC) reviewed the chemicals and recommended the amendments of the SC annexes A, B, and C. Accordingly the SC COP adopted the following:

- 2009: Decisions SC-4/10 to SC-4/18 that amended Annexes A (elimination), B (restriction), and C (unintentional production) of the Stockholm Convention to list the below nine (9) additional chemicals as Persistent Organic Pollutants (new POPs):
  - Chlordecone,
  - Hexabromobiphenyl,
  - Pentachlorobenzene,
  - Lindane (gamma hexachlorocyclohexane),
  - Alpha Hexachlorocyclohexane (Alpha HCH),
  - Beta Hexachlorocyclohexane (Beta HCH),
  - Tetrabromodiphenyl ether and Pentabromodiphenyl ether (commercial pentabromodiphenyl ether),

  - Hexabromodiphenyl ether and Heptabromodiphenyl ether (commercial octabromodiphenyl ether),
  - Perfluorooctane sulfonic acid, its salts and Perfluorooctane sulfonyl fluoride (PFOS).
- 2011: Decision SC-5/4 adopted Endosulfan as the tenth new listed POP
- 2013: Decision SC-6/13 adopted an amendment to Annex A to the Stockholm Convention to list Hexabromocyclododecane (HBCD) with specific exemptions
- 2015: Decisions SC-7/12, SC-7/13 and SC-7/14 amended the Annexes A and C listing Hexachlorobutadiene (HCBD), Pentachlorophenol and its salts and esters (PCP) and Polychlorinated Naphthalenes (PCN) respectively.

Based on the above decisions, and among the numerous implications for Parties of the listed new chemicals, there had been the need "To review and update the National Implementation Plan" (Article 7).

At COP-5, the Global Environment Facility (GEF) announced that it would make available grants of up to USD 250,000 to each eligible country embarking upon NIP review and updating. Thus, Parties to the Stockholm Convention were requested not only to include information on new POPs but also to update existing information on the twelve (12) initial POPs.

In that regard, the Lebanese Ministry of Environment did execute (May 2015 – April 2017), the Project "Review and Update of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants in the Republic of Lebanon" funded by GEF and implemented by UNEP.

1.2 Objective and Structure of the NIP

The goal of the NIP updating exercise is to protect human health and the environment from the risks posed by the unsound use, management and release of POPs.

Whereas, the purpose of this 2017 NIP is to reassess national priorities and update earlier action plans to reflect progress made in implementation and to account for newly listed POPs in the Convention.

In order to achieve the above objectives, the Ministry of Environment prepared in 2016 the "National Assessment of POPs Impacts and Management – Pesticides, Industrial and Unintentionally Released" covering the following:

- Regulatory and Institutional Framework Assessment - 2016
- Assessment of POPs Pesticides - 2016
- Assessment of Industrial POPs and Unintentionally Released POPs - 2016
- Socio-Economic Impact Assessment of POPs - 2016

Building on the findings of the above assessments and following the "Guidance for Developing, a National Implementation Plan for the Stockholm Convention on Persistent Organic pollutants" (Draft 2014), the structure of the NIP is summarized as follows:

Introduction

- Country Commitments to Stockholm Convention
- Objective and Structure of the NIP
- Methodology

Country Baseline

- Country Profile
- Environmental Overview
- Implementation Status of previous NIP
- Institutional, Policy and Regulatory Framework
- Assessment of POPs Issue in the Country

Strategy and Action Plan

- Policy Statement
- Implementation Strategy
- Action Plan and Prioritization
- Timetable and Resource requirements

1.3 Methodology

This 2017 National Implementation Plan builds on the findings of the 2016 conducted assessments. Major milestones during the development of this 2017 NIP include:

1. Three (3) Inventories covering:
   a. Unintentionally released POPs (Dioxins, Furans, PeCBs, HCB and PCBs)

   b. Industrial POPs (PFOS and related chemicals, POPs- PBDEs, HBCD and PCBs)
   c. POPs Pesticides
2. Assessment of regulatory and institutional framework
3. Assessment of socio-economic impacts of POPs
4. Assessment of national laboratories infrastructure
5. Assessment of previous NIP implementation status
6. Development of implementation action plan and prioritization of objectives

The process was driven by a highly participatory approach whereby a steering committee was involved in every critical step and other stakeholders were also engaged through various meetings and participatory workshops. An overview on the stakeholders' engagement and public consultation is shown in Appendix A.

The development of the National Implementation Plan can be divided into three (3) main stages: (i) review process, (ii) assessment of the national priorities, and (iii) formulation of the updated National Implementation Plan.

1.3.1 Review Process

The review process was a critical phase during which the subject was well understood by all team members, available information and guidance were reviewed, roles and responsibilities were well defined, and the work plan was developed. Figure 1 summarizes the main activities undertaken during this stage.

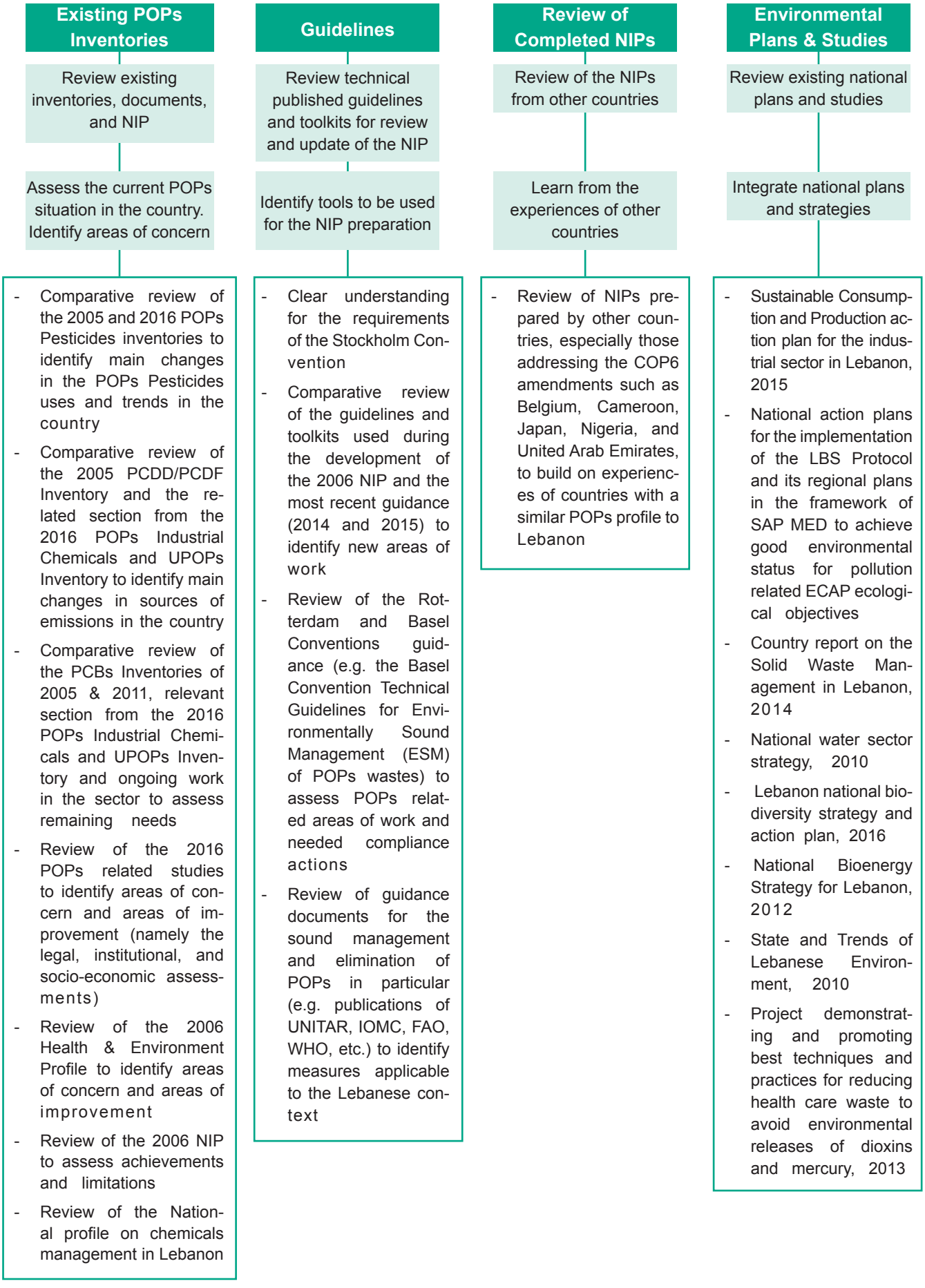


Figure 1 - Main activities undertaken during the review process

In addition to the review process, a training workshop on the development of a national implementation plan for POPs management was organized by the Project Management Unit (PMU) at the Ministry of Environment (MoE).

1.3.2 National Priority Assessment

The review process included the assessment of the status and trend of POPs existence and use in Lebanon as well as the areas of concern and improvements for POPs sound management and elimination in line with the Stockholm Convention requirements.

In this regard, the following activities were undertaken:

- The 2006 NIP was assessed in order to identify achievements and limitations;
- A questionnaire was developed for each of the main stakeholders responsible for the implementation of the NIP, primarily the Ministries of Environment, Agriculture, Public Health and Industry. The ministries were asked to report on the implementation status of each of the actions stated in the previous NIP. Non-achieved actions were investigated to determine the obstacles faced, their validity in light of the updated POPs inventories and studies and the new UNEP Guidance for developing NIPs. Further information on the implementation status of the previous NIP can be found in *section 2.3*;
- The findings of the 2016 national POPs inventories were also reviewed in order to identify data gaps and deficiencies.

Accordingly the main objectives for the NIP based on the identified areas of concern and improvement were developed along with a set of criteria to allow the prioritization of those main objectives.

The areas of concern and improvement were identified for each concerned category (POPs Pesticides, POPs Industrial Chemicals and Unintentionally Released POPs).

Those identified areas along with the main developed objectives and prioritization criteria were then shared and discussed with the appointed NIP Steering Committee during a workshop held at MoE (23 January 2017). Objectives and prioritization criteria were then amended based on the received feedbacks and comments.

Further information on the criteria developed can be found in *section 3.3*.

1.3.3 Formulation of the National Implementation Plan

As part of the NIP's development, the main objectives were broken down into individual actions. The actions further addressed each group of POPs category (POPs Pesticides, POPs Industrial Chemicals and Unintentionally Released POPs (UPOPs)).

The actions were developed taking into consideration mainly the following:

- Legal and institutional requirements for implementation of the convention;
- Requirements for exemptions as well as mechanisms to ensure exemptions are updated as needed;
- UPOPs considerations in accordance with Article 5 of the Stockholm Convention;
- POPs stockpiles, products, and article in use and waste in accordance with Article 6 of the Stockholm Convention;
- Control measures to reduce or eliminate releases from intentional production and use in accordance with Articles 3 and 4 of the Stockholm Convention;
- New chemicals in accordance with Articles 15 and 16 of the Stockholm Convention;
- Performance indicators to be used to determine the effectiveness of the actions taken; and
- Availability of resources.

The feedback and comments of the NIP Steering Committee and other stakeholders including the Thematic Task Teams were integrated in the action plan during and following the "Strategy Development – POPs National Implementation Plan" workshop held on 6 March 2017.

During the workshop, the participants reviewed, discussed and amended the suggested actions and prioritized the objectives.

Based on the action plan, a road map for the implementation of these actions was also developed.

The Road Map details:

- Required measures;
- Responsible actors;
- Detailed roles and responsibilities of key actors;
- Needed resources;
- Mechanisms of implementation;
- Role and input required from international organizations including among others financial and technical requirements; and
- Logical framework matrix.

Accordingly, the NIP report has been developed based on the findings of the review process, the prioritization of objectives, and the development of the action plan.

2 COUNTRY BASELINE

2.1 Country Profile

This section presents background information on Lebanon, particularly the physical, demographic, geographic, and economic status in the country, with emphasis on the industrial and agricultural sectors.

2.1.1 Geographic Profile

Lebanon is located in the eastern Mediterranean region (between latitudes 33°03'-34°45' and longitudes 35°05'-36°30'9) and has a total area of 10,452 km^2 divided among four (4) different physiographic regions. The first is the coastal plain in western part of the country, stretching from the northern tip to the south. Two (2) mountain chains, Mount Lebanon and Anti Mountain, run across the country parallel to the sea. In between these two (2) chains, is the fourth physiographic region, the Bekaa valley.

The climate differs across physiographic regions. The coastal area has a typical Mediterranean climate, rainy winters and arid conditions in the remaining months. The mountains are cooler and receive more rainfall than the coastal areas. The highest mountain peaks are covered with snow for the majority of the year. The total amount of precipitation varies greatly from year to year (MoE/UNDP, 2014). The average rainfall in the coastal area ranges between 700 and 1000 mm, an average of 1,600 mm in Mount Lebanon, 200 - 800mm in the Bekaa valley, and a range of 600 mm to 1000 mm in the Anti-Mount Lebanon chain (FAO, 2011).

2.1.2 Demographic Profile

Lebanon's total population was estimated at 6,237,738 persons in July 2016 (World fact book, 2016). The capital Beirut is located centrally on the coast with an estimated population of about 400,000. Lebanon also hosts a high number of Syrian and Palestinian refugees. As of September 2016, around one (1) million Syrian refugees were registered with the United Nations High Commissioner for Refugees (UNHCR). The refugees are dispersed throughout the different governorates of Lebanon in various types of settlements. About 450,000 Palestinian refugees are also registered with United Nations Relief and Works Agency for Palestine Refugees (UNRWA), most of these refugees are residing in twelve (12) camps around the country.

As of 2016, it was estimated that the population of females and males are equally divided within the country. The rate of unemployment as declared averaged to 22.1% for youth between the ages of 15 and 24. The rate of illiteracy in the same year was estimated to be 4.6% as of 2015 (World fact book, 2016).

In 2016, the estimated crude death rate of the over-

all Lebanese population was estimated at around 4.9 deaths per 1000 persons, with mortality rate being higher for men (8.0‰) than for women (7.1‰), while crude birth rate was around 14.4 live births per 1000 people (World fact book, 2016). Cancer related death rates between 2000 and 2012 ranged between 100 and 125 case per 100,000 individuals (WHO, 2014).

2.1.3 Government and Political Profile

Lebanon is a republic, with the official language being Arabic while French and English are the two locally used languages.

The Head of the State is the President of the Republic, who is elected by the Parliament and supervises the functions of each of the individual authorities. With the consultation of the members of the Parliament, the President appoints the Prime Minister which in turn forms a Council of Ministers. The appointment of the cabinet of ministers is ratified by the Parliament.

Administratively, Lebanon is divided into eight (8) Governorates, divided into twenty-five (25) Caza. The administrative center of each Caza is principally located in the most important town of the region. Each Governorate is headed by a Governor, who represents the national government administration and each Caza is headed by a "Qaimmacam".

The municipalities and the councils of elders make up the local government in Lebanon. The Mayor heads the municipality enjoying a vast authority over local affairs, while the "Moukhtar" heads the council of elders and provides services related to civic personal certifications.

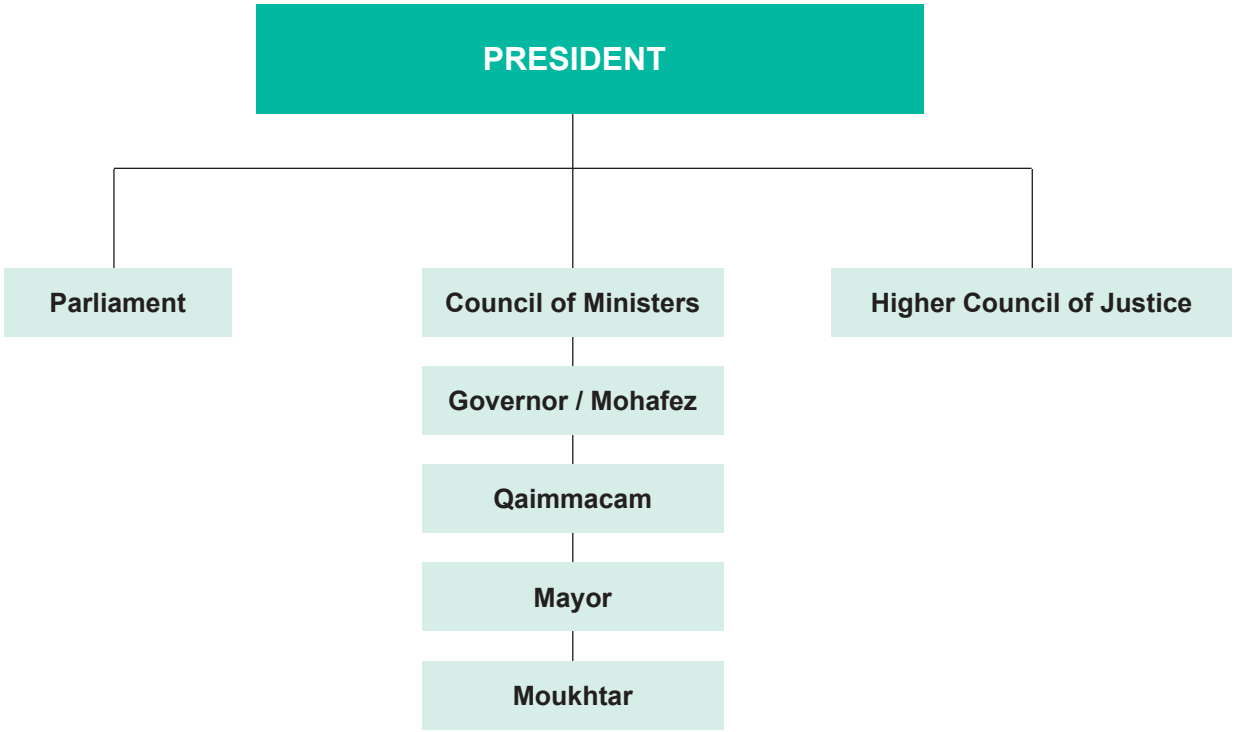


Figure 2 - Hierarchy of the Lebanese Government

The central government is supported by a number of public institutions that includes among others, the Council for Development and Reconstruction (CDR), Investment Development Authority for Lebanon (IDAL), Electricity of Lebanon (EDL), National Council for Scientific Research (NCSR), Lebanese Standards Institutions (LIBNOR) and Industrial Research Institute (IRI).

The Parliament

Lebanon's legislative body, represented by the Lebanese Parliament (128 seats), is organized into specialized committees.

The committee for environment has twelve (12) permanent Members of Parliament. The committee meets at irregular intervals to discuss and review draft legislation and issues related to the environment, and to oversee the work of the executive body including public expenditure in green sectors. Discussion issues have included inter-alia the need to upscale the ministry of environment's resources and to solve air pollution from the transport sector, solid waste disposal, forest fires, water bodies pollution, etc. (SOER, 2010).

The Council of Ministers

Lebanon's executive body, headed by the Presidency of the Council of Ministers, enacts regulations in the form of decisions and decrees. The number of ministers in the ministerial cabinet is flexible as it differs from a cabinet to another; currently it is composed of 29 Minister in addition to the President of CoM.

Lebanon has passed so far more than 750 texts related to environmental issues, including; circulars, ministerial decisions, decrees, laws and international treaties.

The Judiciary Authority

Although Lebanon's judiciary system is not specialized in environmental matters, it has in recent years acquired resources to investigate and arbitrate environmental issues effectively. The judiciary system, consisting of judges and prosecutors, helps stop or curtail environmental abuses and crimes around the country provided that such abuses and crimes are detected and reported. The judiciary system is critical for enforcing environmental laws and regulations and policies (SOER, 2010).

Recognizing the importance of the protection of the environment, the Law 251 dated 15/04/2014 institutionalized "General Prosecutors for the Environment" and "Environmental Investigating Judges".

2.1.4 Economic Profile

The market service and trade sectors are the largest contributors to GDP, at almost 60% of the total. The agricultural and industrial sectors make about 12% of the GDP; 5% from agriculture and 7% industry (Presidency of the Council of Ministers, 2010). Table 1 shows the composition of Lebanon's 2010 GDP.

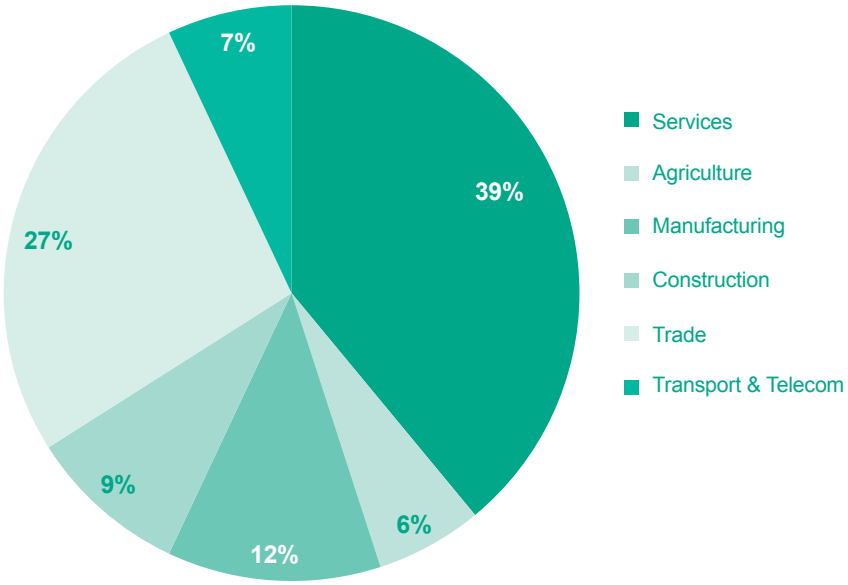
Table 1 - GDP of Lebanon (2010)

Sector	Value (LBP Billion)*
Agriculture and Livestock	2,650
Energy and Water	-1,473
Industry	4,002
Construction	8,515
Transportation and Communications	3,084
Market Services	18,721
Trade	15,395
Government	5,071
Total GDP	**55,965**

* 1,507 Lebanese Pounds (LBP) are equivalent to 1 US Dollar

Source: Presidency of the Council of Ministers, 2010

The Lebanese labor force is distributed across many sectors (Figure 3). The service sector employs more than any other, approximately 39% of the country's workforce. This is followed by trade and manufacturing, 27% and 12% respectively. The agriculture sector only employs 6% of the labor force.



Source: CAS, 2011

Figure 3 - Employment by sector (2010)

2.1.5 Agriculture Sector

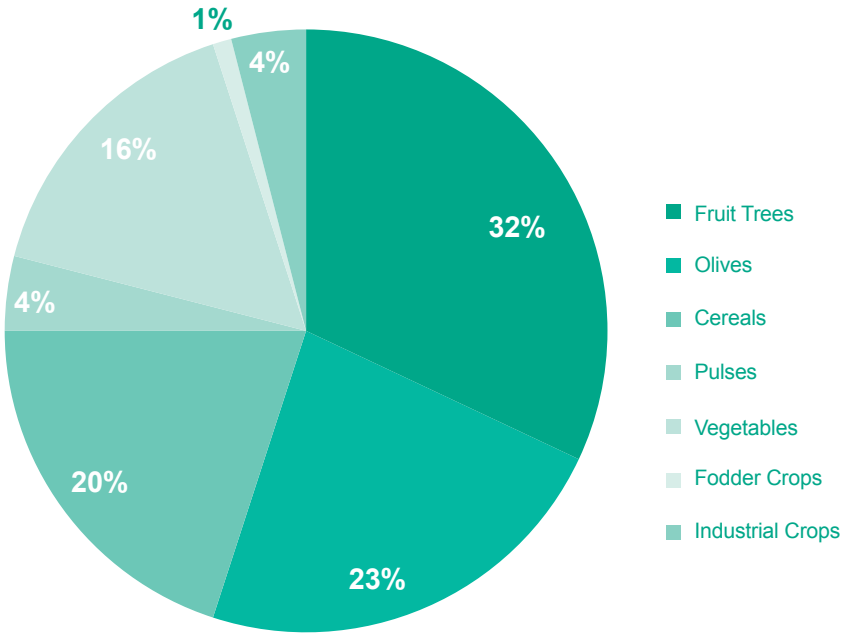
According to the Agriculture fact book prepared in 2016 by IDAL, 65% of Lebanese territory is covered by agricultural areas (IDAL, 2016).

Table 2 - Agriculture areas and holdings

Area	Number of Holdings	Size (ha)	Average Area of holdings (ha)
Mount Lebanon	31,178	25,588	0.7
North	27,636	24,065	0.8
Akkar	28,120	35,352	1.3
Bekaa	12,516	41,649	3.3
Baalbeck - Hermel	21,569	57,625	2.7
South	22,111	25,621	1.2
Nabatiyeh	26,382	26,095	1
Total	**169,512**	**230,995**	**1.4**

Source: MoA, 2011

Agriculture is dominant in the Bekaa valley (about 42%), in addition to the North and South Governorates. The main agricultural products include citrus, potatoes, grapes, olives, apples, and tobacco. Figure 4 presents the major crops of Lebanon.



Source: MOA, 2011

Figure 4 - Major crops harvested in Lebanon (2010)

Agriculture Import

Lebanon is highly dependent on food imports. 80-85% of Lebanon's food needs are imported, noting that the import accounted for about five (5) times the value of agricultural export (IDAL, 2016).

Agriculture Export

Exports of agricultural products have fluctuated over the last few years, due to varying factors and conditions.

The largest share of Lebanese agriculture exports is destined to the GCC countries with a share of 50% of total exports. KSA, Kuwait and UAE rank first, second and third respectively within the export to GCC countries. The Arab countries (excluding GCC) rank second amongst country groups and occupy around 41% of total exports, with Egypt, Syria and Jordan as main destinations (IDAL, 2016).

However and as per the published Agriculture fact book 2016 (IDAL, 2016), over the 2014-2015 periods, nearly all agriculture product exports declined sharply with a net decrease of 33% as a result of the closure of the Syrian - Jordanian land borders.

Use of Pesticides

In Lebanon, pesticides are widely used in agriculture. A FAO report listed "excessive use of pesticides" as one of the general challenges facing agriculture in Lebanon (FAO, 2013). A report by the Arab Forum for Environmental Development found that the rate of pesticide per hectare in Lebanon between the years of 1993 and 2002 was two (2) times higher than the rates in Egypt and Jordan (AFED, 2008).

2.1.6 Industrial Sector

Between 1997 and 2009, the industrial sector's contribution to the Lebanese GDP decreased by 5% from 12.5% to 7.5%. Despite this decline, industrial exports as a percentage of total exports have increased from 37% to 57% between 2000 and 2007. This increase is mainly attributed to external demand shocks, and not to an increase in productivity (LCPS, 2014).

Most of the industries in Lebanon are small scale and spread all over the country. The concentration of the Lebanese industry is in Mount Lebanon, the sea front suburbs of Beirut and the coastal area of northern Lebanon (EFL, 2013).

According to MoI, around 75% of the industries were mostly established prior to the enactment of the Decree 8018/2002 "Permitting of establishments". This issue has major consequences on the alignment of industrial enterprises with recent permitting systems

including the environmental management requirements (EFL, 2013).

Moreover, according to the MoI census of 2007, the majority of industries is located outside "industrial zones" and is mainly within residential areas including towns and cities. As of January 1999, there are 71 industrial zones in Lebanon.

Noting that the industrial zones have not been provided with adequate infrastructure for optimal operation and management of industrial processes including environment management requirements (EFL, 2013).

The Decree 5243 dated 05/04/2001 "Classification of industries" classified the industrial establishments according to their ISIC number (industrial activity) and classes. According to the above classification Decree and Decree 8018 dated 12/06/2002 on "Procedures and permitting requirements to establish/operate industrial establishments", the Ministry of Industry, organized the industrial permitting procedures as follows:

- For class I, II and III enterprises, a two-tier permitting process is requested and includes an establishment permit and an operation permit;
- For class IV and V enterprises, only one (1) permit is required for the establishment and operation of the industrial enterprise (EFL, 2013).

2.1.7 Transport Sector

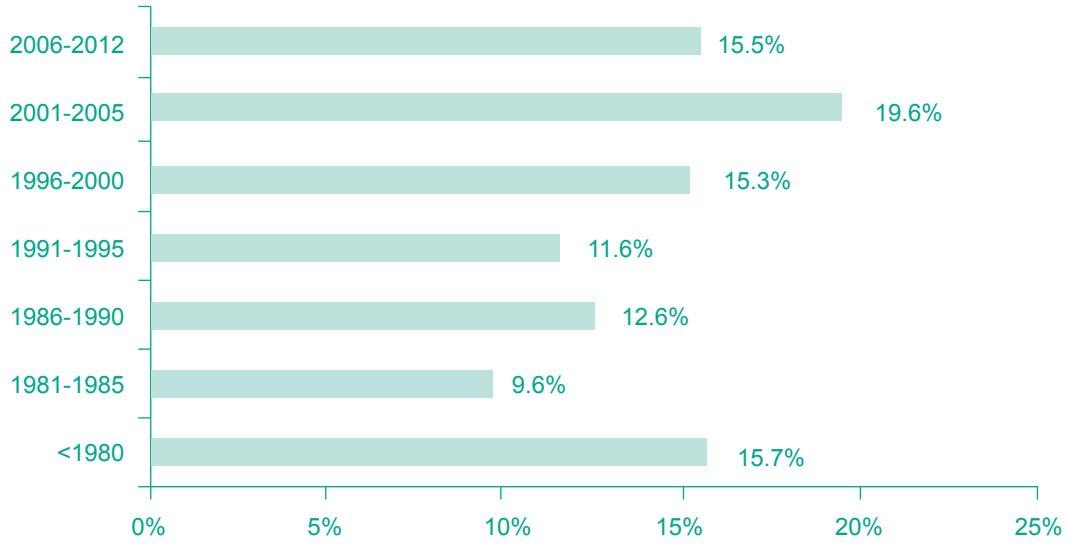
The transport sector includes land, marine and aviation sub-sectors.

Land Transport

In Lebanon, there are no existing appropriate infrastructure for non-motorized vehicles (i.e. bicycle lanes, safe storage, and convenient and affordable bike rentals), thus the land transport sector only consists of road-motorized vehicles (4-stroke engines and 2-stroke engines).

In Lebanon, the import of second hand cars is very common. Therefore, a large share of vehicles manufactured between 1970 and 2004 potentially containing PBDE is still being imported and circulating on the roads.

Based on the "National Greenhouse Gas Inventory Report and Mitigation Analysis for the Transport Sector in Lebanon-2015", the 2012 vehicle fleet database shows 1.58 million registered vehicles and the age distribution of passenger cars (public and private) reflected the old nature of the fleet, with 71% older than 10 years (Figure 5) (MoE/UNDP/GEF, 2015).



Source: MoE/UNDP/GEF, 2015

Figure 5 - Vehicle percentage distribution per model year of production

Marine Transport

In Lebanon, the official harbors are five (5); Beirut, Tripoli, Saida, Tyr and Jounieh. The port of Beirut is considered the biggest commercial port, hosting 78% of the incoming ships while the port of Tripoli (the second largest) hosts around 16% of the incoming ships (MoE/UNDP/GEF, 2015).

Aviation

Middle East Airlines (MEA) is the national air carrier of Lebanon and Beirut International Airport (BIA) is the only operational commercial airport in the country.

The other remaining airports in Lebanon such as the Riyak and Kleyaat airports are reserved for military services (MoE/UNDP/GEF, 2015).

2.2 Environmental Overview

2.2.1 Air

The most significant sources of pollution, in Lebanon, from economic activities are the transport, energy and industry sectors. Whereas, other economic sectors also affect air quality including agriculture, construction and quarrying. Other sources of air pollution include open dumping and/or burning of municipal solid waste, burning of tires, fire and explosion accidents in poorly regulated warehouses (SOER, 2010).

Air quality monitoring in Lebanon has been relying so far on individual initiatives mostly conducted by research groups and universities in Lebanon, driven by scientists' research agenda rather than by a control and mitigation vision of the central environmental authority.

However in 2013, the MoE under the context of the "Environmental Resources Monitoring in Lebanon Project (ERML)" with the support of the United Nations Environment Programme (UNEP) and United Nations Development Programme (UNDP) launched real time air quality monitoring in five (5) sites using online analyzers connected to a supervisory control and data acquisition system (DAS) located at MoE. The current network includes five (5) urban background air quality monitoring stations (AQMS) represented in the below Table 3.

Table 3 - National air quality monitoring network (2013)

Station Name	CO	NOx	O_3	SO_2	PM_{10}	$PM_{2.5}$	Weather Station
AQMS01 (Beirut- Pine Forest)		x	x		x	x	
AQMS02 (Beirut- Hadath)	x	x		x	x	x	x
AQMS03 (Saida)	x	x		x	x	x	
AQMS04 (Baalbeck)		x	x		x	x	
AQMS05 (Zahleh)	x	x		x	x	x	x

Source: MoE, 2016

In addition to the existing background air monitoring stations, the MoE is currently installing ten (10) additional AQMS in different areas to monitor population exposure to industries, power plants, road traffic in addition to urban sources of pollution. All these stations comprise online analyzers for the monitoring of CO, NOx, O_3, SO_2, PM_{10}, $PM_{2.5}$, PM_1, and meteorological parameters. Moreover, for the heavy industrialized Chekka region, three (3) PM analyzers will be added in addition to the AQMS in Chekka-Selaata area (MoE, 2016).

Additionally, the Ministry of Environment through the Circular 13/1 in 2013 emphasized on the compliance to the Minister of Environment's Decision 191/1 dated 08/10/1997, requiring the cement industries to submit monthly reports on the air emissions released from their stacks namely the pollutants SO_2, NOx, PM and CO, and a yearly report on the PCDD/PCDF releases.

2.2.2 Water

The availability of water, in its various forms including groundwater, rivers, storage dams and springs (estimated at 2,000 - 2,700 million m^3 per year) surpasses the expected water demand for the Lebanese population (about 1,800 million m^3 in 2035). Nevertheless, with the underdeveloped and polluted water infrastructure, Lebanon's water resources are under stress and its government's ability to meet those requirements are restricted.

Over 50 percent of irrigation water comes from underground wells and boreholes while 80 percent of potable water comes from groundwater sources. In addition, due to economic development, population growth and urban expansion, private wells have increased greatly in the last few years (MoEW, 2010). Aquifers are being over exploited and the data available from the MoEW supports the anecdotal evidence of wells drying up or increasing in salinity.

Furthermore, the large majority of the country does not have access to potable tap water due to degraded and contaminated water networks. Instead, most of the population depends on purchased bottle water.

2.2.3 Wastewater

According to the 2016 Industrial and UPOPs Inventory Report, 301.4 Mm^3 of wastewater was generated in 2014 with 12% treatment rate, resulting in 36.2 Mm^3 of treated wastewater, and 265.2 Mm^3 of open water dumping.

Wastewater management is considered a national priority. On one hand, disparities in sewer network coverage are observed throughout the country with main cities such as Beirut, Tripoli and Saida benefiting from the highest coverage due to population density in these areas. However, most of these cities' networks are old and require immediate rehabilitation works, with the exception of the city of Beirut. On another hand, wastewater treatment efficiency at the national level is still below acceptable levels with estimates indicating around 8% average treatment rate prior to discharge through sea outfalls (SOER, 2010) (MoE/EU/UNDP, 2014).

Three (3) WWTPs were constructed in the northern part of the country. Tripoli treatment plant started operation in 2013 and consists of a secondary treatment facility. The project is supposed to cover Tripoli coastal area, Al Qalamoun, some parts of Koura and Zgharta districts, the coastal areas of Beddawi, Deir Amar and El Minyeh (hence serving the equivalent of 1,000,000 inhabitants) (NAP, 2015). Tripoli treatment plant is currently operational at 20% of design capacity owing to incomplete of network connection works.

Two (2) other primary treatment facilities are constructed in Batroun and Chekka but still not yet operational. Sea outfalls are commonly identified along the coastal zone and consist of around 16 domestic sewage and 14 industrial outfalls. Most outfalls extend only a couple of meters or terminate near the coastline; thus not allowing effective dilution of wastewater (MoE/LEDO/ECODIT, 2001). Towns not connected to the sewer system still rely on septic tanks (27.3%) or on direct discharge into the environment.

Greater Beirut area and its suburbs have the highest wastewater network connection coverage reaching around 79% (MoE/EU/UNDP, 2014). Beirut alone benefits from 96% network coverage (SOER, 2010). Two (2) WWTPs are constructed to serve the area namely Al Ghadir (pre-treatment facility currently operational at 50% of design capacity) and Al Jiyeh (bio-filtration facility) stations with a design capacity to serve 250,000 and 80,000 persons respectively. Sea outfalls are commonly identified along the coastal zone and consist of around 39 domestic sewage and 9 industrial outfalls.

Unfortunately, wastewater generated in Mount Lebanon is discharged directly into the sea through coastal outfalls without any form of pretreatment. Most outfalls are not properly designed to allow effective dilution (MoE/LEDO/ECODIT, 2001). Some inland towns are not yet connected to the sewer system and around 21% of households rely on septic tanks (MoE/EU/UNDP, 2014).

Sewer network coverage in the southern part of the country is around 50% (MoE/EU/UNDP, 2014). Three (3) WWTPs were constructed in this zone, namely in the cities of Saida, Tyre and Nabatiyeh. Only Saida primary treatment and Nabatiyeh secondary treatment facilities are currently operational with the former working only at 50% of design capacity.

Discharges from industrial zone in Ghazieh (where tanneries, chemical companies and slaughterhouses are located) and Bourj el Chemali are discharged in the Mediterranean directly without prior treatment.

Industrial wastewater is very diverse from phosphor-gypsum slurry discharged into the sea to olive mill wastewater. Therefore, in 2005, the project "Integrated Waste Management for the Olive-Oil Pressing Industries in Lebanon, Syria & Jordan" was initiated at the MoE. This latter project identified 492 surveyed olive mills discharged into public sewers and streams during the olive pressing season. By signing the Barcelona Convention and its amendments including the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (also known as the LBS Protocol), a sectorial plan for the reduction of pollution of the Mediterranean Sea from land-based sources was updated and developed by the MoE in 2015.

2.2.4 Solid Waste

Lebanon has been going through a national solid waste management crisis, due primarily to population growth, urbanization, dwindling land areas which have so far prevented the implementation of a comprehensive plan for solid waste management in Lebanon. While government- and donor-funded studies and master plans related to municipal SWM have started to show modest results, very little has been achieved in so far as managing industrial waste, including hazardous waste, as well as other types of waste such as construction and demolition waste.

Similarly to the wastewater management sector, the existing solid waste management infrastructure is not adequate to cope with unexpected increase in municipal waste volumes.

Up until 2014, two (2) sanitary landfills and one (1) controlled dump were operational in Lebanon in addition, a total of 670 dumps sites were identified; of which 504 are Municipal Solid Waste (MSW) dumps and 166 are Construction and Demolition Waste (CDW) dumps (MoE/UNDP/2011).

As of 2011, a mechanical biological treatment facility handles the waste of the city of Saida and takes in 200 tonnes per day of mixed municipal solid waste. According to the 2014 SWEEPNET report, 10 small-scale waste sorting facilities currently operate in Lebanon each handling on average 10 tonnes per day. Multiple recycling facilities for paper/ cardboard, aluminum, glass and plastic currently operate throughout the country.

In addition, NGOs currently play a major role in the waste management sector in Lebanon. One (1) organization collects and treats infectious medical waste (sterilization through autoclaving) from healthcare facilities across the country. Two (2) organizations collect, process and dispose of EEE waste. One (1) organization collects waste lubricant oils to be used in high temperature cement kilns.

While for the majority of the non-infectious hazardous waste is currently poorly nationally managed, only one (1) academic institute has been exporting its hazardous waste generated on campus in accordance with Basel Convention requirements.

2.2.5 Biodiversity and Natural Heritage

Lebanon has a very rich and unique biodiversity mainly due to its biogeography, geology, ecology and historic human settlements in the Mediterranean area. According to the Critical Ecosystem Partnership Fund (CEPF), the Mediterranean area is considered to be a true biodiversity "hotspot" and globally ranks third among hotspots in plant diversity and endemism after the Tropical Andes and Sundaland.

One of the most remarkable features about Lebanon is the presence of biodiversity in a very limited area of land. Lebanon covers 0.007% of the world's land surface area and hosts about 0.8% of the world's recorded and catalogued species. Lebanon has a high

percentage (12%) of endemic terrestrial and marine plant species (SOER, 2010).

Lebanon has been designating Protected Areas (PA) since the 1930's. The current Protected Areas (PAs) in Lebanon are divided into three (3) categories:

- Nature reserves established by law since 1992;
- Nature sites under the protection of MoE and established by MoE decisions or decrees based on MoE proposals on the basis of the law of protection of natural sites;
- Protected forests established by MoA decisions.

Moreover, some sites are recognized by international entities and conventions; i.e. World Heritage Sites by UNESCO, Ramsar sites under the Ramsar Convention, Important Bird Areas (IBAs) by BirdLife International, and Specially Protected Areas of Mediterranean Importance (SPAMI) under the SPA and Biodiversity Protocol (NBSAP, 2016).

On a global scale, UNESCO-MAB has identified three (3) sites in Lebanon as Biosphere Reserves:

1) Shouf Biosphere Reserve (2005);
2) Jabal Al Rihane Biosphere Reserve (2007); and
3) Jabal Moussa Biosphere Reserve (2008)

Whereas, the valley of Qannoubine and the Arz El Rab cedar forests are listed as cultural landscapes by UNESCO World Heritage Convention (NBSAP, 2016).

Four (4) Ramsar sites are recognized in Lebanon under the Ramsar Convention on Wetlands of International Importance:

1) Ammiq Wetland;
2) Raas Al-Chaqaa;
3) Tyre Coast Nature Reserve;
4) Palm Islands Nature Reserve

Moreover, in Lebanon there had been fifteen (15) sites listed as Important Bird Areas (IBAs) by Birdlife International.

In addition, two (2) sites are listed as "Specially Protected Areas of Mediterranean Importance" (SPAMI) by the Specially Protected Areas (SPA) and Biodiversity Protocol which are; (1) Tyre Coast Nature Reserve and (2) Palm Islands Nature Reserve (NBSAP, 2016).

2.2.6 Energy

Lebanon is entirely dependent on imports of fuel for energy. Excluding limited hydropower, primary energy production was at 14,021 TJ in 2014, up from 9,499 TJ in 2004, which is equivalent to about 4.5 GJ/person. Primary energy sources include gasoline, gas oil, fuel oil and diesel oil, in addition to several other minor petroleum products such as aircraft oil, liquid gas and tar. Another source of power generation is biogas from landfills accounting to 280.28 MJ in 2014.

Thermal power plants generate 85 percent of total electricity in the country of which five (5) plants are located on the coastal zone, while hydropower plants generate an additional four (4) percent. The remaining eleven (11) percent come from imports through two (2) Turkish power ships currently supplementing the country's supply. Because Lebanon's formal energy production currently does not meet demand, private backup generators produce an estimated 500MW, equivalent to 20 percent of the total production (MoEW, 2010). Private generators (un-surveyed but in the thousands) are found in industries and other establishments, and may be located on balconies, in basements, empty lots, and curbsides (SOER, 2010).

In an effort to expand energy access and fight climate change, the Government of Lebanon with an international support, and with the private sector is working toward energy access, efficiency and sustainability, focusing on the following aims:

- Decreasing public and private financial burdens related to energy expenditure;
- Scaling up renewable energy use to 12 % of the national energy mix by 2020;
- Increasing energy efficiency by 5 %;
- Promoting small-scale renewable energy sources; and
- Enhancing the drive towards a green economy

2.2.7 Environmental Academic Profile

Good environmental governance requires good en-

vironmental professionals; people who understand the environment in all its aspects, and appreciate the interconnectedness of environmental issues and sectors. Lebanese universities have seen a gradual increase in environmental diploma courses and degrees, and the number of environmental students is rising slowly but surely (SOER, 2010).

Table 4 summarizes the environmental specialties within the academic sector in Lebanon.

Table 4 - Summary of environmental specialties within academic sector in Lebanon

University	Degree
American University of Technology (AUT)	BSc. Environmental Health
	BSc. Water resources and environmental Geosciences
Beirut Arab University (BAU)	BSc. Environmental Sciences
	MSc. Environmental Sciences
	PHD Environmental Sciences
Holy Spirit University - Kaslik (USEK)	MSc. Life and Earth Sciences (Oceanography and marine environment)
	MSc. Life and Earth Sciences (Geology)
	MSc. Environmental Biochemistry
	MSc. Environmental Chemistry
Lebanese American University (LAU)	MSc. Civil & Environmental Engineering
Lebanese University (LU)	BSc. Health and Environment
	MSc. Agriculture Engineering Option Environmental
	MSc. Environmental Expertise and Treatment
	MSc. Energetics
	MSc. Biodiversity : Management and Conservation of Natural resources
	MSc. Phyto-ecology : Resources, Security and Applications
American University of Beirut (AUB)	BSc. Landscape design and Eco-Management
	BE. Civil and Environmental Engineering
	BSc. Environmental Health
	MA. Environmental Policy Planning
	ME. Environment and Water
	MSc. Environmental Technology
	MSc. Environmental Health
	MSc. Ecosystem Management
	PHD. Environmental and Water Resources Engineering
Notre Dame University (NDU)	BSc. Environmental Sciences
	BSc. Environmental Biology
	BSc. Environmental Chemistry

Table 4 - Summary of the environmental specialties within the academic sector in Lebanon

University	Degree
Saint Joseph University - Beirut (USJ)	BE. Water & Environmental Engineering
	BA. Geography and Land Use Management
	BSc. Life and Earth Sciences- Biochemistry
	MSc. Environmental Sciences and Management
	MSc. Industrial Technology
	MA. by research Geography and Land Use Management
University of Balamand (UOB)	BSc. Environmental Sciences
	BSc. Environmental Health and Development
	MSc. Environmental Sciences
	ME. Environmental Engineering
American University of Science and Technology (AUST)	Specialized Certificate in Applied Toxicology
	MSc. Biotechnology- Forensic medicine

2.2.8 Environmental Career Opportunities

As new environmentally sustainable technologies and practices are introduced and adopted, new job opportunities across all the sectors are expected to appear. Already, now several green jobs exist in most of the sectors including renewable energies, energy efficient appliances, organic agriculture and integrated pest management, green construction as well as in a number of green waste management activities such as sorting, composting and recycling.

In addition, the enactment of the following Decrees; 8213 dated 24/05/2012 “Strategic environmental assessment”, 8633 dated 07/08/2012 “Fundamentals of environmental impact assessment” and 8471 dated 04/07/2012 “Environmental compliance for establishments”, lead to the increase in the number of consultancy firms providing environmental study services, and therefore creating new career opportunities in the environmental sector.

2.3 Implementation Status of Previous NIP

In order to assess the progress to date in the implementation of the 2006 National Implementation Plan (NIP), two (2) components were analyzed; (i) previous assessments / inventories and (ii) updates from related Ministries.

A questionnaire was developed for each of the main stakeholders responsible for the implementation of the 2006 NIP, primarily the Ministries of Environment, Agriculture, Public Health and Industry. The ministries were asked to advice on the implementation status of each of the actions stated in the previous NIP. Non-achieved actions were investigated to determine the obstacles faced, their validity in light of the updated POPs inventories and studies and the new UNEP Guidance for developing NIPs.

2.3.1 Updates from related Ministries

The MoI, MoE, MoA and MoPH were asked to fill a questionnaire containing a list of actions from the previous NIP in order to assess its implementation status. For each action, the questionnaire included the following questions:

- Has the action been addressed, partially addressed, not addressed;
- If not, what were the technical or legal constraints that prevented its completion;
- What are the resources needed to insure the implementation of the action.

Overall, responses from questionnaires filled by the concerned ministries showed minimal activities and initiatives related to the implementation of the previous

2006 NIP. Some activities related to the Ministry of Environment have been fully implemented and many are currently being further developed. Also, POPs Pesticides had been banned by the Ministry of Agriculture.

Below, in Table 5, is a summary of information provided by each approached Ministry.

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Environment	
Actions (2006 NIP)	**Updates – MoE**
Partially Addressed	
Update Decision 52/1 (29/07/1996) - Specifications and concentrations to limit air, water, and soil pollution. Introduce ambient standards for POPs releases in different environmental media *(Task 3)*	Decisions 52/1 and 8/1 are currently being updated taking into account the ELVs for PCDD/PCDF
Update Decision 8/1 (30/01/2001) - Environmental limit values for emissions and discharges from classified establishments and wastewater treatment plants. Introduce standards for Dioxins/Furans at sources mentioned in the decision. Add new standards for sources under sources II in Annex C of Article 5 of the Convention *(Task 4)*	
Review and update mandates of key institutions (MoE, MoI, MoPH, MoA); where required, human resource with specified expertise levels is to be given positions at the ministry *(Task 10)*	New employees with relevant background and expertise joined the MoE
To enforce the ban, MoE should send a memo (bayan taarifih) to Lebanese Customs indicating which products and equipment may contain PCBs (products and chemical standards used by testing laboratories should be exempted) *(Task 12)*	Not through a memo however the decisions of the Minister of Environment are applicable at the Customs Authority and there is a continuous cooperation between both institutions in this regard which is more dependent on personal initiatives
Conduct audits at existing plants in Lebanon and evaluate recommended solutions such as: the use of plastic-free and oil-free feed material, high furnace temperatures above 850° C, effective gas collection, afterburners and rapid quench, activated carbon adsorption, and de-dusting fabric filters *(Tasks 29,30,31,32)*	As application to the Decree 8471 dated 04/07/2012 “Environmental compliance for establishments” and its implementing decisions of the MoE, the existing industrial establishments are obliged to audit their industries and apply for the compliance certificate within the specified deadlines
Target municipalities and the general public - Cover 70% of Lebanese municipalities with even geographical distribution. Main focus; Solid waste management, Car maintenance *(Task 70)*	Awareness, information dissemination and training targeted mainly the management of the Municipal Solid Waste
Provide EDL technicians with awareness material on health and safety guidelines for PCB handling *(Task 72)*	In 2011, and during the preparation of the “PCB Inventory Update and Project Preparation Study”, the EDL technicians were informed about the danger caused by PCB and were partially trained on the safe handling of PCB, however this activity is being currently addressed by the project “PCB Management in the Power Sector”

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Environment	
Actions (2006 NIP)	**Updates – MoE**
Partially Addressed	
A monitoring program should be established by the inspection unit to validate the result of the self-monitoring reports *(Task 92)*	Monitoring template was prepared and approved
Addressed	
Identify the location and status (waste incinerated, quantity, APCs, etc.) of existing medical waste incinerators in Lebanon (based on MoPH study) *(Task 28)*	The MoE identified the incinerators and is enforcing the treatment of the infectious waste by sterilization and currently there is no licensed medical waste incinerators
Promote good waste management practices in hospitals (e.g., waste minimization, segregation at the source by waste type, wastes recycling) *(Task 28)*	The MoE is promoting sterilization over incineration for infectious waste. For the other types of MW, they are being stored and exported abroad to disposal facilities in accordance with Basel convention requirements. In addition the "Project demonstrating and promoting Best Techniques and practices for reducing health care waste to avoid environmental releases of Dioxins and mercury" accomplished the following activities: - Establishing best practices in 2 model facilities - Developing and implementing training programs on health care waste management
Promote appropriate treatment of bottom ashes and residues from flue gas to reduce PCDD/PCDF releases into the environment during incineration *(Task 28)*	MoE, is banning incineration of infectious waste and promoting its sterilization, whereas for the other type of MW they are being stored and exported to abroad disposal facilities in accordance with Basel Convention requirements
Consider best available techniques in incinerators to reduce emissions; remove chlorinated products and heavy metals, ensure good combustion conditions (turbulence, temperature, residence time) *(Task 28)*	
Ban incineration of PVC made materials and promote its replacement when possible by other non-chlorinated plastics *(Task 28)*	
Provide alternatives to incineration: sterilization (steam, advanced steam, dry heat), microwave treatment, alkaline hydrolysis, or biological treatment, each followed by landfilling *(Task 28)*	

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Environment	
Actions (2006 NIP)	**Updates – MoE**
Addressed	
Label new stockpiles *(Task 43)*	In 2011, a "PCB Inventory Update and Project Preparation Study", updated the preliminary PCB inventory (2005) and identified PCB contaminated transformers and capacitors (in service and out of service) in EDL and PCB-contaminated sites and minor PCB contaminated equipment in the private sector. In 2015, through "PCB Management in the power sector project" a national inventory is being carried out. The 2011 report was done as a preliminary inventory and preparatory phase for the current PCB Management in the Power Sector Project but most of the data was based on estimation and analysis of concessions, private sectors and EDL (transmission and distributions networks)
Provide training on reduction of POPs emissions *(Tasks 28 and 71)*	PCDD/PCDF were addressed under the context of the project "Demonstrating and promoting Best Techniques and practices for reducing health care waste to avoid environmental releases of Dioxins and mercury"
Collect and assess soil samples from each potentially contaminated power plant and substation *(Task 54)*	In 2011, 11 soil samples were taken from the Bauchrieh storage site and repair shop. 7 out of the 11 samples were PCB-contaminated above a level of 50 mg/kg, with the highest concentration of 376 mg/kg. The lowest concentration was 16 mg/kg. Even inside the workshop, the concentration in the upper floor was above 50 mg/kg. The average of the eleven samples was 105 mg/kg and the results clearly demonstrate that the entire site may be PCB contaminated
Collect and assess water samples from each potentially contaminated sites near power plant and substation using quality assurance and quality control measures (QA/QC) *(Task 55)*	In 2011, samples from the Bauchrieh well were tested. The well contains about 61 m^3 contaminated oil. With a density of 0.9 it corresponds to about 55 tonnes oil. With an average content of 2,224 mg/kg the total content in terms of pure PCB is about 122 kg
Make copies of all POPs-related material to be stored in MoE Library for unrestricted disclosure *(Task 67)*	The previous NIP 2006 and all the 2005 inventories are available in the MoE library in addition to other SC related documents
Require identified sources to perform self-monitoring and send reports to MoE *(Task 91)*	Periodic reports based on circular 13/1 dated 2013 i.e. cement industries are being submitted to the MoE. Periodic reports (every 3 months) based on circular 11/1 dated 24/03/2011 "Periodic reporting for dangerous and infectious healthcare waste treatment" are being submitted to the MoE.

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Environment	
Actions (2006 NIP)	**Updates – MoE**
Addressed	
Develop or participate in regional and international training and/or capacity building programs *(Task 93)*	The staff at the MoE, is participating whenever given the opportunity in all the regional and international training and/or capacity building programs related to the different environment related topics
Exchange information and technical expertise with pertinent regional and/or international technology centers *(Task 94)*	Through the participation of MoE representatives in regional and international trainings, and through the "Demonstrating and promoting Best Techniques and practices for reducing health care waste to avoid environmental releases of Dioxins and mercury" Project
Mobilize local funding (if any) for NIP implementation (or chemicals management in general) *(Task 95)*	During the last 10 years, the MoE mobilized local funds and applied for international funds for the implementation of the following projects: - Demonstrating and promoting Best Techniques and practices for reducing health care waste to avoid environmental releases of Dioxins and mercury - PCB Inventory Update and Project Preparation Study - EIA for the PCB Management in the Power Sector project - PCB Management in the Power Sector project
Ministry of Public Health	
Actions (2006 NIP)	**Updates – MoPH**
Partially Addressed	
Promote good waste management practices in hospitals (e.g., waste minimization, segregation at the source by waste type, wastes recycling) *(Task 28)*	Decree 13389 dated 18/09/2004 "Determination of types of healthcare wastes and ways of their disposal" was followed by recommendations of good waste management practices
Provide alternatives to incineration: sterilization (steam, advanced steam, dry heat), microwave treatment, alkaline hydrolysis, or biological treatment, each followed by landfilling *(Task 28)*	Decree 13389 dated 18/09/2004 in part addresses alternative treatment of medical waste

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Industry	
Actions (2006 NIP)	**Updates – MoI**
Partially Addressed	
Target industries: 100% of all unintentional dioxin producing industries under categories II & III *(Task 71)*	Only minor work had been done on raising awareness among industries. CELEP 3 a project executed by UNIDO and funded by Japan for wood manufacturing and coating, paint manufacturing, metallic works in the Bekaa
Develop measurable indicators for each proposed action (such as the percentage coverage of awareness programs) reflective of each task achievements and methodically evaluate each task upon completion *(Task 76)*	In 2015, the MoI initiated the project "Program for the on-going development of industrial statistics" to enhance the data collection and management procedures
Ministry of Agriculture	
Actions (2006 NIP)	**Updates – MoA**
Partially Addressed	
Enhance control of smuggling and illegal entry and exit of POPs pesticides and chemical *(Task 7)*	- Decision 78/1 issued in 2006 requires shipments received at port to be completely emptied from shipping containers in order to be fully inspected by MoA. However, this is not always implemented - Currently MoA, conducts inspections of licensed agriculture chemicals distributors. However, in the majority of cases those entities do not carry illegal pesticides at their retail outlets - Decision 311/1 issued in 2010, requires pesticide importers to declare the import of pesticides. Once shipment arrives to port it is inspected by the Ministry of Agriculture, sampled, tested and cross-checked with legal restriction. - Some of the weaknesses and gaps in the smuggling control mechanisms in the country were identified and attributed to the large border line between Syria and Lebanon allowing for a large amount of smuggling making it difficult to control and to the latest Syrian civil war that led to decrease in smuggling control. In addition to the need to improve the collaboration among concerned stakeholders including MoA, MoE and Customs Authorities in controlling smuggling activities

Table 5 - Summary of updates on 2006 NIP implementation

Ministry of Agriculture	
Actions (2006 NIP)	**Updates – MoA**
Partially Addressed	
Enhance inspection of pesticides outlets and distribution retailers with respect to product expiry dates, labeling requirements, hygiene and other standards *(Task 8)*	Only the first sub-activity was addressed identifying the weaknesses and gaps in the inspection of pesticides outlets and distribution retailers, summarized as follows: - Lack of staff and funds to conduct the necessary volume of inspections - Regulatory deficiencies and unclear legislation regarding the definition of the procedures for tackling the issue and prosecuting violators in addition to the deficiency in the implementing legal texts for the existing laws - Lack of practical knowledge on POPs pesticides at the inspector level - Lack of collaboration among concerned entities in tackling this issue
Identify and involve all pesticides producers and distributors in data logging *(Task 64)*	In 2013, the MoA initiated collaboration with pesticides producers and distributers requesting information on the quantity of expired products, noting that the number of responders was not high
Target farmers: at least 1000 farmers (direct training) and a minimum of 50% of agricultural associations (by coverage of farmers number and geographical distribution), that are geographically well-distributed among cazas and agricultural areas *(Task 69)*	Often trainings are offered to farmers for the management of crops in general where pesticides use is discussed. However, no trainings are provided specifically for pesticides, their use and impact on health and the environment
Addressed	
Develop or participate in regional and international training and/or capacity building programs *(Task 93)*	The related team of the MoA participated in the following international training/capacity building programs: - EU technical assistance information exchange instrument (TAIEX): The objective of the experts mission to Lebanon was to provide the Phytopharmacy Department staff with the necessary tools to better evaluate the scientific data in the registration files of the chemical and biological pesticides, based on which permits to introduce or ban a pesticide will be granted in Lebanon - Crop life is annually visited by Ministries from across the MENA region including Lebanon

2.3.2 Identified Challenges

Based on the responses of Ministries to the questionnaires, the following is a summary of the overarching challenges faced in the implementation of the previous 2006 NIP:

- Insufficient financial resources for the implementation of different projects and the application of certain actions;
- Need to enhance collaboration among concerned stakeholders including MoA, Customs, MoE, MoI and MoPH on executing certain actions;
- Low priority of certain actions in ministerial goals resulting in their abandonment;
- Need to increase awareness on decision-makers level on the importance of executing certain actions;
- In some cases, weak legislation prevented the execution of certain actions;
- Lack of effective data management has affected the ability of ministries to implement certain actions;
- Lack of communication mechanisms with concerned stakeholders such as industries, farmers, distributors and traders made it difficult to disseminate the necessary information and as result interfered with the implementation of certain actions;
- Insufficient institutional knowledge and capacity also prevented some actions from being implemented.

2.3.3 Important Addressed Actions

Some actions did take place addressing directly and indirectly POPs related issues. A summary on those actions is as follows:

Assessment and disposal of PCB contaminated equipment

The previous NIP 2006 prioritized the management of PCBs in the country and accordingly the following was undertaken:

- In 2011, a "PCB Inventory Update and Project Preparation Study", funded by the World Bank, was published. The aim of the assessment was to prepare a summary report that illustrates the current PCB situation in the country to be submitted to the GEF for funding of Lebanon PCB project. The undertaken assessment during October-December 2010, included an update of the previous inventories of PCB-containing equipment and PCB-contaminated sites. On the basis of an assessment of different options for disposal of PCB-containing equipment and waste, proposed project components and safeguarding measures including schedules for project implementation, environmental management plan and monitoring and evaluation were proposed;
- The Government of Lebanon worked on developing a full board project for managing the PCBs in the power sector; the "PCB Management in Power Sector Project";
- In 2014, a full Environmental and Social Impact Assessment (ESIA) was conducted for the "PCB Management in Power Sector Project". This ESIA highlighted on the importance of the project implementation and reviewed all national legislation and regulation relevant for the management of PCB in Lebanon. In the ESIA, the environmental and social impacts of the project were analyzed and environmental management plans were proposed including monitoring plans necessary to evaluate the environmental quality throughout the process;
- In 2015, the full board project "PCB Management in the Power Sector" was initiated, funded by GEF through the World Bank and executed by the Ministry of Environment. The project is also co-funded by the Government of Lebanon through the Ministry of Environment and Electricité du Liban.

Proper management of medical waste

The Government of Lebanon has made noteworthy strides to improve Healthcare Waste (HCW) management in the country. Accordingly, the Council of Ministers enacted Decree 8006/2002 on the classification of HCW and the proper disposal method of each type of waste. The Decree 8006/2002 was amended through Decree 13389 dated 30/09/2004.

The Decree 13389/2004, classified medical waste into different categories and required that medical

waste be treated prior to disposal. The Decree imposed that the treatment of infectious medical waste should be through sterilization and not incineration.

In 2011, MoE issued the Circular 11/1 dated 24/03/2011 "Periodic reporting for dangerous and infectious healthcare waste treatment". The Circular 11/1 required from all the licensed medical institutes, which are implementing sterilization of dangerous and infectious healthcare wastes within their premises, to submit periodic reporting (every 3 months) to the ministry.

The MoE has also implemented the project "Demonstrating and promoting best techniques and practices for reducing health care waste to avoid environmental releases of Dioxins and mercury", funded by GEF through UNDP. The overall goal of this project was to protect public health and the global environment from the impacts of dioxin and mercury releases. To achieve this, the project demonstrated best environmental practices and best available technologies at healthcare facilities that have been selected to serve as models.

The project focused primarily on activities such as promoting the use of non-burn waste treatment technologies, improved waste segregation practices and the use of appropriate alternatives to mercury-containing devices. These activities were reflected in the following seven (7) project objectives:

- Establish model facilities and programs to exemplify best practices in healthcare waste management,
- Deploy and evaluate commercially available, non-incineration healthcare waste treatment technologies appropriate to the needs of each country,
- Introduce and evaluate the use of mercury-free devices in model facilities,
- Establish or enhance training programs to build capacity for the implementation of best practices and technologies both within and beyond the model facilities and programs,
- Review and update relevant policies,
- Disseminate project results and materials to stakeholders and hold conferences or workshops to encourage replication,
- Make project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.

Environmental Assessment

In 2012, the Decree 8633 dated 07/08/2012 "Fundamentals of environmental impact assessment", was enacted requiring the industries among other sectors (commercial buildings, resorts …) to perform Environmental Impact Assessment or Initial Environmental Examination in accordance to its annexes before the establishment and operation.

In 2012, the Decree 8471 dated 04/07/2012 "Environmental compliance for establishments", was also enacted, setting the fundamentals of environmental compliance. It explained the environmental compliance, invited and encouraged the establishments to acquire for the environmental compliance certificate, defined the procedures to obtain this certificate and its renewal. It also set the related violations and penalties. The Decision 539/1 dated 17/11/2015 of the Minister of Environment "Determination of the deadlines of applications for the environmental compliance certificates from the industrial establishments subject to Decree 8471/2012" specified the deadline for the applications of environmental compliance for the different industrial classes. In order to obtain an environmental compliance certificate, the establishment is to conduct an Environmental Audit.

Cooperation between related stakeholders (MoE, MoI, MoA and Customs Authorities)

The Decision of the Minister of Environment 590/1 dated 21/12/2015 "Mechanism of action, from an environmental perspective, with license applications of industrial establishments" have shown a tight cooperation between the MoE and MoI due to their mutual engagement in the licensing of the industrial establishments. This decision defined the following:

- The procedures for taking the decision from the environmental perspective in regards to li-

cense applications of industrial establishments within the MoE;

- The mechanism to be followed by the MoE representative at the industrial permitting committee;
- The mechanism of coordination between the MoE representative at the industrial permitting committee and the department of urban protection at the service of urban environment at the ministry.

The proven successful cooperation between the MoE and the Customs Authority is a key factor in the implementation of the Basel convention, and in the management of chemicals in the country. The main cooperation domain is in the application of the Decision of the Minister of Environment 71/1 dated 19/05/1997 "Organization of wastes import".

Another proven successful cooperation is between the MoA and the Customs Authority in the application of the decisions of the Minister of Agriculture banning the import of pesticides in the country.

Banning of POPs Pesticides

The MoA, banned the use and import of all the listed POPs Pesticides in the Stockholm Convention through several Ministerial Decisions.

2.3.4 Lebanon Compliance to Stockholm Convention Requirements

The level of compliance with the Stockholm Convention requirements is compiled in Table 6 below with emphasize to the initial POPs and the new listed pesticides in the convention.

Table 6 - Stockholm Convention requirements and level of compliance of Lebanon

Convention Article	Level of compliance	Comments
Article 3- Measures to reduce or eliminate releases from intentional production and use	For POPs pesticides refer to section 2.5.1	
	For PCBs refer to section 2.5.2.	The full national inventory of PCB equipment is currently being conducted. The preliminary inventory had been conducted in 2011.
	For DDT refer to section 2.5.1	
Article 4- Register of exemptions	Refer to section 2.5.8	
Article 5- Measures to reduce or eliminate releases from unintentional production	Refer to section 2.5.6	
Article 6- Measures to reduce or eliminate releases from stockpiles and wastes	Refer to section 2.5.7	
Article 7- Implementation plans	Lebanon approved and submitted its first NIP on 17 May 2006 to the Conference of the Parties of the Stockholm Convention	
Article 8- Listing of chemicals in Annexes A, B and C	Up to now Lebanon has not submitted a proposal on the listing of new chemicals in Annexes A, B and C to the COP	

Table 6 - Stockholm Convention requirements and level of compliance of Lebanon

Convention Article	Level of compliance	Comments
Article 9- Information exchange	Refer to section 2.5.10	
Article 10- Public information, awareness and education	Refer to section 2.5.10	
Article 11- Research, development and monitoring	Refer to section 2.5.9	
Article 12- Technical assistance	Lebanon is a recipient developing country Party. Since the first NIP, Lebanon has received technical assistance from international funds tackling the health care waste, PCBs in power sector, capacity building, etc.	Technical assistance should be promoted in the future to ensure the sound management of POPs.
Article 13- Financial resources and mechanisms	Lebanon has no unpaid pledges	
Article 15- Reporting	Refer to section 2.5.11	
Article 16- Effectiveness evaluation	Refer to section 2.3.3	
Article 17- Non-compliance	As the procedures and institutional mechanisms for determining non-compliance are not yet approved and developed, the countries compliance cannot yet be verified by the Conference of Parties/ Compliance Committee	
Article 19- Conference of the Parties	Lebanon is a party to the Stockholm Convention and participating in all Stockholm Convention COPs	
Article 21- Amendments to the Convention	Lebanon has accepted all the Stockholm Convention amendments	
Article 22- Adoption and amendment of annexes	Lebanon has accepted all the amendments of the Stockholm Convention Annexes	
Article 24- Signature	Lebanon signed the Stockholm Convention on 23 May 2001	
Article 25- Ratification, acceptance, approval or accession	Lebanon ratified the Stockholm Convention on 3 January 2003	
Article 26- Entry into force	The Stockholm entered into force for Lebanon on 17 May 2004	

2.4 Institutional, Policy and Regulatory Framework

2.4.1 Roles and Responsibilities of Ministries, Agencies and other Governmental Institutions involved in POPs Life Cycles (from Source to Disposal, Environmental Fate and Health Monitoring)

2.4.1.1 Ministry of Environment

The Ministry of Environment (MoE) is the main governmental body concerned with environmental issues in the country. It was established in 1993 (under Law 216/1993 that was amended by Law 690/2005), to meet Lebanon's environmental challenges, and articulate environmental policy principles and strategy objectives.

The mandate of the MoE requires close coordination with many other relevant ministries, public and private sector groups (environmental inspection and enforcement, climate change adaptation, sustainable management of natural resources, continuous monitoring of air quality, promotion of hazardous and non-hazardous waste management, etc…). The Decree 2275/2009 set the hierarchy of the MoE and divided it into seven (7) services. Each service is divided into departments, which are also divided into divisions. The following figure represents the hierarchy of the ministry.

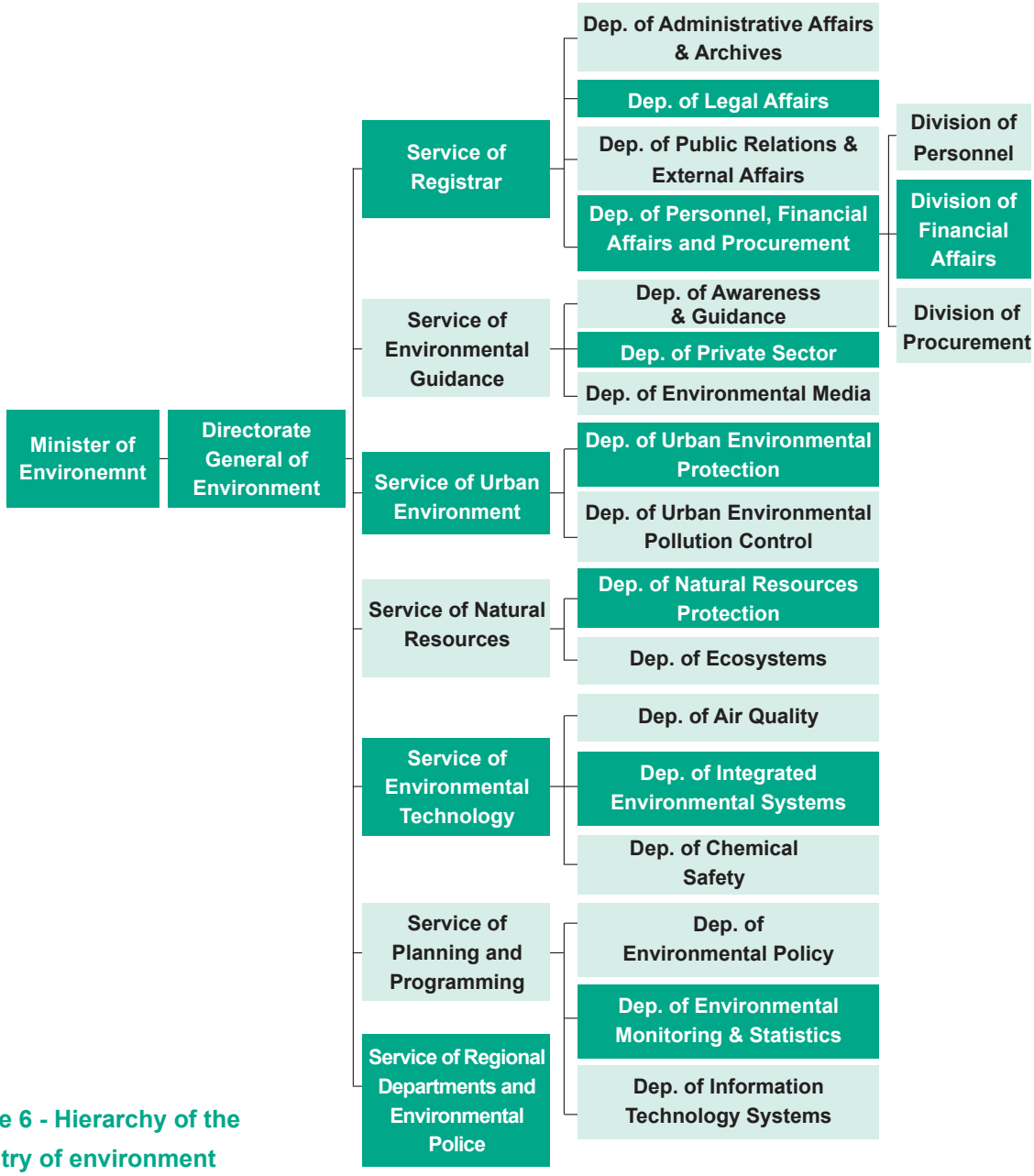


Figure 6 - Hierarchy of the ministry of environment

The chemicals management including POPs falls under the mandate of the **Service of Environmental Technology – Department of Chemical Safety** as per Decree 2275/2009.

The main responsibilities of the **Department of Chemical Safety** (Decree 2275/2009 - Article 23) can be summarized as follows:

- Preparation of draft strategies, plans, programmes, implementation projects, activities and studies for sustainable and integrated management of chemicals and hazardous wastes and follow up on its good implementation
- Classification of all types of chemicals and their usages and all types of hazardous wastes
- Identification of the binding environmental conditions through **decisions** to be issued from the Minister of Environment in accordance with a proposal from the Director General of the Environment and after the consultation of the Council of State, for:
  - The integrated management of chemicals during all its stages; from extraction to disposal
  - The import/export of chemicals
  - The integrated management of hazardous wastes during all its stages; from generation to disposal
  - The import/export of hazardous wastes
  - The approval of Customs declaration, and the methods of destruction of expired or damaged products
- Establishment of the limit values for hazardous solid and liquid waste discharges in water and/or soil through a decision to be issued from the Minister of Environment in accordance with a proposal from the Director General of the Environment and after the consultation of the Council of State.

After the amendments of the convention which resulted in the addition of new industrial chemicals (new POPs), and in order to comply with the provisions of the convention, a cooperation between the Department of Chemical Safety and the Department of Protection of Urban Environment is very essential. Due to the fact that among its duties, the **Department of Protection of Urban Environment at the Service of Urban Environment** is reviewing the environmental conditions for the industrial establishments in the process of getting their permit from MoI, thus recommend their approval or rejection.

The main duties of the **Department of Protection of Urban Environment** (Decree 2275/2009 - Article 17) can be summarized as follows:

- Preparation of draft strategies, plans, programmes, implementation projects, activities and studies for making the urban environment more harmonized with the natural resources by preventing all sources of pollution in the urban environment and follow up on its good implementation
- Identification of the binding environmental conditions through **decisions** to be issued from the Minister of Environment in accordance with a proposal from the Director General of the Environment and after the consultation of the Council of State, for:
  - The prevention from all sources of pollution in the urban environment
  - The master plan and area classifications in the urban environment in a cooperation with Directorate General of Urban Planning
  - The classification of industrial areas for classified establishments (industrial and non-industrial) in a cooperation with the MoPWT
  - The operation and construction permits applications of the classified establishments (industrial and non-industrial)
  - The permit application for big projects, annexation and sorting projects, development projects including gardens, recreational areas, public swimming pools, and cemeteries situated on public land
- Identification of the mechanism for giving environmental permits for wastewater disposal and trade though the issuance of decree(s) from the CoM via a proposal from both the Minister of Environ-

ment and the Minister of Finance

- The definition of classified establishments (industrial and non-industrial) which its operation requires an environmental license related to the discharge of wastewater.

In addition, two (2) main procedures were established at the MoE by ministerial decisions for the chemicals management. The procedures can be summarized as follows:

1) **Decision 71/1 dated 19/05/1997** "Organization of wastes import";

Procedure for wastes/products restricted: MoE restricted the import of several wastes based on the Basel Convention and listed them in this decision. Each imported good has an HS code for identification and checking at Customs. If the product is listed under Decision 71/1, then the LCA will transfer the Customs declaration to the MoE for clearance and approval or rejection. At the MoE, the Department of Chemical Safety is in charge of assessing the imported goods and deciding upon it.

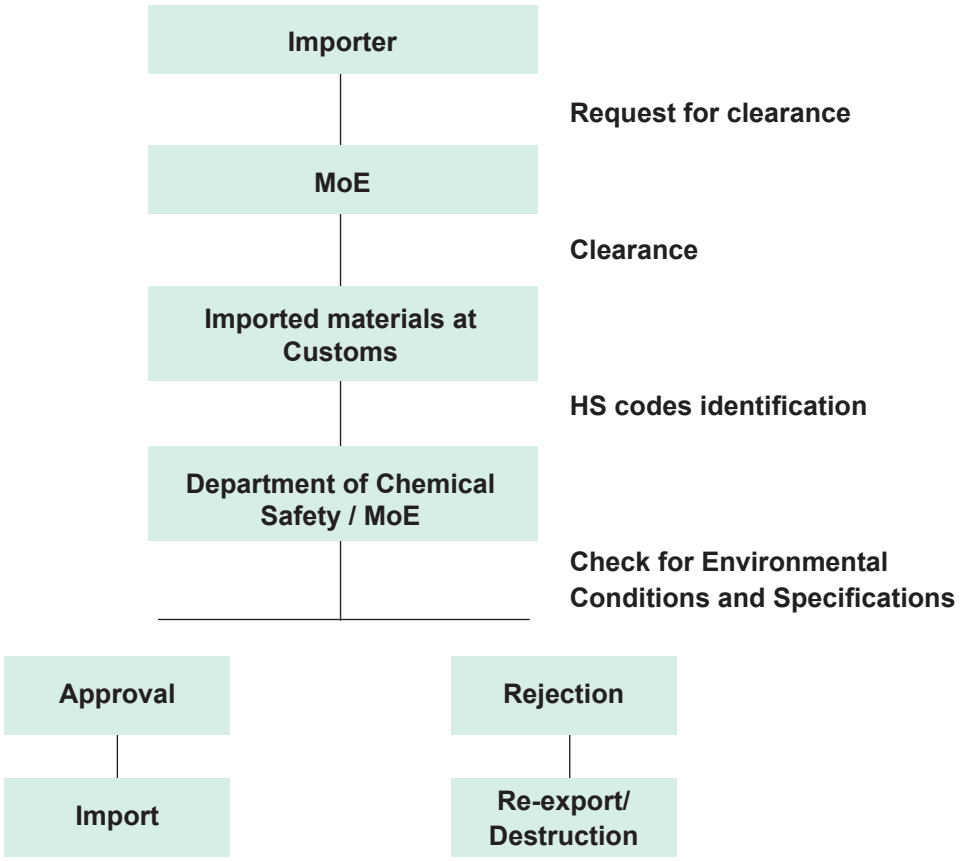


Figure 7 - Procedure for wastes / products import restricted by ministry of environment

2) Decision 590/1 dated 21/12/2015 "Mechanism of action, from an environmental perspective, which license applications of industrial establishments";

Procedure for industrial permits: MoE has the power to approve or reject the licensing of industrial establishments from the environmental perspectives.

2.4.1.2 Ministry of Agriculture

The Ministry of Agriculture is responsible for the management of pesticides in the country ranging from giving import permit, registration, distribution, to disposal and handling of empty containers.

The management of pesticides falls within the responsibilities of the **Service of Plant Protection** at the MoA. The Service of Plant Protection is composed of the Plant Protection Department and the Phyto-Pharmacy Department.

The Plant Protection Department licenses the importers of pesticides. Only licensed importers are allowed to apply for the registration of pesticides at MoA.

The licensed importer submits an application for registration to the Phyto-Pharmacy Department. Registrations are for three (3) years or for a duration that does not exceed the validity of the certificate of registration for either the formulated product or the Technical Grade Active Ingredient (TGAI), whichever is less. After expiration, an application must be submitted for renewal.

The registration requirements at the MoA had been set in the Ministerial Decision 310/1 dated 24/06/2010.

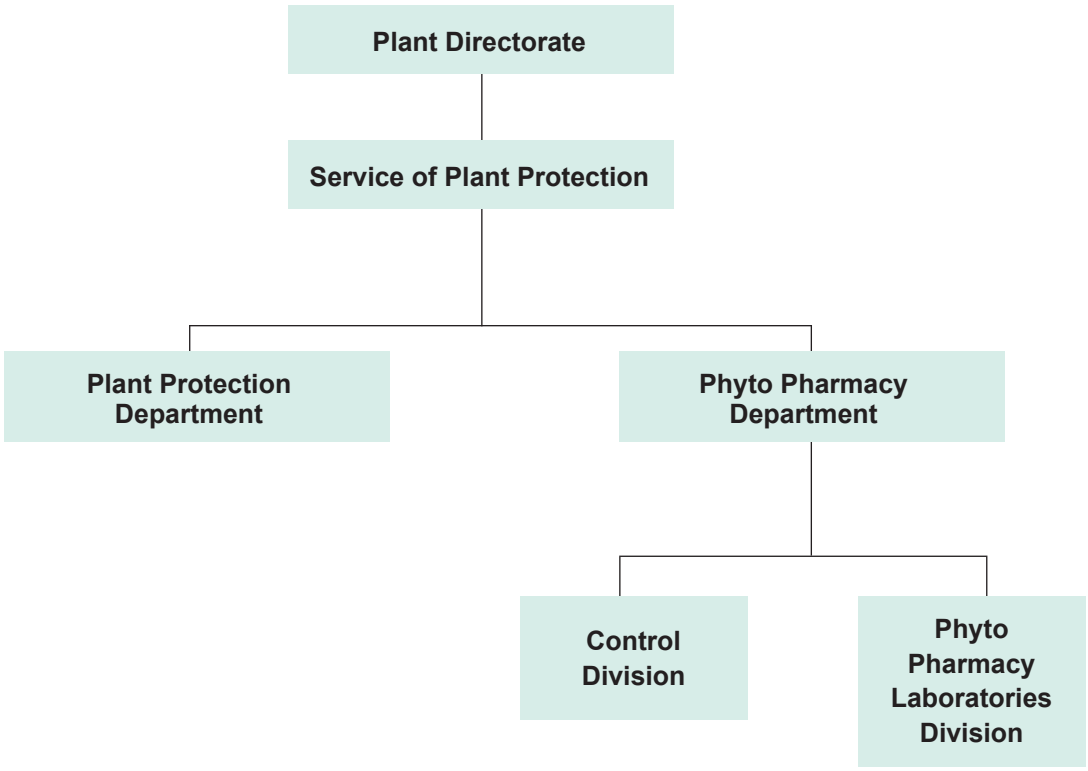


Figure 8 - Hierarchy of plant directorate at the ministry of agriculture

Permit Procedure

Approval of registrations for existing active ingredient pesticide products is made by a committee within the Plant Protection Service - Plant Pharmacy Departments including the Director of the Phyto-Pharmacy laboratories division (FAO, 2013).

Approval of registrations for new active ingredients is not solely the responsibility of the Phyto Pharmacy Department, thus it is approved or denied by a decision from the pesticides committee (FAO, 2013).

The pesticides committee was first proposed by Decision 131/1 dated 06/11/1991. The composition and responsibilities were refined in subsequent years including Decision of 554/1 dated 19/12/2008. Nowadays, the committee consists of representatives of the same oversight;

- Directorate of Plant Resources Plant Protection Service,
- Phyto-Pharmacy Department,
- Plant Protection Department,
- MoPH sanitary engineering service,
- Lebanese Agricultural Research Institute (LARI),
- (1) representative of the faculty of agriculture from one of the universities, and
- (6) members from the private sector (that have one unified vote)

The Director General of Ministry of Agriculture chairs this committee (FAO, 2013) .

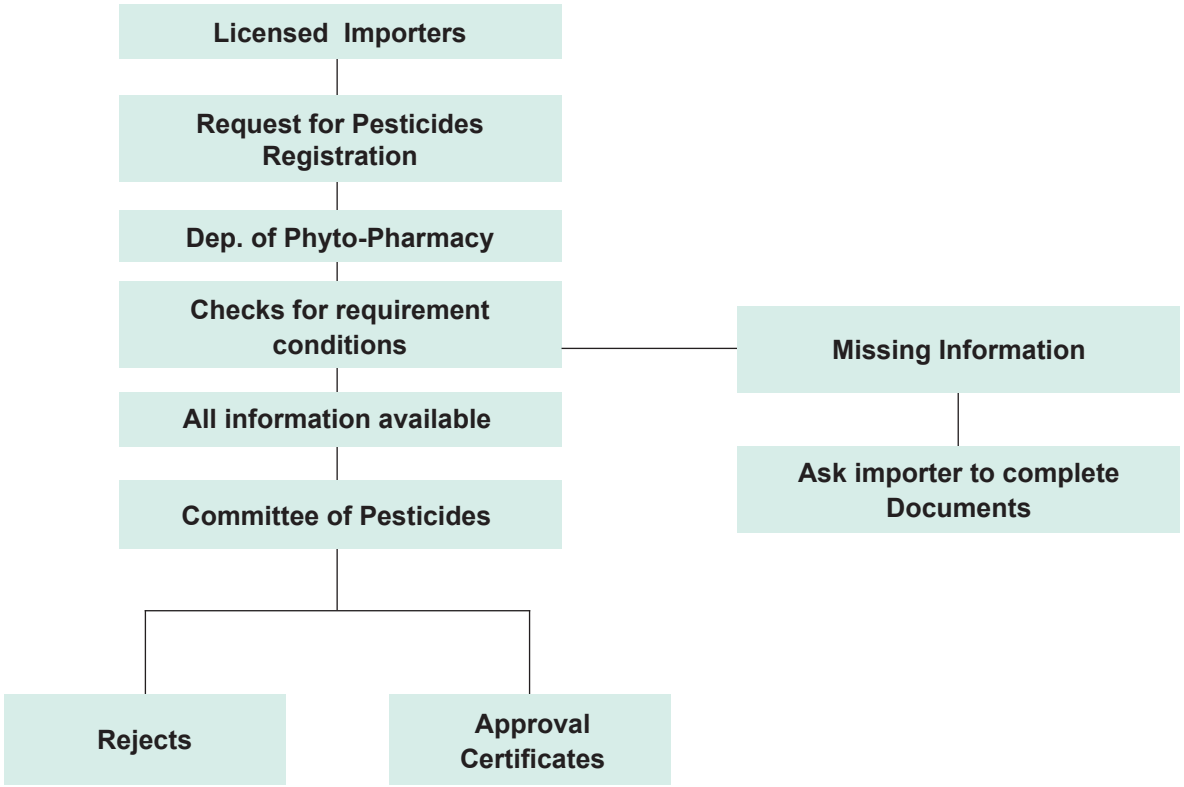


Figure 9 - Permit procedures for import of pesticides

Once pesticides reach the LCA, the importer submits an import request at the MoA. The Phyto-Pharmacy Department then checks for the pesticide registry (if the pesticide is not registered at MoA, the request will be denied).

If the pesticide is registered, the department checks if the importer has an import permit thus keeping request in process or otherwise it stops. Whereas at Customs, the inspectors check if the importer has an import permit allowing the importation. Sampling is done by inspectors at the quarantine and sent to one of Ministry of Agriculture's laboratories which is usually Phyto – Pharmacy laboratory in Kfarshima to identify the active ingredient and its percentage composition.

Laboratory results are then compared with the information submitted by the importer; if the test results show a difference of 10% for pesticides whose active ingredients constitute 10%, or 5% for pesticides with 10-20% active ingredients, or 3% for pesticides with over 20% active ingredients, compared to the submitted information by the importer, the request is rejected. This procedure is summarized in the following chart.

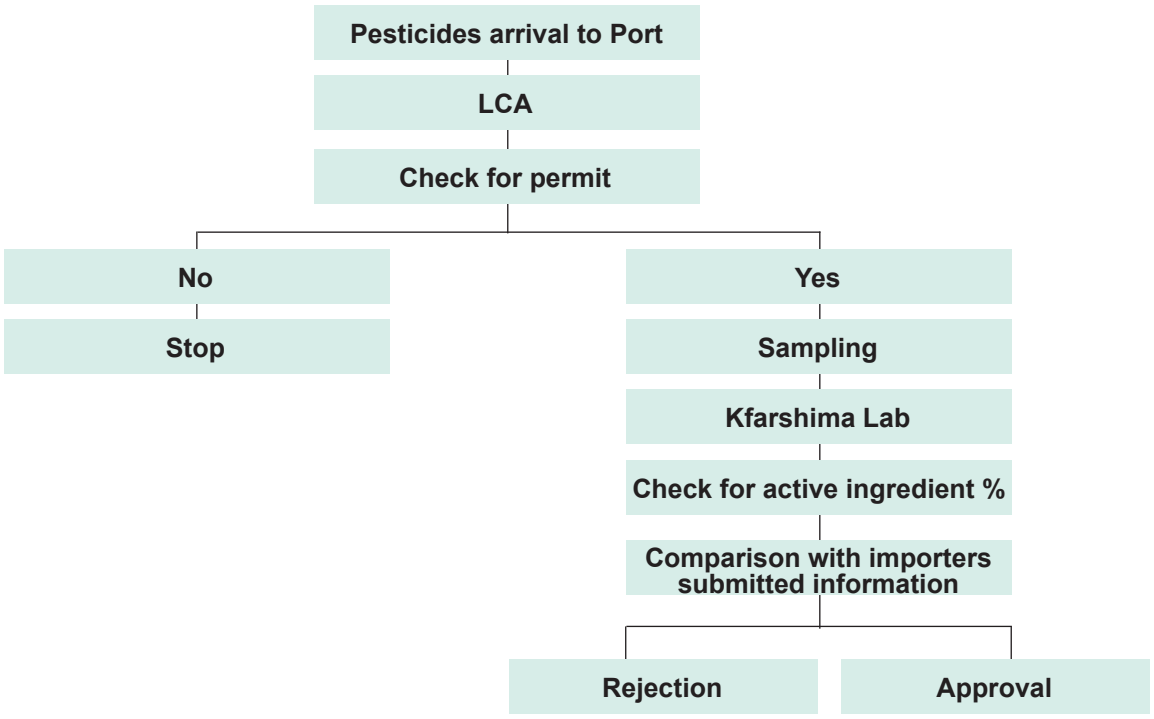


Figure 10 - Procedures required to import pesticides at ministry of agriculture

2.4.1.3 Ministry of Public Health

The Ministry of Public Health and particularly the Sanitary Engineering Service (SES) at the Ministry of Public Health (MoPH) has the responsibility for reviewing, updating and enforcing the registration and use of public health pesticides, biocides and homeowner pesticide products.

An importer of these pesticides/biocides products must be registered within the MoPH. Once registered, an importer may submit a request for a product registration (Figure 11).

The Sanitary Engineering Service makes all decisions related to the acceptance, denial, cancellation and investigation.

There are no dossier requirements for active ingredient purity checks, methodology or certificates of analyses. The MoPH has no laboratory for verification, but random sampling can occur under the request of SES.

Dossier data routinely submitted to the MoA for registration are not required from the MoPH. These data could include but are categorically missing:

- Human exposure and toxicological studies
- Ecological effects and toxicity to non-target organisms
- Environmental exposure studies
- Environmental fate

It is worth mentioning also, that the import quantities of the pesticides/biocides products are neither required nor available at the MoPH.

There is no expiration date for MoPH registered pesticides (FAO, 2013).

In addition to the above mentioned, and according to the Decree 8377/1961, the MoPH sets specifications and technical conditions in the design of public sewers, drinking water networks, waste collection and disposal systems, and participates in the classification of industrial establishments.

Moreover, the MoPH plays a very important role in the management of HCW.

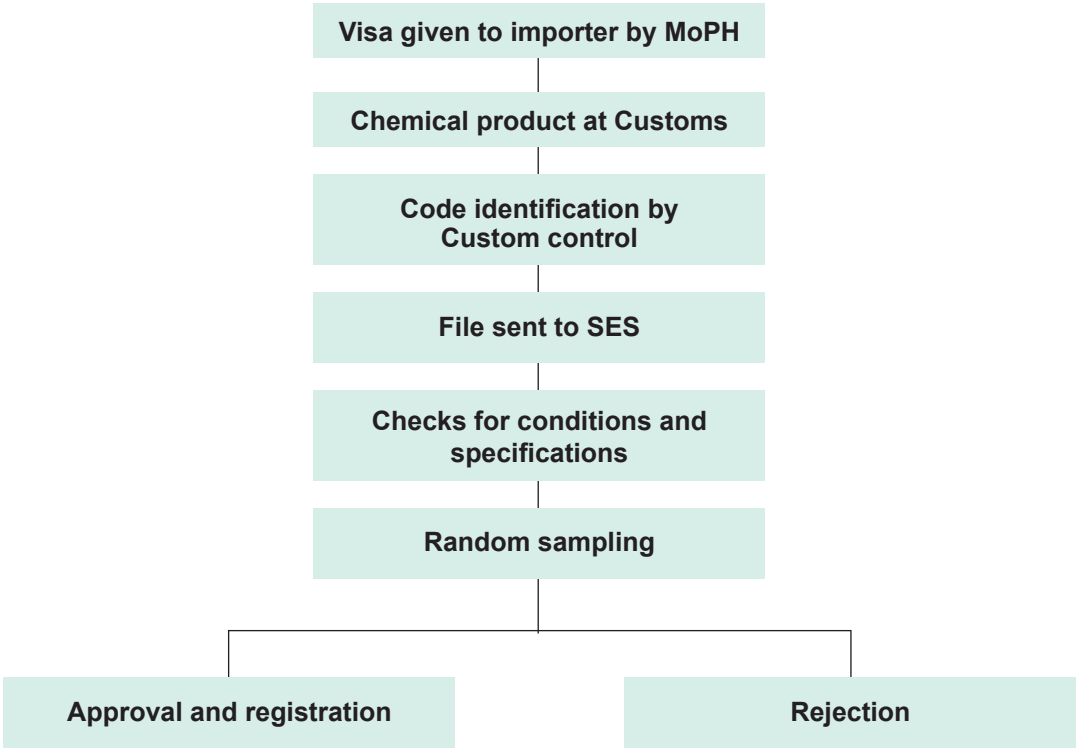


Figure 11 - Procedures required to import pesticides for domestic use at ministry of public health

2.4.1.4 Ministry of Finance / Lebanese Customs Authority (LCA)

LCA is responsible for controlling goods imported/exported to/from Lebanon in accordance to the Customs Law or any other law or agreement which Lebanon is a party of.

The **Article 144** of the Customs Law 4461 dated 15/12/2000 stated the following:

1- Customs may destroy goods proved to be, according to analysis and inspection, inconsistent with applicable laws and regulations.
2- A special committee designated by the director general shall destroy the goods at the expense of the owner provided he is notified to attend the destruction process. Should the owner of the goods fail to appear, destruction shall be carried out in his absence and the committee shall write down a record of such destruction.
3- If such destruction is proved to be harmful to the environment, it shall be permitted, under the conditions set by the director general of Customs, to require the re-export rather than the destruction of goods.

2.4.1.5 Ministry of Energy and Water / Electricité du Liban (EDL)

The power sector itself is largely owned and administered by an autonomous state owned national electrical utility, Electricité du Liban (EDL) under the jurisdiction of the Ministry of Energy and Water (MoEW). This also includes other small distribution concessions and hydroelectric generation administered by MoEW.

The main responsibility of the MoEW / EDL in regards to Persistent Organic Pollutants is the management of transformers and capacitors containing PCBs. Noting that cooperation between MoE and EDL institutions had been established to manage PCB in the Power Sector in an environmentally sound manner and that a Memorandum of Understanding had been signed under this context on March 15, 2016.

2.4.1.6 Ministry of Industry

The Law 642 dated 02/06/1997, gave this ministry the power to control the industrial sector and permitting the establishments and operation of industries including those located within industrial areas in accor-

dance to the provisions of this law.

The Article 5 of this law stated that **Industrial Permitting Committees** will be established at the MoI to study:

- Permit applications submitted to the ministry, and
- Requests for permitting renewal

The committees propose the approval of licensing, renewal, or withdrawal of the license in accordance to the principles of this law and its applicable legal texts. Within 2 months from the date of submitting the application, the committee has to respond. In case of no reply during that period, the request becomes a license as long as the applicant is abiding by the public health and environmental requirements.

Each committee shall include representatives from the MoI, MoPH, MoE and MoPWT/DGUP. The representative joins the committee when the requested permit includes activities related to the duties and authorities of his ministry.

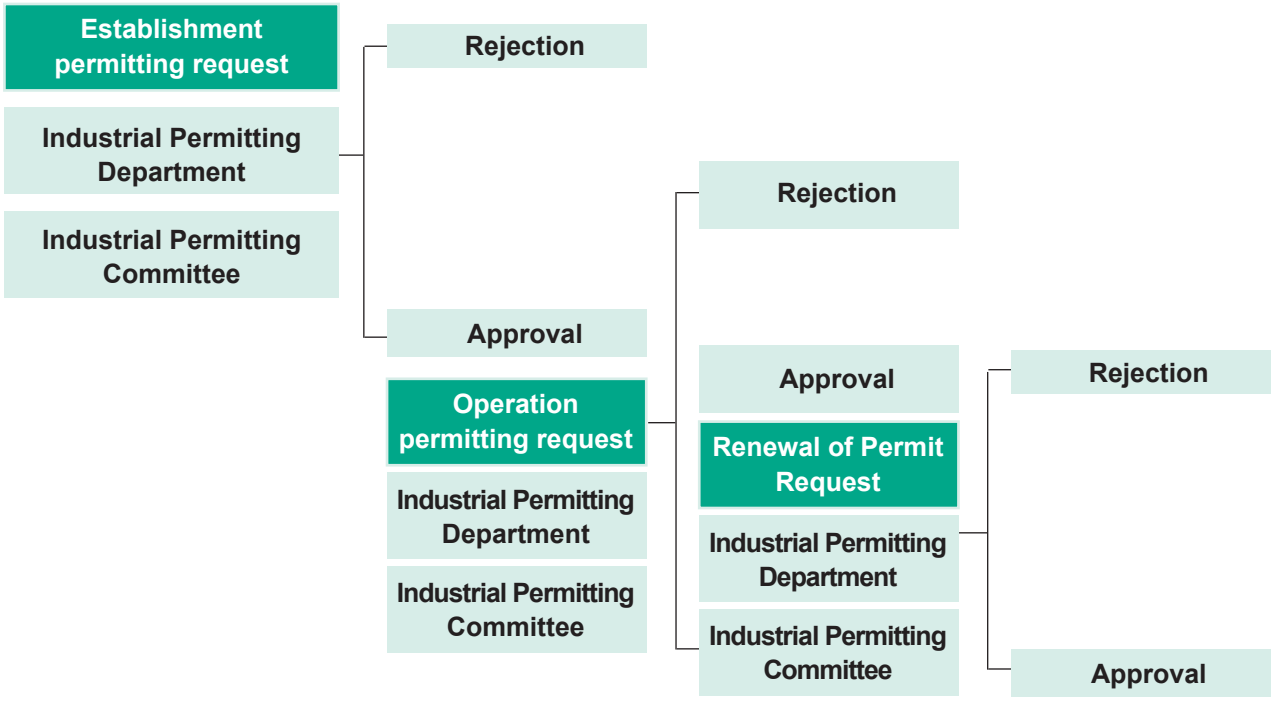


Figure 12 - Procedures of industrial permits at ministry of industry

2.4.1.7 Ministry of Economy and Trade

The Decree 841 dated 06/12/2008 stated that the Consumer Protection Directorate has the mandate of implementation of several activities including:

- Development of a strategic plan and annual work plans in coordination with the Directorate General for Economy and Trade
- Finalization of the necessary procedures for the implementation of some provisions of the consumer protection law
- Identification of activity centers covered by the consumer protection law, including assessment and classification
- Development of the guidelines for the controller including the definition and types of control, rights, duties, and powers of the controller and his working tools and other internal and monitoring related matters
- Follow up on consumer protection and monitoring, evaluation and reporting all the emerged situations

- Development of the control procedures and other measures to achieve their goals

On the other hand, under the context of the consumer protection rights, the ministry is responsible of receiving complaints from a product consumer victim, investigating and taking the required and necessary applicable measures.

2.4.1.8 Ministry of Labor

The Decree 8352 dated 30/12/1961 and its amendments, gave the MoL and particularly the division of statistics the duty to collect the occupational, social and statistical information from private institutions, the different entities related to the MoL, MoSA and the municipalities.

The Department of Labor Inspection and Safety controls the following:

- Reception of the inspection reports from the labor inspectors in the central and regional departments
- Collection of statistics from the inspection reports of labor to provide them to the statistics department
- Authorization of the use of machinery in factories and establishments in accordance with the applicable regulations
- Study of the causes of occupational diseases and prevention methods

2.4.2 Relevant International Commitments and Obligations

Lebanon is involved in a number of international organizations through regional and international agreements and conventions as listed in the below Table 7.

Table 7 - Multilateral Environmental Agreements ratified by the Government of Lebanon

Year	Name of Convention, Treaty & Protocol	Adhesion, Signature, Accession, Ratification	Law / Decree, date *(publication in the official gazette)*
Conventions			
2012	Convention on International Trade in Endangered Species of Wild Fauna and Flora	Adhesion	Law 233, 22/10/2012
2008	**Amendments to Barcelona Convention**	**Adhesion**	**Law 34, 16/10/2008**
2004	**Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade**	**Adhesion**	**Law 728, 15/05/2006**
2001	**Stockholm Convention on Persistent Organic Pollutants**	**Signature: 22/05/2001** **Accession**	**Law 432, 08/08/2002**
1999	Convention on Wetlands of International Importance especially as Waterfowl Habitat-Ramsar	Adhesion	Law 23, 01/03/1999
1994	United Nations Convention to Combat Desertification-Paris	Ratification	Law 469, 21/12/1995

Table 7 - Multilateral Environmental Agreements ratified by the Government of Lebanon

Year	Name of Convention, Treaty & Protocol	Adhesion, Signature, Accession, Ratification	Law / Decree, date *(publication in the official gazette)*
Conventions			
1992	United Nations Framework Convention on Climate Change-Rio de Janeiro	Ratification	Law 359, 11/08/1994
1992	Convention on Biological Diversity-Rio de Janeiro	Ratification	Law 360, 11/08/1994
1989	**Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal**	**Ratification**	**Law 387, 21/12/1994**
1986	Convention on Early Notification of a Nuclear Accident-Vienna	Ratification	Law 566, 24/07/1996
1986	Convention on Assistance in Case of a Nuclear Accident-Vienna	Ratification	Law 575, 24/07/1996
1985	Vienna Convention for the Protection of the Ozone Layer	Adhesion	Law 253, 30/03/1993
1982	Convention of the Sea (Mont –Diego Bay)-Jamaica	Adhesion	Law 295, 22/02/1994
1976	**Barcelona - Convention for the Protection of the Mediterranean Sea against Pollution**	**Signature: 16/2/1976 Accession**	**Decree Law 126, 30/06/1977**
1973	International Convention for the Prevention of Pollution from Ships-London	Adhesion	Law 13, 28/05/1983
1972	UNESCO Convention on the Protection of Cultural & Natural Heritage	Adhesion	Law 19, 30/10/1990
1969	International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties-Brussels	Ratification	Decree 9226, 12/10/1974
1969	International Convention on Civil Liability for Oil Pollution Damage-Brussels	Ratification	Law 28, 12/10/1973
1963	Convention on Civil Liability for Nuclear Damage-Vienna	Adhesion	Law 565, 01/08/1996
1954	International Convention for the Prevention of Pollution of the Sea by Oil-London	Adhesion	Law 68, 16/11/1966
Protocols			
2006	Cartagena Protocol on Biosafety	Adhesion	Law 31, 16/10/2008

Table 7 - Multilateral Environmental Agreements ratified by the Government of Lebanon

Year	Name of Convention, Treaty & Protocol	Adhesion, Signature, Accession, Ratification	Law / Decree, date *(publication in the official gazette)*
Protocols			
2005	Kyoto Protocol to the United Nations Framework Convention on Climate Change aiming to fight Global Warming	Adhesion	Law 738, 15/05/2006
1999	Beijing Amendment of Montreal Protocol	Adhesion	Law 758, 11/11/2006
1992	Copenhagen - Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer	Adhesion	Law 120, 03/11/1999
1990	London - Amendment to the Montreal Protocol on Substances that deplete the Ozone Layer	Adhesion	Law 253, 31/03/1993
1987	Montreal Protocol on Substances that deplete the Ozone Layer	Adhesion	Law 253, 31/03/1993
1982	Geneva - Protocol Concerning Mediterranean Specially Protected Areas	Adhesion	Law 292, 22/02/1994
1980	Athens - Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources	Adhesion	Law 292, 22/02/1994
1976	Barcelona - Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency	Signature: 16/02/1976 Accession	Decree Law 126, 30/06/1977
1976	Barcelona - Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft	Signature: 16/02/1976 Accession	Decree Law 126, 30/06/1977
Agreements			
2004	Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic-ACCOBAMS	Adhesion	Law 571, 05/02/2004
2002	Agreement on the Conservation of African-Eurasian Migratory Water Birds (AEWA)	Adhesion	Law 412, 13/06/2002
Treaties			
1971	London-Moscow-Washington - Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Seabed and the Ocean floor and in the Subsoil	Ratification	Decree 9133, 07/10/1974
1963	Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and in Underwater	Ratification	Law 59, 30/12/1964

Source: SOER, 2010

As a part of its broader commitments for chemicals sound management;

- Lebanon ratified the **Stockholm Convention** through the Law 432 dated 08/08/2002, and since then there had been no record of specific exemptions, thus committed to the full prevention of all the chemicals listed in Annex A and Annex B of the Convention.
- The Lebanese Parliament passed Law 387 in 04/11/1994, and ratified the **Basel Convention** in order to reduce the generation of hazardous wastes and other wastes minimization, aligned with the growing international concern about the need for strict controls on the movement of hazardous and other wastes.
- In 15/05/2006, the Lebanese Parliament passed the Law 728, and ratified the **Rotterdam Convention** on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

2.4.3 Description of Existing Legislation and Regulations Addressing POPs

On the national level, and over a period of time, Lebanon has developed several legal texts (Laws, Decrees, Decisions, Circulars) addressing the environment and the management of chemicals (including POPs).

All the reviewed, analysed and assessed national relevant legal texts to the management of chemicals (including POPs) are listed below (by chronological order of years). The following listed titles were translated from the original texts (Arabic to English), therefore inaccuracy might occur. It is worth mentioning that, the below briefs form each legal text, are tackling only the articles / parts related or co/related to the chemicals management (including POPs).

2.4.3.1 Laws

Law 6 dated 08/01/1968 *"Organization of the trade of fertilizers, agricultural medicines and feeds"*

This law covered organizational matters of all works related to the production, manufacturing, importation, distribution and usage of fertilizers, agricultural medicines and feeds. This law set the penalties of violations.

Law 11 dated 24/04/1978 *"Organization of the import and the occupations of selling, filling, packaging, preparing, manufacturing and spraying pesticides and rodenticides for domestic use"*

This law determined the general conditions for the permit of professionals as per their carried activities, its monitoring and penalties.

Law 64 dated 12/08/1988 *"Environmental preservation against pollution from harmful wastes and hazardous materials"*

Noting that, Article 14 of this law had been cancelled by the Law 216/1993. However, Law 216/1993 had been canceled (excluding its first article) by Article 11 of the Law 690/2005.

This law defined the harmful wastes as being the residues and byproducts resulting or released from every transformation or usage of materials containing any hazardous materials listed in its Annex 1. It enforced the following:

- Punishments for crimes related to breaching the terms of the various stages of management of harmful wastes;
- Penalties for all those responsible or aware people about the crime and refrain from reporting it to concerned authorities;
- Penalties ranged from payment of fines to death penalty.

Law 387 dated 04/11/1994 *"Ratification of Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal"*

This law adopted all the obligations and provisions of the Basel Convention which include among others:

- The definition of hazardous wastes;
- The restriction of trans-boundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management and with a proof of acceptance of the importing country;
- The only legitimate trans-boundary shipments of hazardous waste are exports from countries with-

out facilities, or expertise to dispose safely of certain wastes, to countries which have both facilities and expertise.

Law 642 dated 02/06/1997 *"Establishment of the Ministry of Industry"*
This law gave the Ministry of Industry the authority to organize the industrial sector in Lebanon.

Law 444 dated 29/07/2002 *"Protection of the environment"*
This is the framework law of the environment, it is considered as the basic legal instrument for environmental protection and management. It defined the following eleven (11) environmental principles inspired from Agenda 21 principles:

- Precaution (cleaner production techniques);
- Prevention - Best Available Technologies / Best Environmental Practices (BAT/BEP);
- Polluter-Pays-Principle (polluters pay for pollution prevention and control);
- Biodiversity conservation (in all economic activities);
- Prevention of natural resources degradation;
- Public participation (free access to information and disclosure);
- Cooperation between central government, local authorities, and citizens;
- Recognition of local mores and customs in rural areas;
- Environmental monitoring (pollution sources and pollution abatement systems);
- Economic incentives to encourage compliance and pollution control Legislation Analysis;
- Environmental Impact Assessments.

Law 432 dated 29/07/2002 *"Ratification of Stockholm Convention on Persistent Organic Pollutants"*
This law adopted among others the following:

- Eliminate dangerous POPs, starting with the 12 initial;
- Support the transition to safer alternatives;
- Target additional POPs for action;
- Clean-up old stockpiles and equipment containing POPs;
- Work together for a POPs-free future.

Law 659 dated 04/02/2005 *"Consumer protection"*
This law settled the general rules and guidelines to protect consumer rights including the health and safety of products and services.

Law 728 dated 15/05/2006 *"Ratification of Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade"*
This law is highly beneficial for Lebanon, as follows:

- Prevent the entry of hazardous chemicals into the country;
- Regulate imports of pesticides and chemicals listed in Annex III of the Convention;
- Benefit from information exchange.

2.4.3.2 Decrees

Decree 8735 dated 23/08/1974 *"Maintaining public hygiene"*
This decree, among others, prevented the discharge of sewage and wastewater from industries within waterways and beaches and enforced industrial establishments to treat their wastewater before discharge.

Decree 5100 dated 12/04/1982 *"Identification of technical requirements for the career of importing and selling pesticides and rodenticides for domestic use"*
This decree determined the required technical and special conditions for the career of importing, selling, filling, packaging, preparing, manufacturing and spraying pesticides and rodenticides for domestic use. It is a practical decree for the Law 11/1978 mentioned above.

Decree 4917 dated 24/03/1994 *"Amendment of classifications of dangerous, harmful and disturbing establishments"*
This decree listed in its Annex the dangerous, harmful and disturbing establishments according to the industrial type and class. It cancelled the Annex of the Decree 1120/1936 and both Decrees 2009/1959 and 7558/1961.

Decree 13528 dated 19/11/1998 *"Regulatory texts for trade of pesticides"*

This decree cancelled the Decree 5039 dated 26/03/1982.
This decree set the general legal rules applied for occupations related to import, sell, package, prepare, produce and use of pesticides. It also set the penalties and punishments related to those occupations and their practices.

Decree 1039 dated 02/08/1999 *"Giving an obligatory status for specifications on drinking water"*
This decree gave the obligatory status for national standards and specifications related to drinking water and bottled drinking water, and specified the acceptable testing results generated by the adopted laboratories.

Decree 5243 dated 05/04/2001 *"Classification of industries"*
This decree classified the industrial establishments according to their ISIC number and classes.

Decree 8018 dated 12/06/2002 *"Definition of principles, procedures and conditions for construction and operation permits of industrial establishments"*
This decree determined the principles, procedures and conditions for the following:
- Construction of industrial establishments;
- Operation of industrial establishments;
- Permit renewal;
- Permit amendment;
- Special conditions;
- Permit cancellation and closure of industrial establishments.

Decree 9765 dated 11/03/2003 *"Monitoring, measures and penalties related to industrial establishments"*
This decree specified the following:
- Fundamentals of monitoring industrial establishments;
- Measures and penalties for violations taking into consideration the provisions of Decree 8018/2002.

Decree 11802 dated 03/01/2004 *"Regulating the occupational prevention, safety and health in all enterprises subject to the Code of Labor"*
The main objective of this decree was to increase the safety conditions of workers while using chemical products.

Decree 13389 dated 18/09/2004 *"Determination of types of healthcare wastes and ways of their disposal"*
This decree:
- Defined the types of healthcare wastes;
- Required proper waste segregation and waste minimization;
- Set guidelines for the collection, storage, treatment and disposal of the different types of wastes;
- Required an EIA study for licensing HCWT facilities;
- Gave healthcare facilities 120 days for complying with the decree.

Decree 8471 dated 04/07/2012 *"Environmental compliance for establishments"*
The objective of this decree was to set the fundamentals of environmental compliance. It explained the environmental compliance, invited and encouraged the establishments to acquire for the environmental compliance certificate and defined the procedures to obtain this certificate and its renewal. It also set the related violations and penalties.

Decree 8633 dated 07/08/2012 - *"Fundamentals of environmental impact assessment"*
This EIA decree and its annexes included all the requirements for screening, preparation of the environmental assessment and supervision of the environmental assessment process including consultation and disclosure.

2.4.3.3 Ministerial Decisions

In addition to the listed above laws and decrees aiming for the protection of the environment and the chemicals management, each of the concerned ministries issued several Decisions to serve the same purpose. These are summarized below:

Decisions – Ministry of Environment

Decision 52/1 dated 29/07/1996 *"Definition of standards and maximum allowable limits for the reduction*

of air, water and soil pollution"
This decision defined the standards and limits for the reduction of air, water and soil pollution.

Decision 71/1 dated 19/05/1997 *"Organization of wastes import"*
This decision regulated the import of wastes to Lebanon. It presented two separate wastes lists: "allowed wastes" and "banned wastes".

Decision 8/1 dated 30/01/2001 *"Specifications and standards for air emissions and liquid effluents generated from classified institutions and for wastewater treatment plants"*
It defined the general limit values for emissions of air pollutants and liquid effluents generated from certain industries such as glass, batteries, electroplating, and aluminum manufacturing.

Circular 11/1 dated 24/03/2011 *"Periodic reporting for dangerous and infectious healthcare waste treatment"*
Through this circular and in compliance with the Decree 13389/2004, the ministry of environment required from all the licensed medical institutes, which are implementing sterilization of dangerous and infectious healthcare wastes within their premises, to present periodic reporting (every 3 months) to the ministry of environment. The circular issued the requested report template required to be used.

Decision 539/1 dated 17/11/2015 *"Determination of the deadlines of applications for the environmental compliance certificates from the industrial establishments subject to Decree 8471/2012"*
This decision determined the deadlines for industrial establishments to apply for an environmental compliance certificate as per below:

- The deadline for Class 1 industries is 31/12/2018
- The deadline for Class 2 industries is 31/12/2019
- The deadline for Class 3 industries is 31/12/2020

It informed about the consultancy firms allowed to do the environmental audit, and set penalties related to non-environmental compliance.

Decision 590/1 dated 21/12/2015 *"Mechanism of action, from an environmental perspective, with license applications of industrial establishments"*

This decision defined the following:

- The procedures for taking the decision from the environmental perspective in regards to license applications of industrial establishments within the MoE;
- The mechanism to be followed by the MoE representative at the industrial permitting committee;
- The mechanism of coordination between the MoE representative at the industrial permitting committee and the department of urban protection at the service of urban environment at the ministry.

In addition, the Minister of Environment, throughout the years, took several decisions related to the environmental conditions for construction and operation permits of industrial facilities, among which:

- **Decision 75/1 dated 05/09/2000** "Environmental conditions for construction and operation permits of tanneries"
- **Decision 61/1 dated 10/09/2001** "Environmental conditions for construction and operation permits of plastic factories"
- **Decision 16/1 dated 04/03/2002** "Environmental conditions for construction and operation permits of rubber factories"
- **Decision 106/1 dated 08/07/2010** "Environmental conditions for construction and operation permits of clothes factories"

Decisions – Ministry of Agriculture

The Minister of Agriculture published several decisions related to the pesticides management in Lebanon including POPs pesticides. These decisions are:

Decision 92/1 dated 20/05/1998 "*Standards of pesticides labels and the information required on them"*
This decision banned the import, retail and trade of pesticides unless its label includes the standards and information in accordance to its annex.

Decision 94/1 dated 20/05/1998 *"Banning the import of some pesticides"*
This decision banned the import of many pesticides, among which are POPs pesticides namely; Aldrin, Chlordane, Chlordecone, DDT, Dieldrin, Endrin, HCH

containing less than 99% of gamma isomer, Heptachlor, Mirex, Toxaphene).

Decision 262/1 dated 26/09/2001 *"Banning the registration of some pesticides"*
This decision banned giving new import registrations for many pesticides, among which are POPs pesticides namely; Lindane.

Decision 554/1 dated 19/12/2008 *"Internal regulation of pesticides committee"*
This decision specified the organization and mandate of the pesticides committee.

Decision 570/1 dated 24/12/2008 *"Banning the import of some pesticides"*
This decision banned the import of many pesticides, among which are POPs pesticides namely; Hexachlorobenzene and Pentachlorophenol and its salts and esters.

Decision 79/1 dated 13/02/2010 *"Registration cancellation and banning of import of some pesticides"*
This decision banned the import of many pesticides, among which are POPs pesticides namely; Endosulfan.

Decision 310/1 dated 24/06/2010 *"Organization of registration of imported and nationally produced pesticides and their usages"*
This decision specified the needed procedures, information and documents to apply for pesticides registration and to process its cancellation.

Decision 868/1 dated 14/12/2010 *"Allowing selling and using some pesticides"*
This decision allowed selling and using some banned pesticides (subject to Decision 79/1 dated 13/2/2010) until its expiry date, among which are POPs pesticides namely; Endosulfan.

Decision 311/1 dated 26/01/2011 *"Organization of import of pesticides"*
This decision specified the procedures and needed documents and testing to import a pesticide.

Decisions – Ministry of Public Health
The Minister of Public Health took decisions linked to the management of chemicals in the country:

Decision 2287/1 dated 24/12/2014 *"Management of medical wastes"*
This decision was taken in compliance with the above mentioned Decree 13389/2004.

Decision 2824/1 dated 29/12/2014 *"Establishment of a committee for healthcare wastes treatment"*
This decision established a committee at the Ministry of Public Health responsible to develop a full study on the medical wastes status at all private and public hospitals.

The following Table 8 summarizes all of the above listed POPs management national related legal texts and highlights on the main provisions, principles and rules tackling directly or indirectly POPs.

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Law					
6	08/01/1968	Organization of the trade of fertilizers, agricultural medicines and feeds	LP	It covered organizational matters of all works related to the production, manufacturing, importation, distribution and usage of fertilizers, agricultural medicines and feeds. This law set the penalties of violations	**Law 89 dated 7/9/1991** *(Government Budget and annexed budgets of year 1991),* specifically in its Article 30, stated that all penalties set in Laws dated before 1983, are to be multiplied by 100 times. However, despite of this increase, the set penalties of violations in the trade of fertilizers, agricultural medicines and feeds remain too low
11	24/04/1978	Organization of the import and the occupations of selling, filling, packaging, preparing, manufacturing and spraying pesticides and rodenticides for domestic use	LP	It aimed to control the production and trade of pesticides and rodenticides for domestic use (including POPs)	It gave the power to MoPH to control, monitor and license pesticides and rodenticides for domestic use
64	12/08/1988	Environmental preservation against pollution from harmful wastes and hazardous materials	LP	It defined the harmful wastes as being the residues and by-products resulting or released from every transformation or usage of materials containing any hazardous materials listed in its Annex 1. It also regulated the following: - Control and minimization of POPs from HCW; - Control of all types of hazardous wastes including POPs wastes; - Control of production, transport, trade of harmful and hazardous wastes;	**Article 2** of this law referred to the lists in its Annex 1 including the classification of hazardous wastes. It stated that the harmful wastes will be defined in practical decrees and consequently the list (Annex 1) could be amended by a decree upon the request and proposal of the Minister of Public Health and the Minister of Public Affairs. Noting that in 1988, the MoE was not yet established therefore the law did not give it any power in this regards.

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Law					
				- Set the rules of disposal of hazardous wastes; - Set the penalties of violations leading to environmental pollution	The above mentioned decrees have not been issued yet. Several authorities were given to other ministries by the provision of this law but, since the establishment of the MoE it became under the mandate of the MoE for example the **Article 9** stated that the management of protected areas falls under the mandate of the MoA while currently it's under the mandate of the Service of Natural Resources at the MoE as per the Law 690 dated 26/08/2005 "Establishment of the Ministry of Environment and Identification of its mandates"
387	04/11/1994	Ratification of the Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal	LP	It adopted the Basel convention's text as it is; - Definition of hazardous wastes; - Restriction of trans-boundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management and with a proof of acceptance of the importing country; - Restriction of the allowance of export of hazardous waste from countries without facilities, or expertise to dispose safely of certain wastes, to countries which have both facilities and expertise	.....

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Law					
642	02/06/1997	Establishment of the Ministry of Industry	LP	It gave the MOI, the authority to organize the industrial sector including the industries dealing with POPs or releasing POPs unintentionally	.....
444	29/07/2002	Protection of the environment	LP	This is the national framework law of environment. It mainly tackled the following: - Definition of environmental principles - Procedures of environmental planning - National council for the environment - Resource mobilization for environmental protection - Procedures of monitoring of environmental pollution - Organization of environmental information and participation in the protection of the environment - Environmental Impact Assessments - Protection of all environmental matrices from all types of pollution such as harmful and hazardous chemicals - Responsibilities and penalties	**Article 4** stated the 11 principles for the protection of the environment including the principle of prevention encouraging the use of Best Available Practices (BAT/BEP). **Article 25** stated that any burning activity of fuel shall be subject to environmental limits values in accordance to the national standards. However this article did not mention the open burning of solid wastes. **Article 28** stated that, among others, a practical decree should be endorsed to specify the environmental national standards, the procedures to control its implementation, the principles of assessing the environmental status and protecting it. Especially for issues related to air pollution and burning activities. **Chapters 2 and 3** of this law tackled the protection of the coastal and marine environment and the protection of the water matrices against pollution. In particular, **Article 35** set the measures to protect the public water and its usage, and **Article 36** stated that the Minister of Environment is to propose a decree for national standards of water.

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Law					
				.....	**Article 40** stated that the MoE is to propose a decree defining the following: - List of harmful and hazardous wastes containing harmful materials to public health and safety in order to ban its import, entry, trade, stock, usage, retail, or transport through and in the Lebanese territories - List of wastes allowed for import, trade, stock, usage, retail, or transport through and in the Lebanese territories - Terms and conditions for import of waste generating products and materials, its entry, trade, stock, usage, retail or transport through and in the Lebanese territories **Article 44** stated that the import, trade, production, marketing, transport, usage, distribution of hazardous chemicals is subject to prior clearance and under the monitoring of MoE, this clearance is to be provided through a decree proposed by the Minister of Environment
432	29/07/2002	Ratification of Stockholm Convention on Persistent Organic Pollutants	LP	It adopted the Stockholm Convention's text and annexes as they are; - Elimination of listed POPs; - Support the transition to safer alternatives; - Target additional POPs for action; - Clean-up old stockpiles and equipment containing POPs; - Solidarity for a POPs-free future	.....

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Law					
659	04/02/2005	Consumer protection	LP	It settled the general rules and guidelines to protect consumer rights including the health and safety of products and services. In **Articles 60 and 61,** it stated that the National Council for Consumer Protection (including the Director General of the Environment as a member in this council), is responsible for the awareness of consumers on sustainable use of products and encourage the services that protect the environment	Even though this law addressed the environment in an indirect way, more emphasis is needed on types of products and services to be more environmental friendly and POPs free
728	15/05/2006	Ratification of Rotterdam Convention on the prior informed consent Procedure for certain hazardous chemicals and pesticides in international trade	LP	It adopted the Rotterdam Convention's text and annexes as they are; - Prevent the entry of hazardous chemicals into the country; - Regulate imports of pesticides and chemicals listed in Annex III of the Convention; - Benefit from information exchange	.....
Decree					
8735	23/08/1974	Maintaining public hygiene	CoM	In regards to the protection of the environment, this Decree enforced the following: - Ban disposal of demolition and solid wastes in public areas and roads; - Ban wastewater discharge in rivers or in the sea or its leakage in the soil; - Allow the disposal of cars and trucks, its parts, and bodies in walled plot depending on a permit from the Governor; - Violations and penalties	This decree although it tackled the environment indirectly, its main purpose was towards the public hygiene and the visual impacts

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Decree					
5100	12/04/1982	Identification of technical requirements for the career of importing and selling pesticides and rodenticides for domestic use	CoM	It sets up the rules and regulations and technical requirements for occupations related to pesticides and rodenticides for domestic use; importing, selling, filling, packaging, preparing, manufacturing and spraying	It gave the power to MoPH to control, monitor and license the import, trade, filling, packaging, preparation, manufacturing and spraying of pesticides and rodenticides for domestic uses
4917	24/03/1994	Amendment of classifications of dangerous, harmful and disturbing establishments	CoM	It classified the dangerous, harmful and disturbing industrial establishments and their classes	The lists contain some industries that may include POPs chemicals in their production process or may release POPs and UPOPs, namely; asphalt melting industries, cement industries, toys industries, tobacco industries, silver plating industries, leather industries, carpet industries, chemical industries, rubber industries, and others
13528	19/11/1998	Regulatory texts for trade of pesticides	CoM	It set the general legal rules applied for occupations related to import, sell, package, prepare, produce and use of pesticides. It also set the penalties and punishments related to those occupations and their practices	.....
1039	02/08/1999	Giving an obligatory status for specifications on drinking water	CoM	It gave the obligatory status for national standards and specifications related to drinking water and bottled drinking water, and specified the acceptable testing results generated by the adopted laboratories	These national standards took into consideration the following POPs: Aldrin, Dieldrin, Lindane, Toxaphene, without taking into consideration the presence of PFOS in water
5243	05/04/2001	Classification of industries	CoM	It classified the industrial establishments according to their ISIC number and their classes	.....

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Decree					
8018	12/06/2002	Definition of principles, procedures and conditions for construction and operation permits of industrial establishments	CoM	It determined the principles, procedures and conditions of the below: - Construction of industrial establishments; - Operation of industrial establishments; - Permit renewal; - Permit amendment; - Special conditions; - Permit cancellation and closure of industrial establishments	.....
9765	11/03/2003	Monitoring, measures and penalties related to industrial establishments	CoM	It specified the following: - Fundamentals of monitoring industrial establishments; - Measures and penalties for violations taking into consideration the provisions of Decree 8018/2002	**Article 4** gave the authority of monitoring the industrial establishments to the Monitoring Department at the MoI, municipalities within their territories, and concerned bodies in the MoE and MoPH as per the enforced legal texts
11802	03/01/2004	Regulating the occupational prevention, safety and health in all enterprises subject to the Code of Labor	CoM	It mainly tackled the following: - Prevention and safety at work; - Healthy conditions at work; - Safety measures for chemical usage at work; - Prevention measures for gasoline usage	**Article 12** stated that the Minister of Labor is to issue a decision to specify the required measures to be adopted when workers are exposed to any hazardous vapour **Article 25** set up general conditions to deal with some types of wastes However, even though this Decree tackled the environment indirectly, its main purpose was towards the health and safety of workers
13389	18/09/2004	Determination of types of healthcare wastes and ways of their disposal	CoM	The main provisions of this decree concern the following: - Definition of HCF, HCW and their categories; - Treatment of HCW; - Classification of HCW in its annexes	**Article 9** obliged the HCF to treat their hazardous and infectious wastes through sterilization therefore it minimizes their burning and open dumping consequently decreasing the release of Dioxins and Furans

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Decree					
8471	04/07/2012	Environmental compliance for establishments	CoM	The main provisions of this decree concern the following: - Definition of establishments, environmental audits; - Explanation of environmental compliance; - Procedures and requirements for the application of environmental compliance certificate; - Violations and Penalties	All the pre-existing industries using chemicals (including POPs) are subject to environmental audit in order to apply for the environmental compliance certificate, therefore the MoE will be able to control the establishments and to monitor and audit the usage and release of POPs in the established industries
8633	07/08/2012	Fundamentals of environmental impact assessment	CoM	It tackled among others the following: - Classification of projects requiring EIA, and IEE; - Procedures, rules and regulations for the preparation and review of EIA and IEE; - Procedures to monitor the projects; - Violations and penalties	All the projects (including industries) using chemicals (including POPs) are subject to EIA, IEE or Environmental Audit, therefore the MoE will be able to control the upcoming establishments and to monitor and audit the usage and release of POPs in the established industries
Ministerial Decisions					
52/1	29/07/1996	Definition of standards and maximum allowable limits for the reduction of air, water and soil pollution	MoE	It listed and defined among others the following: - Standards of Drinking Water; - Standards of wastewater; - ELVs for air pollution at work; - ELVs for noise pollution; - ELVs for air pollution resulting from waste burning; - ELVs for air pollution in cement industries	It did not tackle the limits of POPs emissions, residues and generation in all the matrices. Noting that it set the limits of Dioxins in working places

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Ministerial Decisions					
71/1	19/05/1997	Organization of wastes import	MoE	Based on the Basel Convention, this Decision settled the institutional, organizational, and regulatory framework for import of wastes. It also defined the following: - Requirements for import of wastes (Annex 1); - Ban of the import of wastes (Annex 2)	The annexes of this decision were based on the Basel convention. Since 1997, those annexes were not updated, and thus not related to the updated HS codes
75/1	05/09/2000	Environmental conditions for construction and operation permits of tanneries	MoE	It settled the environmental conditions related to the following: - Processes of tanneries; - Pollution resulting from tanneries; - General environmental conditions required for tanneries	Although this decision tackled the wastes generated from the industrial processes in general, it did not mention / regulate the usage or the release of POPs chemicals
8/1	30/01/2001	Specifications and standards for air emissions and liquid effluents generated from classified institutions and for wastewater treatment plants	MoE	Amendments of the ELVs adopted by Decision 52/1 dated 29/07/1996	This decision did not mention any ELV for Dioxins and Furans resulting from MSW burning, or in residues, in soil or water
61/1	10/09/2001	Environmental conditions for construction and operation permits of plastic factories	MoE	It settled the environmental conditions related to the following: - Plastic production processes; - Wastes resulting from plastic production; - General environmental conditions required for plastic production	Although this decision tackled the wastes generated from the industrial processes in general, it did not mention / regulate the usage or the release of POPs chemicals
16/1	04/03/2002	Environmental conditions for construction and operation permits of rubber factories	MoE	It settled the environmental conditions related to the following: - Rubber production processes; - Wastes resulting from rubber production; - General environmental conditions required for rubber production	Although this decision tackled the wastes generated from the industrial processes in general, it did not mention / regulate the usage or the release of POPs chemicals

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Ministerial Decisions					
106/1	08/07/2010	Environmental conditions for construction and operation permits of textile industries	MoE	It settled the environmental conditions related to the following: - Textile production processes - Wastes resulting from textile production - General environmental conditions required for textile production	Although this decision tackled the wastes generated from the textile industrial process, it did not mention the usage or the release of POPs chemicals
11/1	24/03/2011	Circular: Periodic reporting for dangerous and infectious healthcare waste treatment	MoE	This Circular established the reporting mechanism required from the licensed medical institutes, which are implementing sterilization of dangerous and infectious healthcare wastes within their premises, to the ministry	Through monitoring the sterilization system of healthcare wastes, the incineration of the dangerous and infectious waste decreased
539/1	17/11/2015	Determination of the deadlines of applications for the environmental compliance certificates from the industrial establishments subject to Decree 8471/2012	MoE	It determined the deadlines for industrial establishments to apply for environmental compliance certificate, informed about the consultancy firms allowed to do the environmental audit, and set penalties related to non-environmental compliance	The MoE will be able to control, monitor and audit the usage and release of POPs in the established industries and force the industries to treat their wastes and chemicals in an environmentally sound manner
590/1	21/12/2015	Mechanism of action, from an environmental perspective, with license applications of industrial establishments	MoE	It defined the following: - The procedures for taking the decision from an environmental perspective in regards to license applications of industrial establishments within the MoE; - The mechanism to be followed by the MoE representative at the industrial permitting committee; - The mechanism of coordination between the MoE representative at the industrial permitting committee and the department of urban protection at the service of urban environment at the MoE	This decision is to organise and unify the mechanism related to license applications for industries at the Ministry of Environment

Table 8 - Summary of POPs national related legal text

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Ministerial Decisions					
92/1	20/05/1998	Standards of pesticides labels and the information required on them	MoA	It banned the import, retail and trade of pesticide unless its label includes the standards and information in accordance to its annex	.....
94/1	20/05/1998	Banning the import of some pesticides	MoA	It banned the import of Aldrin, Chlordane, Chlordecone, DDT, Dieldrin, Endrin, HCH containing less than 99% of gamma isomer, Heptachlor, Mirex, Toxaphene	.....
262/1	26/09/2001	Banning the registration of some pesticides	MoA	It banned giving new import registrations for Lindane	.....
554/1	19/12/2008	Internal regulation for pesticides committee	MoA	It organized and set the mandate of the pesticides committee that deal with all pesticides (including POPs)	.....
570/1	24/12/2008	Banning the import of some pesticides	MoA	It banned the import of Hexachlorobenzene and Pentachlorophenol and its salts and esters	.....
79/1	13/02/2010	Registration cancellation and banning the import of some pesticides	MoA	It banned the registration and import of Endosulfan	.....
310/1	24/06/2010	Organization of registration of imported and nationally produced pesticides and its usages	MoA	Control of pesticides registration	.....

Legal Text	Date	Title	Issuing Institution	Legal text related to chemical management (including POPs)	Remarks
Ministerial Decisions					
868/1	14/12/2010	Allowing the selling and using some pesticides	MoA	It allowed selling and using existing Endosulfan in the country till its expiry date	.....
311/1	26/01/2011	Organization of import of pesticides	MoA	Control of import of pesticides	.....
2287/1	24/12/2014	Management of medical wastes	MoPH	It is to comply with Decree 13389/2004	.....
2824/1	29/12/2014	Establishment of a committee for healthcare wastes treatment	MoPH	It established a committee to study the HCW status in all the hospitals in the country	The constant coordination between the MoPH and the MoE in this regards can be of a great value

In addition to the above mentioned legal texts, the ministry of environment suggested and presented several draft legal texts such as the integrated solid waste management law to the parliament and others but till this date there is no feedback related to these draft laws from the Parliament.

2.5 Assessment of Pops Issue in the Country

The full 2016 assessment reports (POPs pesticides, IPOPs and UPOPs, socioeconomic and regulatory and institutional framework) had been published and disclosed on the Ministry of Environment's website (http://www.moe.gov.lb/The-Ministry/Reports.aspx).

2.5.1 Assessment of POPs Pesticides including DDT (Annexes A and B)

The Lebanese governments over the course of the years issued a series of decisions regulating and banning the import and use of many POPs pesticides; they can be summarized as follows:

- **Decision 94/1 dated 20/05/1998:** banned the import of many pesticides, among which are POPs pesticides namely; Aldrin, Ahlordane, Chlordecone, DDT, Dieldrin, Endrin, HCH containing less than 99% of gamma isomer, Heptachlor, Mirex, Toxaphene.
- **Decision 262/1 dated 26/09/2001:** banned giving new import registrations for many pesticides, among which are POPs pesticides namely; Lindane.
- **Decision 570/1 dated 24/12/2008:** banned the import of many pesticides, among which are POPs pesticides namely; Hexachlorobenzene and Pentachlorophenol and its salts and esters.
- **Decision 79/1 dated 13/02/2010:** banned the import of many pesticides, among which are POPs pesticides namely; Endosulfan.
- **Decision 868/1 dated 14/12/2010:** allowed selling and using some banned pesticides (subject to Decision 79/1 dated 13/2/2010) until its expiry date, among which are POPs pesticides namely; Endosulfan.

2.5.1.1 Objective and Methodology

A **Sectoral Assessment on POPs Pesticides in Lebanon was conducted in 2016** (January - November 2016) covering the update of the Preliminary Pesticides Inventory (2005). The general goal of this qualitative assessment was to understand the current status of the POPs Pesticides in Lebanon, identifying areas potentially contaminated with POPs and developing guidelines to manage POPs containing material, contaminated sites, and restrict their future uses.

The identification of potentially contaminated sites was based on questionnaires, interviews and available data; no sampling or laboratory analysis was envisaged as part of this assessment.

The methodology of this 2016 assessment was based on a tailored field survey at farmers, distributors and suppliers level, complemented by further meetings and data collection with other national related stakeholders involved in the pesticides market chain and the pesticides import procedures.

2.5.1.2 Inventory

Status of Pesticides Import

Since Lebanon is not a pesticide producing country, it relies on direct imports through importers from the private sector. However, few pesticides dedicated to agriculture use are formulated and packaged in Lebanon by a single registered company.

The Customs Authority is responsible for law enforcement to control smuggling as well as to control the imported or exported goods to the country via official ports (maritime, airway or terrestrial). The Customs Authority does not allow the retrieval of pesticides shipments through these ports without the previous approval of the MoA, represented by its officers at these ports (import/export and quarantine services). The pesticides import approval procedures are shown in Figure 13 below.

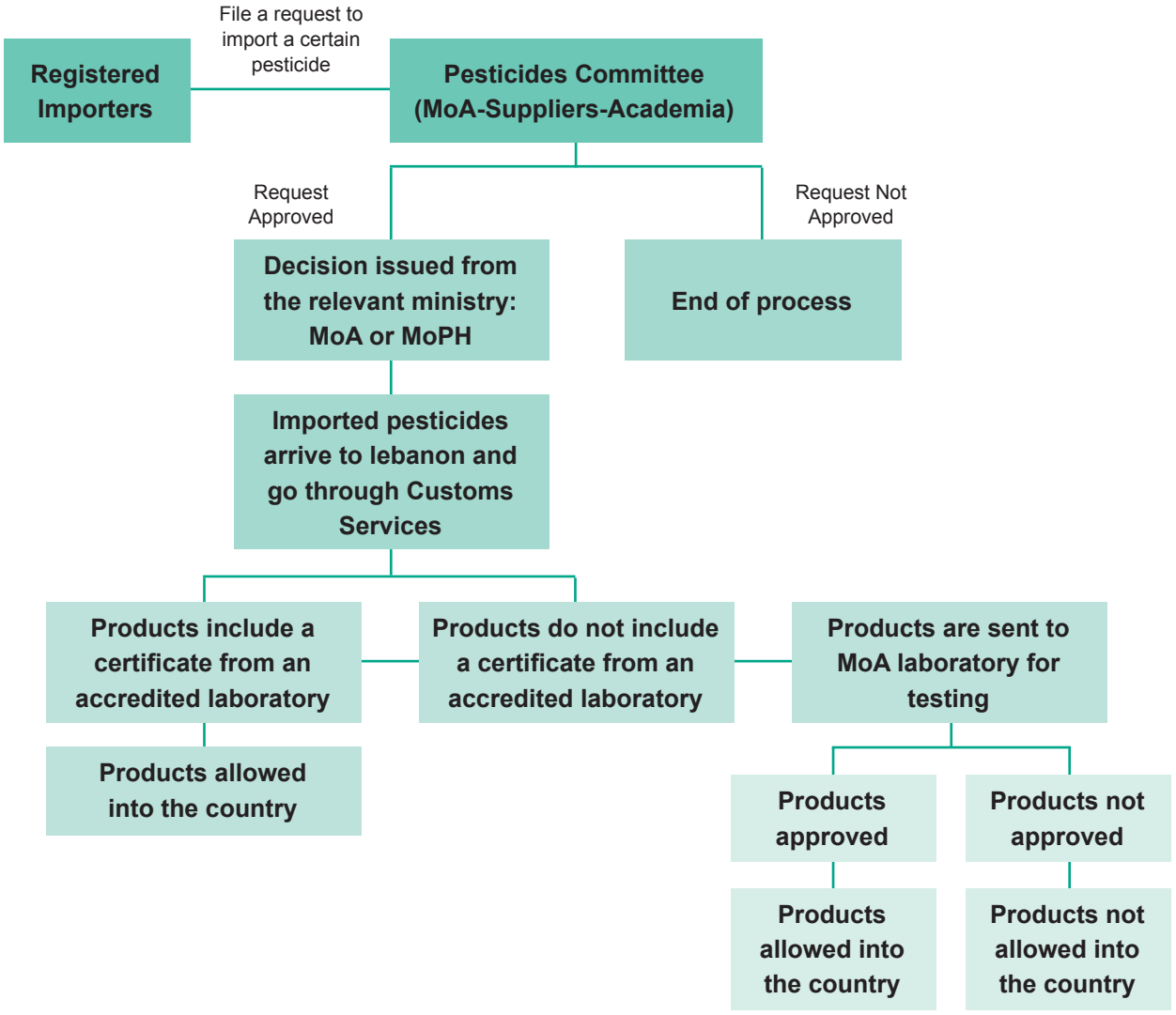


Figure 13 - Procedures of pesticide import

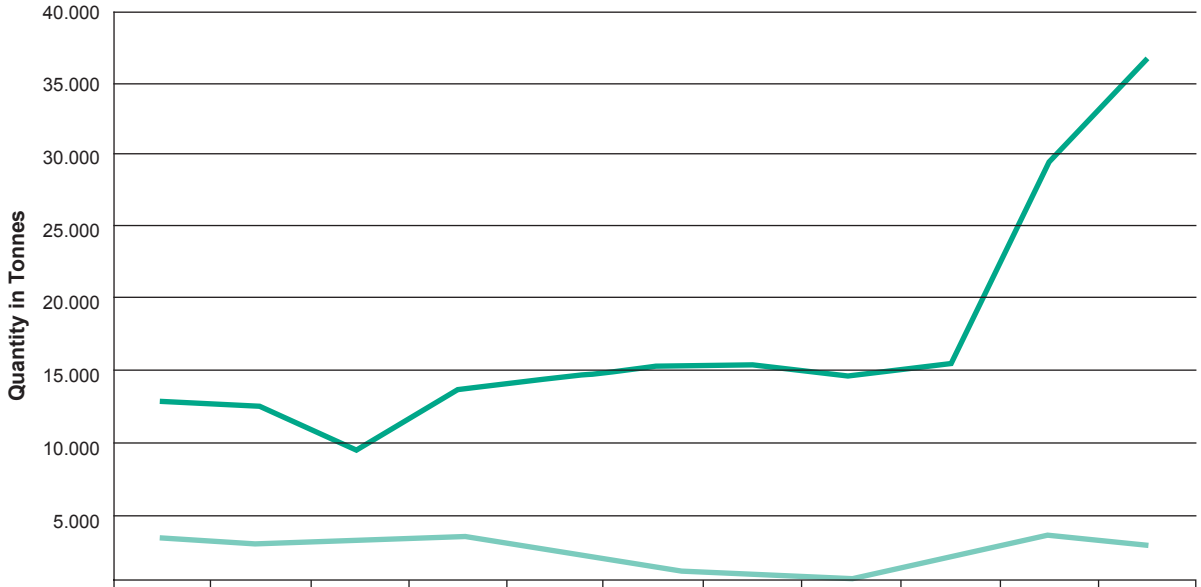
Imported and exported quantities of pesticides were provided by the Customs Authority from 2004 until 2014. In the national tariff, pesticides are found under Section 6 “Products of the chemical or allied industries”, Chapter 29 “Hydrocarbons and their halogenated, sulphonated, nitrated or nitrosated derivatives” and Chapter 38 “Miscellaneous chemical products”.

Chapter 29 includes a list of chemicals from which nine (9) POPs pesticides were identified. The query for data per active ingredient for pesticides showed that POPs were not imported between 2004 and 2014, except for Lindane and Hexachlorocyclohexane (HS Code: 29.03.81), as one (1) tonne was imported in 2009 and then 250 kilograms in 2014.

Under Chapter 38, all pesticides are grouped under one tariff code (HS 38.08) and its sub categories. From the Tariff and HS codes classification under Chapter 38, no information on POPs pesticides can be retrieved. These chemicals are classified based on their packaging characteristics, Methylbromide, and Bromochloro Methane content – which none is indicative of POPs.

Nonetheless, an analysis of the pesticides (components under Chapter 38) import and export trend has been conducted for indicative purposes. Figure 14 below presents the total yearly quantities of imported and exported pesticides in tonnes between 2004 and 2014. A considerable increase in imported quantities can be noticed starting 2012 while exported quantities can be characterized as rather stable.

Lebanon imports pesticides from 68 different countries located all over the world and exports to 55 different countries, mainly Middle Eastern and African ones.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Import	12940	12 423	9.582	13.712	14.316	15.337	15.568	14.763	15.729	29.574	36.912
Export	3.274	2.678	2.994	3.193	1.871	957	689	432	1.918	3.774	2.776

Figure 14 - Imported and exported pesticides in Lebanon between 2004 and 2014

Field Survey

This task included communication with three (3) groups of stakeholders:

- Direct communication with:
  a. Farmers (individual farmers, representatives of farmers groups, associations and cooperatives),
  b. Suppliers and distributors dealing with pesticides,
  c. Industries packaging pesticides and input providers including regional distributing agents, and
  d. Association of pesticides importers and distributors (ASPLANTE)
- Data collection from relevant public institutions (e.g. MoA regional and central offices, MoE, MoPH, Customs, water establishments) and international bodies (e.g. FAO, WHO); and
- Discussions with representatives of academic and research institutions, including laboratories (e.g. LARI, IRI).

For this field survey, four (4) main areas within the country were selected and agreed upon: (i) Akkar coastal plain and mountain areas, (ii) Northern Mount Lebanon (Jbeil - Keserwan coastal area), (iii) Central Bekaa area, and (iv) Saida and Tyre coastal plain. These four (4) areas were chosen based on the following criteria:

- Major agriculture area (importance);
- Diversity of crops (degree of diversity in cropping pattern);
- Diversity of agriculture systems (irrigated, non-irrigated, open field, greenhouses, field crops and perennial crops);
- Diversity in geographical and bioclimatic areas (coastal plain, foot hills, and inland plateau);
- Diversity of farm size, farmer profile and background;
- Presence of major pesticide suppliers and of small distributors;
- Geographical representation / coverage of the country; and
- Cultural aspects reflected in the agricultural practices of the farmers.

Crops were selected based on their economic importance in the selected four (4) regions and in a way to cover the diversity of agriculture patterns and production systems in Lebanon. This is further displayed in the below Table 9 and Figure 15.

Table 9 - Field Survey, distribution by crop and region

		Region			
		Akkar	Northern Mount Lebanon	Central Bekaa	South
Crop	Apple (and pear)	x		x	
	Banana		x		x
	Citrus	x			x
	Cut flowers		x		x
	Grapevine			x	
	Peach	x			
	Olive		x		
	Potato	x		x	
	Strawberry		x		x
	Tomato	x	x	x	x
	Other vegetables	x		x	

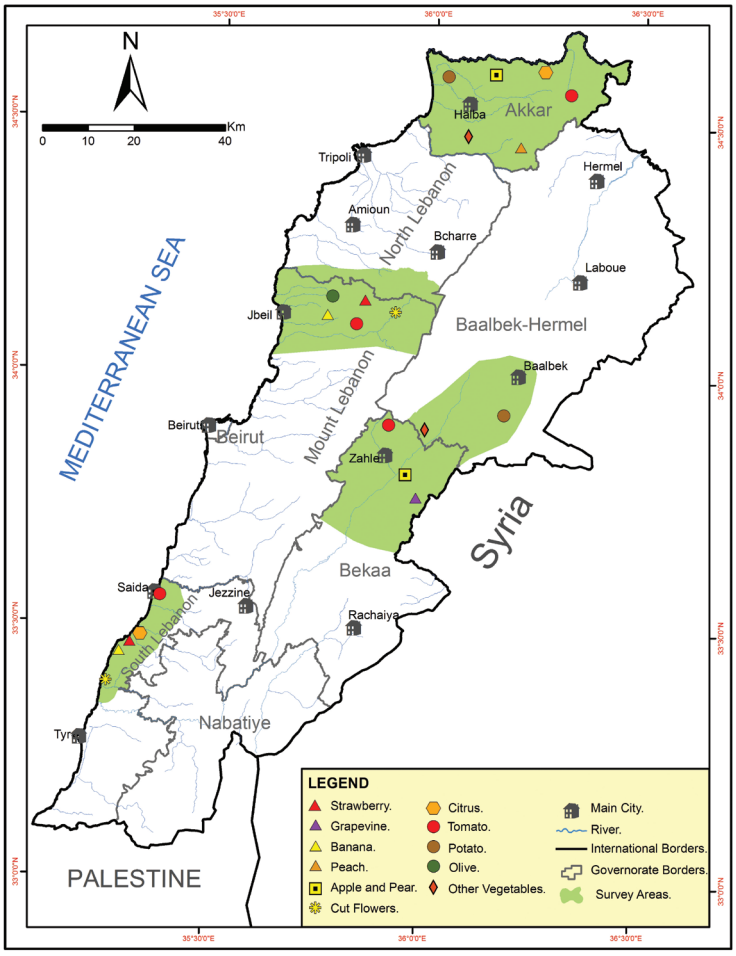


Figure 15 - Surveyed areas and crops

A statistical descriptive analysis was conducted for the field survey carried on the farmers and companies. The analysis focused on answering questions contributing to the objectives of this inventory:

- Presence of POPs in Lebanon, where (region), and their usage (on which crops);
- Awareness of farmers regarding POPs and usage of pesticides;
- Compliance of service providers with MoA regulations regarding POPs and pesticides in general;
- Awareness of suppliers and distributors to POPs and MoA regulations;
- Disposal, storage and stockpiles status;
- Usage of pesticides empty containers by farmers;
- Agriculture practices (including irrigation);
- Willingness of farmers and service providers to recycle obsolete POPs and recycle pesticide containers; and
- Presence (or absence) of potential contaminated sites.

In addition to the analysis of the data collected through field surveys and interviews with key stakeholders; a number of publications related to POPs and pesticides in general, in Lebanon were reviewed.

2.5.1.3 Summary of Findings

The major findings of the inventory can be resumed as follows:

- POPs might be still smuggled into Lebanon across the Syrian border and eventually by airways in provenance from Turkey and China. Endosulfan and DDT might had been smuggled during the surveyed period. Other banned pesticides by MoA are also being smuggled (i.e. Chloropyrifos, Paraquat). However, this claim cannot be proven until further investigation is being carried especially through sampling and laboratory testing.
- Akkar seems to be the region where most banned pesticides and POPs pesticides might be utilized, and to a much lesser extent in the Central Bekaa. Although this survey did not cover all Lebanon, it is assumed from the results and trends that POPs pesticides might also have been used in other regions like Danniyeh and Baalbeck-Hermel which are also close to the northern borders where smuggling activity of goods is common.
- No companies promoting POPs pesticides or banned pesticides were identified, but based on interviews and shared information, these seem to be sold by small local distributing agents, which are not registered at MoA or do not necessarily comply with MoA and MoPH regulations. Many local agents and companies refused to engage in interviews during the survey.
- Some farmers in Akkar could be smugglers themselves, as suspected during the survey near to bordering areas (Wadi Khaled). Most farmers are aware of POPs as illegal pesticides; however they lack awareness of their negative impacts on health and the environment. Many smuggled products (not specifically POPs) are imported in containers without any labeling.
- Most farmers are not aware of the active ingredients of the pesticides they utilize. It is clear that farmers are highly dependent on the agriculture engineers and to a lesser extent on pesticide suppliers in defining the pesticides to be used to control pests and diseases, or to spray pesticides following a calendar. The majority of farmers in Akkar and to a lesser extent in the Bekaa and other regions were not able to link active ingredients to a target pest or disease on a defined crop.
- A clear difference is observed between pesticide suppliers and distributors. Suppliers are aware of POPs and of the latest MoA and MoPH decrees and regulations; their warehouses and pesticide stocks are complying in general with regulations. On the other hand, distributors are

not necessarily abiding by laws and regulations. Moreover, distributors are more likely to procure their products from different sources, and consequently they could be dealing with POPs or other smuggled pesticides. It was evident that farmers relying directly on distributors are those who have the least awareness about POPs and safe use of pesticides.

- Only one (1) farmer confirmed utilizing Endosulfan three (3) years ago. It is believed that there could be few more that unknowingly used POPs pesticides (since they are not all familiar with active ingredients) or did not provide genuine responses. It is assumed that 1-5% of farmers may have used POPs in the past 10 years, and this percentage will be diminishing due to the depletion of stocks worldwide.
- POPs pesticides were not reported to be imported into the country between 2004 and 2014, except for Lindane and Hexachlorocyclohexane (HS code: 29.03.81), as one (1) tonne were imported in 2009 and 250 kilograms in 2014.
- There are no stockpiles for POPs or pesticides empty containers, as most of them are burned in the field or thrown with municipal solid waste. However, in Akkar, where 5% of empty containers are thrown in rivers; some piles may exist temporarily at the end of the dry season (summer) before being washed out by the river flow in winter. It is worth monitoring streams like Estouane, Aarqa and Bared in Akkar, and Litani in Central Bekaa. These streams and their surrounding fields could be potential contaminated sites (Figure 16).
- There is no exhaustive water, soil, or crop analysis about all POPs pesticides in Lebanon. Research focuses on one (1) region or one (1) POP, due to the limited technical, financial and human resources at the academic and research institutions. Although the reviewed and assessed list of publications showed certain complementarities in investigation topics, mainstreaming efforts is deficient.
- One (1) barrier identified in the assessment of POPs pesticides is the classification of imported pesticide products based on end-use rather than on their chemical compositions.
- The registry system at MoA allows the ministry to assess the existing and new registered chemicals, as well as those that are banned, coupled with the requested quantities for import in the license. Yet, there is no mechanism or system implemented by any institution for the assessment and listing of new chemicals already in the market.
- Regarding testing and sampling carried studies and researches during the inventory period (2004-2014):
    - Industrial Research Institute (IRI) laboratories in Haddath tested the presence of some POPs pesticides (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Toxaphene, Lindane, and Endosulfan) in water samples nonetheless; the results of these tests (date, location, concentrations) were not shared due to client confidentiality.
    - Lebanese Agriculture Research Institute (LARI) has one (1) equipped laboratory in Fanar that does the analysis of pesticides residues in food, soil and water. POPs are analyzed in samples from different locations in the country. Based on shared data, since 2011, no POPs were found in tested fruits, cereals, and vegetables. No data was provided regarding food samples, and no data was provided for the time period before 2011. However, the institute recorded the presence of POPs previous to 2011, as confirmed by the interviewed concerned responsible. However, these results were not shared at the time of finalizing this report.
    - Ministry of Agriculture's Phyto–Phar-

macy laboratory in Kfarshima was approached to collect available data on POPs detection in samples analysis. The laboratory personnel mentioned that as part of a project in 2009, 30 strawberry samples collected from all over the country (Akkar, Beirut, Barbir, Chweifet, Nabatiyeh, Saida, Tyr, etc.) were analyzed for Endosulfan residues but none were detected. Moreover, the laboratory personnel also mentioned that since 2011, no POPs residues were found in fruits, vegetables, or cereals.

- Water Establishment of Beirut and Mount Lebanon provided results of water analysis conducted at their own laboratory for pesticides, including POPs between 2012 and 2015. The analyzed water is from samples collected at the sources that are under the direct control of the Water Establishment in Beirut and Mount Lebanon (Madif, Safa, Afqa, Nahr Ibrahim, Jeita, Qachqouch, Fouar Antelias, Barouk, Raayan, Daychouniyeh, Mechref, Naameh, Mamboukh, Qattin Azar Laban, Assal and Shabrouh dam). The results showed the presence of Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Toxaphene, Pentachlorobenzane, Endosulfan, and Pentachlorophenol. The concentrations found were all under the thresholds that are admitted for potable water, as cited by the establishment's representative.

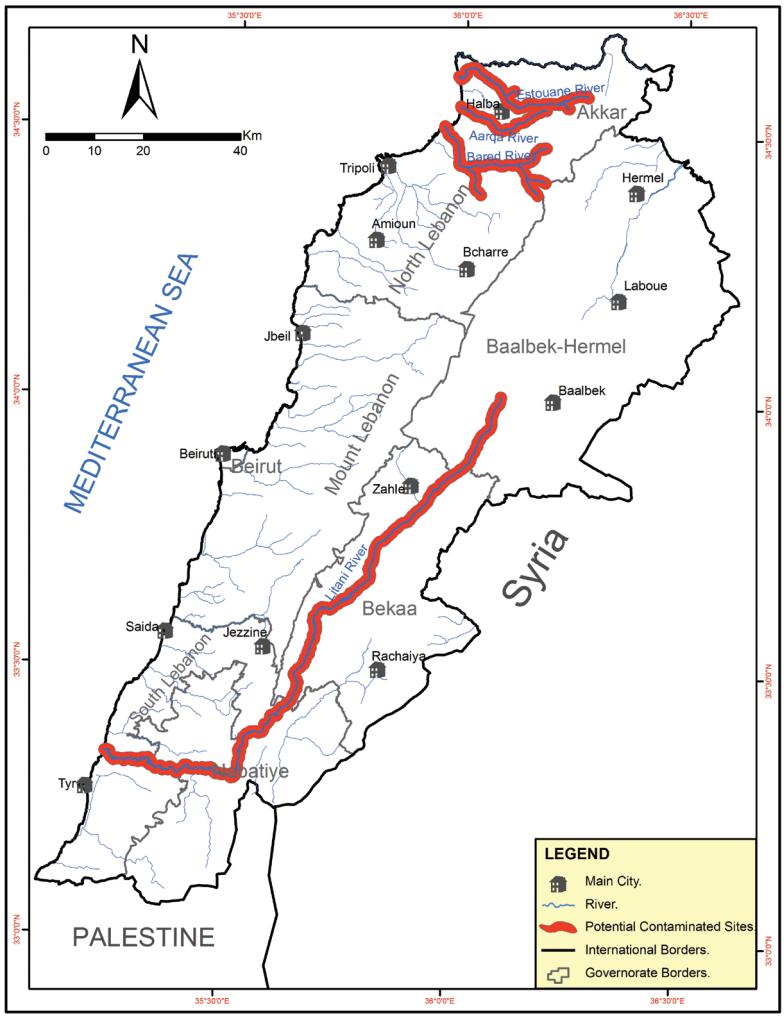


Figure 16 - Potential contaminated sites

2.5.2 Assessment of PCBs (Annex A)

Lebanon has no PCB production facility. Only the use of PCBs in the power sector was investigated during this assessment; the uses of PCB in hydraulic fluids in mining and military as well as in open applications were not assessed at this stage due to lack of data.

2.5.2.1 2005 - Preliminary PCB Inventory

Recognizing the importance of the power sector as a potential stock / user of PCB oil and PCB-containing equipment, a preliminary PCB inventory, funded by GEF /UNEP, was carried out in 2005 that focused on closed applications in the power sector - i.e., transformers containing dielectric fluid/oil. Such transformers are found in power plants (thermal and hydroelectric), substations, and distribution stations.

The **2005 Preliminary PCB Inventory** (MoE/UNEP, 2005) determined that Lebanon's electricity company - Electricité du Liban (EDL) owns and operates seven (7) thermal power plants, 56 substations and more than 16,000 distribution transformer stations. EDL owns and operates three (3) filtration units for improving the oil's dielectric properties. The filtering process may be causing some degree of cross contamination between PCB-containing and non-PCB-containing transformers. Findings of the 2005 inventory can be summarized as follows:

- There are no incineration kilns or dedicated landfills for chemical waste in Lebanon;
- PCB contaminated equipment are disposed of haphazardly or dismantled and sold as scrap. PCB containing oil was dumped recklessly or sold as fuel;
- Ten (10) out-of-service transformers were located in Zouk Power Plant and seventeen (17) in-service transformers in Jieh Power Plant containing about 42 tonnes of PCB oil; commercial names include "Askarel", "Sibanol" and "Pyralene". While test results from other power plants came out negative, PCB oil or PCB contaminated oil may have been present in other power plants and would require more extensive testing;
- The concentration of PCB oil in old and new transmission transformers were below detection limits for 17 transformers. It appears that Lebanon's substations use and have been using for many years PCB-free oil. PCB oil or PCB contaminated oil may nevertheless be present in substations subject to more extensive testing;
- EDL's 16,000 distribution transformers (not including 1,600 out-of-service transformers stored in Bauchrieh storage site) may contain significant quantities of PCB oil. Old and damaged transformers are gradually being replaced with new PCB-free oil but many PCB transformers were still in use and will remain so, for many years to come;
- Contaminated Sites: There are at least seven (7) sites in Lebanon potentially contaminated with PCB oil: two (2) power plants (Deir Aamar and Baalbeck), four (4) substations (Bsalim, Jamhour, Hazmieh and Deir Nbouh) and the EDL repair shop in Bauchrieh. These power plants and substations sustained serious damages and/or were totally destroyed by Israeli air strikes. The repair shop remains the most critical PCB hotspot; about 1,600 transformers are stored on-site destined for repair or final disposal. The disposal of burnt oil (that may or may not contain PCB) poses grave environmental concerns.

2.5.2.2 2011 - PCB Inventory Update and Project Preparation Study

In 2011, a **"PCB Inventory Update and Project Preparation Study"**, funded by the World Bank, was published. The aim of the assessment was to prepare a summary report that illustrates the current PCB situation in the country to be submitted to the GEF for funding of the Lebanon PCB project. The undertaken assessment during October-December 2010, included an update of the previous inventories of PCB-containing equipment and PCB-contaminated sites. On the basis of an assessment of different options for disposal of PCB-containing equipment and waste, project components and safeguarding measures

including schedules for project implementation, environmental management plan and monitoring and evaluation were proposed. The main findings and considerations of the 2011 inventory are summarized below:

- For the management of high-content PCB equipment (Askarel transformers and PCB capacitors), a survey of equipment in thermal and hydropower plants, transmission network, and major industries was conducted. Askarel transformers were identified in Jieh power plant, Zouk power plant and Bauchrieh storage site, as well as PCB capacitors identified in 9 of 58 substations. 49 tonnes of PCB from out-of-service equipment and 147 tonnes of PCB oil from in-service equipment were found. The in-service Askarel transformers in Jieh power plant represent the major part of identified PCBs and have the highest risk of PCB-contamination of the environment if damaged;
- All out-of-service equipment should be exported for destruction abroad and an implementation of management plan should be executed as soon as possible for in-service equipment;
- Inventory of PCB-contaminated transformers in transmission network, distribution network and storage was conducted using PCB test kits and GC/ECD laboratory analyses. The inventory identified a widespread PCB contamination of transformers in all parts of the network, 20-30% of transformers from <1986 are contaminated. The total number of potentially contaminated transformers is 22,100 of which about 19,000 are in the distribution network. It was expected that a national inventory will cover in total 15,600 transformers to be tested and labeled on site; excluding new transformers in the distribution network;
- An estimated 2,800 contaminated transformers in EDL network with a total oil content of 1,000-1,600 tonnes exist. The inventory recommended the establishment of a safe interim storage and decontamination facility for contaminated transformers and oil. It was expected that 730 transformers need to be drained/retro-filled, 395 tonnes contaminated oil will need to be disposed of and 280 transformers to be decommissioned;
- For the management of PCB containing transformers and capacitors in other sectors, 23 industries were visited. From 200 transformers inspected; no Askarel transformers were identified. About 5 tonnes of PCB capacitors were identified in two (2) companies. Total number of potential holders of PCB-containing equipment was estimated at 400-600. The inventory recommended the development of a legal framework and management guidelines for holders of equipment;
- Contaminated Sites: For Bauchrieh storage site; samples of oil, sludge and water in the on-site well and samples of drinking water in nearby wells were taken. An estimation of 55 tonnes of contaminated oil from the Bauchrieh well was found. Extensive contamination was also found under Askarel transformers in Zouk power plant. It was recommended that the site and repair shop is remediated by removing the contaminated soil and concrete and by cleaning equipment. As for the well, it was recommended to empty it and investigate effective remediation measures;
- Open Applications: The presence of old fluorescent light fixtures with PCBs was confirmed in one of the visited companies. However, further identification was not done during the 2011 inventory (as it was not one of the objectives of the inventory update). A preliminary assessment of PCBs in sealants and paints has been conducted. The former uses of PCBs in paints have been confirmed. The former use of PCB in sealants seems less compared to industrial countries. The investigated to what extent PCB has been used in building materials in Lebanon and to what extent PCB contaminated building materials are present in the buildings today need further investigation including sources of contamination of the in-door climate and the environment in Lebanon.

2.5.2.3 PCB Management in the Power Sector Project

During the study period, and since PCB was set a priority of 2006 NIP and as a consequence of the 2011 PCB Inventory Update, the Government of Lebanon worked on developing a full board project for managing the PCBs in the power sector; the "PCB Management in Power Sector Project".

During the preparatory phase of the mentioned–above project "PCB Management in the Power Sector" and since it is classified as a Category "A" project under the World Bank's Operational Policy (OP) 4.01 dated January 1999. The pipeline project required a full Environmental and Social Impact Assessment (ESIA) that was conducted in 2014. The latter highlighted on the importance of the project implementation and reviewed all national legislation and regulation relevant for the management of PCB in Lebanon. In the ESIA, the environmental and social impacts of the project were analyzed and environmental management plans were proposed including monitoring plans necessary to evaluate the environmental quality throughout the process.

After the approval and disclosure of the prepared ESIA by both the Ministry of Environment and the World Bank, the full board project was initiated in May 2015, funded by GEF through the World Bank and executed by the Ministry of Environment. The project is also co-funded by the Government of Lebanon through the Ministry of Environment and Electricité du Liban.

Although it is not during the study period of this current assessment (2004-2014), below is a brief overview of the project;

- The main objective of the project is to dispose of high risk PCBs in the power sector in an environmentally sound manner.
- The project aims mainly to execute the following:
  - A full national inventory of PCB contaminated equipment in the power sector (around 26,702 transformers);
  - Disposal of identified PCB equipment and waste;
  - Establishment of an environmental storage facility for PCB contaminated equipment;
  - Investigation and site assessment of Bauchrieh storage site (including the well);
  - Strengthening the legal framework for improved PCB management;
  - Training and capacity building of related stakeholders on sustainable management of PCB equipment and storage sites;
  - Information dissemination and outreach awareness programs;
  - Technical assistance of national laboratories (accreditation) for the analysis of PCB in dielectric oil, waste products, soil or any other media.

2.5.3 Assessment of HBCD (Annex A)

Hexabromocyclododecane (HBCD) is currently not produced in Lebanon as per information retrieved during the 2016 assessment covering the period of 2004-2014.

According to the "Guidance for the inventory, identification and substitution of Hexabromocyclododecane (HBCD) – draft 2015", three (3) categories were identified as potential sources of HBCD and have been investigated in Lebanon:

Category 1: EPS/XPS/PUR
Category 2: Textile
Category 3: Paints

It is to be noted that High Impact Polystyrene (HIP) was not investigated as part of this inventory since it is classified as a minor use by the 2015 UNEP HBCD inventory guidance.

2.5.3.1 Inventory

Category 1 - EPS/XPS/PUR

HBCD in EPS/XPS/PUR construction insulation foams is dependent on the flammability standards of a country; which are non-existent in Lebanon. In order to investigate the presence of flame retardant EPS/XPS, producers and retailers in Lebanon were identified and contacted. Additionally, five (5) of the biggest contractors in the country were approached.

Eight (8) EPS/XPS producers and retailers were

identified and contacted:

- Three (3); do not produce or deal with flame retardant EPS/XPS;
- One (1); deals with flame retardant XPS but did not provide any further information;
- One (1); flame retardant EPS/XPS could be provided on demand but did not disclose any information about chemical properties and actual uses or provision in the country;
- One (1); produces flame retardant EPS/XPS on demand. The polystyrene is purchased from Turkey and arrives already infused with flame retardants. The company imported 44 tonnes in 2013. The product is imported under the HS code 39.03.11.00 from "Eastchem Kim. End. Iml. Tic. San. A.S.", a subsidiary of "Ravago". According to the company's website, reduced pentane is used as the expansion and flame retardant agent;
- One (1); uses an alternative to HBCD by blowing the XPS with CO_2 to give it flame retardant properties since HBCD is very expensive and decreases the lifetime of the used machinery;
- One (1); imports flame retardant EPS insulation. Raw material is imported from China, Germany, and the Kingdom of Saudi Arabia. The flame retardant EPS is imported from Germany, the exact name(s) of the imported products was not provided by the interviewee but the supplier's name and quantities were provided. The German supplier is "BASF" which produces three (3) different EPS foams: Neopor®, Styropor®, and Peripor®. In November 2014, "BASF" announced the phasing out of HBCD in its EPS products which will be manufactured with Poly-FR instead of HBCD. It was thus concluded that EPS quantities imported between 2004 and 2014 contained HBCD. The distributor imports a total of 300 tonnes of flame retardants chemicals annually resulting in a total import of 3,300 tonnes of HBCD between 2004 and 2014.

The HS code for expandable foams is not subdivided based on the content of the foams and therefore could not be used for the purpose of calculating HBCD releases from this category.

The Order of Engineers and Architects (OEA) were contacted (Beirut and Tripoli branches) to ask about flammability standards in insulation material. The OEA confirmed that such standards are overseen by specialized companies and only submitted for approval to the Syndicate.

One (1) of the fire safety consulting companies approved by the OEA was contacted and the following information was provided;

The CoM issued Decree 7964 in April 2012, to provide the general principles for fire safety design under American and French Codes to be applied for buildings. Additionally, LIBNOR standard NL147 required each facility type to follow certain fire codes and flammability standards as per French and American standards known as "Règlement Français de Sécurité Incendie des Etablissements Recevant du Public", and standards of the "National Fire Protection Association".

Although both fire codes contain sections explicitly on the use of insulation and the flammability requirements; neither sets out requirement or restrictions on the type of chemical to be used as the flame retardant agent.

Out of the five (5) main contracting companies contacted, only one (1) replied explaining that they use different insulation materials: Rock wool. The main insulation uses are not only for temperature and sound insulation but for flammability as well. An elastomeric sealant called "SpecSeal®" is used for flame retardancy. SpecSeal is a non-halogenated (thus HBCD free) latex-based sealant designed to provide passive smoke and fire protection in construction joints. The product is produced in the United States and com-

posed of a mixture of acrylic polymer, alumina trihydrate, sulfuric acid compound with graphite, and calcium carbonate.

In addition, suppliers of pre-fabricated cabins and houses were contacted to inquire about their use of EPS/XPS. Five (5) manufacturers of prefabricated structures were contacted and asked about their used materials:

- One (1) appeared to be a dealer and his supplier was one of the already contacted EPS/XPS producers;
- Three (3) were found to use Polyurethane Foams (PUR) for insulation; two (2) of which have flame retardant characteristics. No further information was disclosed;
- One (1) does not provide flame retardant products.

Whereas for the other uses of EPS/XPS/PUR including (i) packaging, (ii) furniture and nursing pillows, and (iii) disposable cups and dishes, relevant producers and retailers in Lebanon were approached and the responses confirmed that their products, whether locally produced or imported are not flame retardant;

Category 2 - Textile

No flame retardant textile was found to be available in the country based on a limited response of approached companies. Further assessment of this sector is necessary.

Category 3 - Paints

For the purpose of this inventory, the paints section was not tackled as it presents a minor use under HBCD. Paints were investigated as part of the PFOS section.

2.5.3.2 Stockpiles, Waste and Contaminated Sites

The main stockpiles of concern for HBCD are stockpiles of EPS/ XPS at construction sites, in addition to potentially Construction and Demolition Waste (CDW) dumps, and dumps and landfills in general for textiles from vehicles and others.

2.5.3.3 Summary of HBCD Releases

The figure below (Figure 17) provides a summary of HBCD releases assessed by sector.

EPS/XPS/PUR	All **EPS/XPS producers** and retailers were contacted: 63% do not use HBCD, 25% did not disclose conclusive information, 12% imported a total of 3,300 tonnes of HBCD between 2004 and 2014. **Local fire codes** do not set out requirement or restrictions on the type of chemical to be used as the flame retardant agent. Five main contracting companies were contacted to inquire about **insulation material**, only one replied and does not use HBCD. Five suppliers of **pre-fabricated cabins and houses** were contacted, no conclusive information about use of HBCD was drawn. **Foams and nursing pillows** producers and retailers contacted; none produce flame retardant pillows, those who produce flame retardant foams did not provide information about used chemicals.
TEXTILE	Based on interviewees, no flame retardant textile was found to be available in the country.
PAINTS	For the purpose of this inventory, the paints section was not tackled as it presents a minor use under HBCD. Paints were investigated as part of the PFOS section.

Figure 17 - Summary of HBCD assessment findings (2004-2014)

2.5.4 Assessment of POP-PBDE (Annex A)

Polybrominated Diphenyl Ethers (PBDE) is currently not produced in Lebanon. During the 2016 IPOPs assessment, six (6) categories were identified as potential sources of listed PBDEs (POP-PBDEs: tetraBDE, pentaBDE, hexaBDE and heptaBDE) and have been investigated in Lebanon:

Category 1: Electrical and Electronic Equipment (EEE) and related waste (WEEE)
Category 2: Transport
Category 3: Furniture
Category 4: Foam, Mattresses and Pillows
Category 5: Textile
Category 6: Rubber

All products are either locally manufactured or imported, with the exception of transport vehicles which are only imported. It is also to be noted that, textile and rubber in raw forms are not produced in the country, but rather imported and further processed in Lebanon to produce secondary products.

2.5.4.1 Inventory

Category 1 - Electrical and Electronic Equipment (EEE) and related wastes (WEEE)

In order to investigate the presence of POP-PBDEs in EEE in Lebanon, local manufacturers of EEE were identified. It appeared that Lebanon has only one (1) EEE manufacturer which does not produce flame retardant items and does not produce CRT monitors in general.

Four (4) major EEE suppliers and retailers were surveyed to investigate imported products. None of the suppliers mentioned dealing with flame retardant items and none provided quantities of imported CRT monitors.

Accordingly, imported quantities of CRT monitors were calculated from the import database provided by the Customs Authority. Between 2004 and 2006 (inclusive), CRT monitors were imported under the HS Codes 85.28.21 and 85.28.22 as per the "Customs Tariffs according to the Harmonized Systems – 2002"; then from 2007 and on, CRT monitors were imported under the HS Code 85.28.59 (CRT monitors) as per both the "Customs Tariffs according to the Harmonized Systems – 2007" and "Customs Tariffs according to the Harmonized Systems – 2012". CRT monitors are imported from 81 countries all over the world.

It is important to note that under the HS Codes 85.28.21 and 85.28.22 various electronic equipment were imported, including CRT monitors. The Customs Authority provided detailed description of imported items which allowed filtering what could be a CRT monitor. A total of 2,622 tonnes of CRT monitors were imported to Lebanon between 2004 and 2014.

Thus, calculations showed that the estimated amount of OctaBDE in CRT monitors imported to Lebanon between 2004 and 2014 is 1.34 tonnes in approximately 790 tonnes of CRT plastic casings.

In terms of recycling, the initial assessment was conducted through literature search and consultations with the relevant stakeholders, including the EEE recycling organizations in Lebanon. The following information was obtained:

- Very few recycling / collection facilities are available in Lebanon;
- The most established facility is "Beeatouna";
- There are smaller scale facilities such as "Baldati" and "ZeroWasteAct" in Lebanon, which act as transitory elements or collectors / resellers of EEE waste. The EEE waste is then usually sent to "L'Ecoute Association" whose primary role is to dismantle the EEEs and resell them as recyclables.

Category 2 – Transport

Vehicles Manufactured before 2004

In Lebanon, the import of second hand cars is very common. Therefore, a large share of vehicles manufactured between 1970 and 2004 potentially containing PBDE is still being imported and circulating on the roads.

The number of registered vehicles in Lebanon from 2004 until 2014, classified by year of manufacture, starting 1975 until 2004, was provided by the Traffic, Trucks and Vehicles Management Authority at the Ministry of Interior and Municipalities (MoIM).

A total of 590,563 vehicles, manufactured before 2004, were registered in Lebanon between 2004 and 2014. Table 10 below provides the breakdown of this number per vehicle type and per year.

Table 10 - Vehicle fleet manufactured before 2004 and registered between 2004 and 2014

Year of registration in Lebanon												
Vehicles type	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**TOTAL**
Private cars	31,944	24,595	23,146	27,114	41,528	54,001	44,292	26,966	8,637	62,242	64,937	409,402
Public cars/taxis	1,137	780	401	296	343	489	492	313	95	2,020	1,901	8,267
Private trucks and buses	5,234	4,374	4,833	6,173	6,418	9,115	9,014	5,567	3,080	8,231	8,853	70,892
Public trucks and buses	656	447	479	404	445	436	286	240	92	559	646	4,690
Motorcycles	3,102	3,075	4,244	6,263	7,972	10,368	11,659	13,373	6,147	13,033	18,076	97,312
Total												**590,563**

The collected data and the calculations carried on during the 2016 assessment, showed that there are in Lebanon between 2004 and 2014 a total of 1,438,887 vehicles manufactured before 2004:

- 1,204,809 passengers cars;
- 168,650 trucks and buses; and
- 65,428 motorcycles.

According to the IPOPs assessment conducted in 2016, and as per the calculations, 10.5 tonnes of c-PentaBDE are estimated in cars in use during the study period.

Old Train Stations

Site visits to old train stations in Tripoli and Heri (34°18'47" N, 35°43'31" E) were conducted in order to identify any textile, padding, or transport seating that will most probably contain PBDE given the age of the trains. The trains appeared not to contain any textile, padding, or transport seating.

Old Public Buses Fleet

In order to determine the potential existence of PBDE in public old buses, a meeting was held with the Railway and Public Transportation Authority to collect relevant information for old buses. No information was found on the PBDE content of furniture and padding in these buses. On that basis, further investigation of PBDE existence in the remaining buses is recommended.

Once buses are decommissioned, they are cut in half to ensure they are not reused, and they are sold at auction to metal scrapyards. The buses are sold with all the furniture left inside of them. The scrap yard that won the bidding for the buses auctioned was surveyed and informed that buses they have received were crushed as is and exported to Turkey for recycling under the HS code 81.01.97 in 2006.

End of Life Vehicles (Elvs)

In terms of End of Life Vehicles (Elvs), two (2) specialized car scrapping facilities were identified and surveyed to detect the used processing technologies. Crushed vehicles are exported to Turkey for further processing under the HS code 87.03.32.90 (Motors cars and other vehicle: Other). According to the operator of one of the facilities, after metals are recovered, plastics, polyurethane and textile are disposed of at the Naameh Landfill.

Based on information shared by both scraping facilities, the majority of cars arriving to the facilities dates back to the 80s and earlier. A large number of vehicles arriving are made in the United States of America. No database of crushed vehicles is available.

Category 3 - Furniture

The use of PBDE in PUR foam in furniture depends on the flammability standards of a country; which are non-existent in Lebanon for furniture. In order to investigate the presence of flame retardant furniture, the main producers and retailers in Lebanon were identified and surveyed.

Out of the seven (7) establishments that were surveyed, four (4) responded and confirmed that they do not have or produce flame retardant furniture. Due to flammability standards for furniture in the United States of America (USA) and the United Kingdom (UK), in particular, furniture in North America and UK is often flame retarded.

Furniture is imported from 68 different countries including the USA and the UK. Since POP-PBDE production stopped in 1997 in the EU, imported furniture from the UK were not considered in the assessment. Old furniture and mattresses imported from the U.S countries may contain POP-PBDEs.

Given that the Customs data, does not include the year of manufacture, all furniture quantities imported from the US between 2004 and 2014 can possibly contain PBDE. Additionally, it is important to note that, within the USA, flammability standards differ between states and therefore it was not possible to determine the quantity of PBDE in products without knowing the state where it was manufactured.

Table 11 - Quantity of furniture imported from the United States (tonnes)

Imported Furniture Item	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Swivel seats with adjustable height (HS Code: 94.01.30)	11.63	9.91	11.84	14.50	17.74	19.56	21.65	24.19	12.74	21.39	11.13
Camping seats that can turn into beds (HS Code: 94.01.40)	0	0	0	0	0	0	0.03	0	0.3	0.04	2.40
Padded seats (HS Code: 94.01.61)	25.20	15.20	7.79	9.89	6.50	8.78	18.65	13.91	28.64	21.92	29.51
Padded seats (HS Code: 94.01.71)	1.46	3.65	1.46	1.53	3.85	1.26	5.47	2.30	23.98	20.58	0.29
Other seats (HS Code: 94.01.80)	18.11	7.42	16.94	13.99	25.93	38.45	42.37	37.70	51.73	46.25	106.11
Other seats (HS Code: 94.01.80.10)	9.65	3.39	4.25	4.41	9.85	3.76	4.89	6.97	10.48	5.95	5.49
Other seats (HS Code: 94.01.80.90)	8.46	4.03	12.68	9.58	16.08	34.69	37.48	30.73	41.26	40.31	100.62
Rubber or plastic foams whether covered or not (HS Code: 94.04.21)	0.95	0.29	0.15	0.27	1.38	0	0	0	0.09	0	1.01
Rubber foams seats (HS Code: 94.04.29)	5.36	2.31	2.05	1.78	1.66	3.29	4.46	1.30	4.26	8.67	5.92
Sleeping bags (HS Code: 94.04.30)	0.25	0.01	0.03	0	0	0.06	0.12	0.01	0	0.01	0.41
Yearly Total	**81.07**	**46.21**	**57.19**	**55.95**	**82.99**	**109.85**	**135.12**	**117.11**	**173.48**	**165.12**	**262.89**
Total within study period											**1,287**

Category 4 - Foam, Mattresses and Pillows

Nine (9) foam, mattresses and pillows producers were identified in the country; out of which two (2) did not provide any information. Out of the seven (7) respondents:

- Three (3) mentioned that they produce flame retardant products upon demand but did not disclose any information other than following EU standards;
- Two (2) do not produce any flame retardant material;
- One (1) used to produce flame retardant products but did not disclose any further information;
- One (1) explained that they produce flame retardant foams on demand for hotels. The chemical used to provide the flame retardancy properties is called Fyrol® PCF; whose chemical name is Tris (2-chloroisopropyl) phosphate (CAS number: 13674-84-5). Fyrol® PCF is an additive flame retardant extensively used in rigid and flexible polyurethane foams. Fyrol® PCF is not a brominated chemical. This producer also mentioned that, other Lebanese manufacturers use non-flammable glue made in Turkey and which contains formaldehyde; this product is used given that its European counterpart is four (4) times more expensive.

In addition to the above, main end-users of foams, mattresses, and pillows were assessed, which are hospitals and hotels, none mentioned that they have any flame retardant furniture. Based on the collected information, there is no clear indication about the use of PBDE in the production of flame retardant foams, mattresses, and pillows in the country.

Category 5 - Textile

Primary textile production is absent in the country. Fourteen (14) establishments were found to process fabric (for clothing, uniforms, upholstery, etc.). Nine (9) of the surveyed establishments, sell workwear and uniforms, out of which six (6) claimed not to distribute flame retardant goods, whereas three (3) confirmed importing flame retardant uniforms.

No information was provided on the quantity imported, the flame retardant agent(s) used nor on the producer that supplies them with the uniforms. However, one (1) stated that he imports fabric from the UK, the second from Western Europe, and the third from China.

One (1) of the surveyed retailers supplied the Fire-fighting Departments until 2006 and has been supplying the army for the past 4 years. He does not import POPs containing material, he deals with KEVLAR, NOMEX and PBI which are the latest products manufactured by 3M and Dupont using atomized bases non-containing POPs.

Category 6 - Rubber

There are no rubber manufacturers in Lebanon; only rubber retailers. A total of eight (8) retailers were contacted and all confirmed not to deal with flame retardant rubber.

2.5.4.2 Stockpiles, Waste and Contaminated Sites

The EEE 2010 study by “Beeatouna”, an NGO processing electronic waste, showed that disposal behavior in Lebanon for electronics is as follows:

- 65% home storage;
- 7% reselling;
- 9% municipal waste; and
- 19% donation.

As per the above mentioned study, after EEE waste is dismantled and sorted, all materials including polymers are shipped to other countries such as France and Belgium for full recycling in accordance with international standards and regulations.

In the transport sector, private vehicles are sent to disposal at one (1) of two (2) facilities: one (1) that compresses it and exports it with polymers inside, and the other that shreds it for metal recovery in which case polymers becomes a by-product (automotive shredder residues) of the steel recovery process and is disposed of in the Naameh landfill.

According to the Railway and Public Transport Authority (MoIM), out of the three (3) types of buses manufactured before 2004 that were purchased by the transit authority in the past, only Elba (Lebanon)

remain in stock. Three (3) buses are located at the Mar Mikhael Central Station, Beirut and nine (9) buses are located at the Sahet el Abed storage site at the Corniche El Nahr, Beirut. The main stockpiles for Elv vehicles (buses) are the ones in Mar Mikhael and Sahet el Aabed.

Based on the information retrieved form the 2016 assessment, the main hotspots of PBDE are MSW dumps and landfills including the Bsalim landfill for bulky waste, since around 9% of EEE waste, waste from shredded and exported cars (including furniture), used furniture, and possibly flame retardant uniforms and clothing are disposed of with MSW (in open dumps and landfills) and eventually in bulky waste landfills such as Bsalim.

2.5.4.3 Summary of PBDE Releases

Figure 18 below provides a summary of PBDE inventory assessed by sector.

ELECTRICAL AND ELECTRONIC EQUIPMENT (EEE)	The sole EEE manufacturer in the country does not use PBDE. Based on available data on CRT imports, it was calculated that they include 1.34 tonnes of PBDE. The EEE recycling sector in Lebanon is still primary and undeveloped.
TRANSPORT	For vehicles manufactured before 2004, only cars were able to be assessed for PBDE content and it was calculated that they include about 10 tonnes of PBDE. Old trains do not include PBDE given that their paddings and textiles have been removed. Old public buses and Elvs are crushed and exported to Turkey along with their paddings and textiles. Furniture and paddings are sometimes removed from Elvs and dumped with municipal solid waste.
FURNITURE	57% of local manufacturers responded that they do not use PBDE. Assessing USA imported furniture showed that about 1,287 tonnes of furniture were imported during the study period - their PBDE content could not be calculated due to absence of flamability standards information.
FOAMS, MATTRESSES, AND PILLOWS	78% of producers responded, 43% of which did not provide information about chemicals used for flame retardancy while the remaining do not use PBDE in their production processes.
TEXTILE	Primary textile production is absent in the country. 64% of textile processors responded, no conclusive information about their use of PBDE was drawn.
RUBBER	There are no rubber manufacturers in Lebanon; only rubber retailers. A total of 8 retailers were contacted and all confirmed not to deal with flame retardant rubber.

Figure 18 - Summary of PBDE assessment findings (2004-2014)

2.5.5 Assessment of PFOS, its salts and PFOSF (Annex B)

Perfluorooctance Sulfonic Acid (PFOS) and related substances are currently not produced in Lebanon. The following three (3) categories were identified as potential sources of PFOS and related substances and have been investigated in Lebanon as part of the 2016 assessment (carried out from January - November 2016);

Category 1: Surface Treatment
Category 2: Paper Production
Category 3: Performance Chemicals

All products are both locally manufactured and imported, with the exception of firefighting foams and aviation hydraulic fluids which are only imported. It is also to be noted that textile in raw form is not produced in the country, but rather imported and further processed in Lebanon to produce secondary products.

Once these products reach their end-of-life, they are either disposed of with municipal solid waste (open dumping or landfilling) or exported for recycling (e.g., used aviation hydraulic fluids).

2.5.5.1 Inventory

Category 1 - Surface Treatments

Textile and Upholstery

Primary textile production is absent in the country. Fourteen (14) establishments were found to process fabric (for clothing, uniforms, upholstery, etc.). Nine (9) establishments provided information and mentioned that their textiles are not treated with any PFOS-containing material; their raw material and products are EU-standardized for the international market. The remaining five (5) were however non-responsive; thus quantification of PFOS related to textile industries was not possible.

Synthetic Carpets

A total of eight (8) synthetic carpet manufacturers and retailers were identified in Lebanon. Five (5) of them were responsive stating that they do not produce any type of stain repellent carpets or use commercial stain repellents. The remaining three (3) were however non-responsive; thus quantification of PFOS related to synthetic carpets was not possible in this first assessment. There are no identified facilities for the recycling of synthetic carpets in Lebanon.

Apparel and Leather

Eleven (11) leather manufacturers and processors were identified in Lebanon. According to interviewees, the tanneries' products are mainly exported to EU countries and thus strict production measures are applied for the use of the impregnation chemicals. Results of the survey showed that the relevant POPs chemicals are not currently being used by leather tanneries.

Category 2 - Paper Production

Paper and Packaging

A total of ten (10) paper mills and food packaging manufacturers were contacted. Out of the seven (7) that responded, four (4) stated that they do not use chemicals during the production cycle. One (1) explained that he sublets his products to secondary retailers such as printing houses which might add a coated layer for protection based on demand and manufacturers have no information about the type of chemicals used in these coatings.

Two (2) industries which use chemicals stated that they follow strict EU standards, thus were PFOS-free:

- One (1) listed the used chemicals:
  - Defoamer (HS code: 34.02.13)
  - Retention agent (HS code: 39.06.90.90)
  - Flocculent (HS code: 39.06.90.90)
  - Alum (HS code: 28.33.22.10)
  - Cationic starch (HS code: 35.05.10.50)
  - ASA (HS code: 38.09.92.00)
  - PVOH (HS code: 39.05.30.00)
- One (1) stated that the following chemicals are not added to any of their paper and packaging products:
  - Diethanolamine salts of mono- and bis (1H, 1H, 2H, 2H perfluoroalkyl) phosphates where the alkyl group is even-numbered in the range C8-C18 and the salts have a fluorine content of 52.4% to 54.4%

as determined on a solids basis;
- Pentanoic acid, 4,4-bis [(gamma-omega-perfluoro-C8-20-alkyl)thio] derivatives, compounds with diethanolamine (CAS Reg. No. 71608-61-2); and
- Perfluoroalkyl substituted phosphate ester acids, ammonium salts formed by the reaction of 2, 2-bis [(omega-perfluoro-C4-20-alkylthio) methyl] – 1,3-propanediol, polyphosphoric acid and ammonium hydroxide.

Additionally, a random selection of restaurants and cafes, which use paper in their food packaging, were surveyed. They all confirmed that their products, whether locally produced or imported, follow EU REACH standards for food safety and packaging and thus contain no PFOS.

Category 3 - Performance Chemicals

Firefighting Foams

In Lebanon, there is no production of firefighting foams; however, nine (9) main retailers and filling establishments were identified and surveyed. All of them confirmed that firefighting foams are imported into Lebanon following strict European standards and regulations. Three (3) suppliers confirmed distributing AFFF foams in fire extinguishers primarily for the use in gas stations.

Based on the available data and calculations *(noting that UNEP guidance documents state that on average 0.5 to 1.5 % of the total weight of fluorinated firefighting foams is made of PFOS)*, an estimated 56 to 167 kg of PFOS were released between 2004 and 2014 and are divided as follows:

- 5.5 to 16.5 kg of PFOS released during the study period based on the imported quantities provided by one supplier;
- 0.11 to 0.34 kg of PFOS released in 2001 from the activities of the Middle East Airlines (MEA) at Beirut International Airport; and
- 50 to 150 kg of PFOS released between 2006 and 2014 from the activities of Beirut Fire Department.

The national airline company, **Middle East Airlines (MEA)** uses clean agents firefighting systems like FM-200 and CO_2 fire suppression systems. However, they have used 14 liters of AFFF Foams in 2001 to extinguish a fire in fuel tanks (AFFF 3% under the brand name SFFECO-FX100 manufactured in the Kingdom of Saudi Arabia).The AFFF foams used by MEA have a density of 1.6 kg/L before expansion, so the 14 liters correspond to 22.4 kg.

The **Beirut Fire Department** have used between 2012 and 2015, A- and A/B types of firefighting foams supplied by Solberg and Bio-Ex respectively. Nonetheless, they were supplied with Fluoro-Protein foams (FP), Aqueous Film-Forming foams (AFFF), Film-Forming Fluoro-Protein foams (FFFP), and Alcohol-Resistant Aqueous Film-Forming foams (AR-AFFF); which all contains PFOS or related substances. The recorded quantities used between 2006 and 2014 *(no records were available for 2004 and 2005)* along with the locations of fire incidents are presented in Table 12.

This first inventory does not include the PFOS containing firefighting foams used from 1970s to 2003 which is the time of major PFOS used.

Table 12 - Large fire incidents with PFOS firefighting foams (2006 - 2014)

Year	Type of PFOS Containing Firefighting Foam Used	Quantity Used	Location	Land Use Type*	Estimated Surface Area Burnt
2006	AFFF	500 L	Ashrafieh	Residential	1,500 m^2
	AFFF	300 L	Beirut Port	Industrial	150 m^2
2007	AFFF - FFFP	1,500 L	Jnah	Commercial/ Residential	2,000 m^2
2010	AFFF	120 L	Zokak Belat	Residential	100 m^2
2011	AFFF	2,000 L	Koraytem	Commercial/ Residential	700 m^2
	AFFF	300 L	Zarif	Commercial/ Residential	60 m^2
2012	AFFF	370 L	Zokak Belat	Commercial/ Residential	350 m^2
	AFFF	550 L	Karantina	Industrial	400 m^2
2014	AFFF	375 L	Talet Khayat	Commercial/ Residential	300 m^2
	AR-AFFF	225 L	Biel	Recreational/Commercial	400 m^2
TOTAL	-	**6,240 L**	-	-	**5,960 m^2**

** National Center for Scientific Research (2005), Land Use Map of Lebanon 1/50000, Remote Sensing Center*

As shown in Table 12, a total of 6,240 liters of PFOS containing firefighting foams were used in fire incidents in Greater Beirut between 2004 and 2014, over a total surface area of 5,960 m^2.

The **Lebanese Army** has old equipment for firefighting including flame retardant outfits; these equipment and outfits might contain PFOS. However, no responses were provided. Noting that, the use in military has been found a major release and contamination source in other countries (Hu XS et al, 2016).

The Civil Defense Department and the Fire Departments of Tripoli and Beirut were surveyed to provide information on the types of foams used in their trainings and drills, in addition to accidental fires' locations and year of occurrence. The Tripoli Fire Department further contacted and followed-up with, but no information was received until the day of this publication.

As for the **Civil Defense**, the flame retardant they use is Para-Amid and they purchase foams and PPE according to the following standards:

- UL 162: Standard for foam equipment and liquid concentrates;
- NFPA 18: Standard on wetting agents;
- NFPA 1971: Standard on protective ensembles for structural firefighting and proximity firefighting; and
- EN 469: Protective clothing for firemen.

The Civil Defense foams and equipment contain neither PFOS nor their related substances.

Concerning firefighting training sites, none of the respondents used PFOS-based foams and according to the Civil Defense Department in Beirut, very little foam is used in Lebanon for training purposes in general. Most training relies on the use of powder-based firefighting equipment as being more affordable. Thus, it was stated that the used powders are environmental friendly and not harmful to humans.

Metal-Plating

The ten (10) main metal plating industries in Lebanon were surveyed to determine their use of PFOS:

- One (1) explained that the use of PFOS in metal plating is outdated in the field. All big producers in the country now use the "silver strike" method where the main ingredients used are sodium and potassium cyanide; which are mainly imported from the Czech Republic. Small illegal metal platers might still be using PFOS. However, in the author's opinion, this statement is most likely inaccurate since even the German chromium platers are continuing using PFOS and the EU has further registered the use of PFOS;
- One (1) listed the chemicals used in its process: Nickel Chloride ($NiCl_2$), Nickel Sulfate ($NiSO_4$), Pure Silver, Potassium Cyanide (KCN), Tin Chloride ($SNCl_2$), diluted Sulfuric Acid ($H2SO_4$), Sodium Hydroxide (NaOH), Sodium Carbonate ($Na2CO_3$), and Sodium Tripolyphosphate (STPP).

A gap that could be mentioned here, is the lack of information on the nature of the alternative chemicals used. Additionally, only 50% of metal-platers responded, all of which were decorative silver metal-platers.

Chromium platers who did not respond may be still using PFOS. Historically, decorative silver platers may have used PFOS. Therefore, the landfills and open dumps where plating sludge is disposed of are expected to be contaminated with PFOS, Heavy Metals and Cyanides.

Paints, Coatings and Varnishes

In Lebanon, a total of twelve (12) paint and varnishes factories were surveyed: all ten (10) responders stated that they do not use any chemicals containing PFOS in their production. In addition, the MSDS of an additional two (2) paint and varnishes factories previously audited were reviewed and no PFOS containing material were detected.

Compounders (Aviation Hydraulic Fluids)

A survey of MASCO (Middle East Airlines maintenance department) was conducted to retrieve the quantities of Skydrol (Commercial name of the hydraulic fluid) used. Based on the received data, the following two (2) types of hydraulic oils were used during the study period (2004-2014):

- HYJET IV-A PLUS: a synthetic base stocks and additives composed of the following compounds (not fluorinated):
  - 2,6-Di-Tert-Butyl-P-Cresol,
  - Aliphatic Epoxide,
  - Calcium Sulfonate,
  - Triphenyl Phospohate, and
  - Tributyl Phosphate.
- Radcolube RHP5606 Hydraulic Fluid: a petroleum base hydraulic fluid composed of the following compounds (not fluorinated):
  - Distillated (petroleum), Hydrogenated light Naphtenic,
  - Hydrogenated Polyalphaolefin,
  - Acrylic Polymer,
  - Thiophenolic derivative,
  - Alkylated Amine,
  - 1H-Benzotriazole-1-methanamine,N,N-bs(2-ethylhexyl)-armethyl, and
  - Red dye.

Based on the above, both used hydraulic fluids do not contain PFOS.

Plastic and Rubber Products

During the assessment, eight (8) rubber manufacturers were contacted for indicative purposes, and all confirmed not to have used any PFOS containing chemicals in their production.

2.5.5.2 Stockpiles, Waste and Contaminated Sites

No PFOS stockpiles were identified as part of the assessment. All wastes generated from the relevant categories are disposed of with municipal waste in landfills of MSW and bulky waste where carpets and furniture are expected to go; open dumps (MSW and CDW) and controlled dumps throughout the country.

Potential contaminated sites, in addition to landfills and dumps, are all firefighting practice areas in the country and fire incidents sites

(industries, warehouse, etc.) in which PFOS containing firefighting foams were used or assumed to be used.

2.5.5.3 Summary of PFOS Releases

Figure 19 below provides a summary of PFOS releases assessed by sector.

TEXTILE	Primary textile production is absent in the country.
SYNTHETIC CARPETS	63% of synthetic carpet manufacturers responded and do not use PFOS. There are no facilities for the recycling of synthetic carpets in Lebanon.
LEATHER	Relevant POPs chemicals are not currently being used by leather tanneries.
PAPER PRODUCTION	70% of producers responded, all do not use PFOS with the exception of 1 that sublets products to printing house & has no information about chemicals they use. Selected restaurants and cafes use food packaging PFOS-free.
FIREFIGHTING FOAMS	An estimated 56 to 167 kg of PFOS were released between 2004 and 2014 .
METAL PLATING	Out of the 50% respondent, none used PFOS.
PAINTS	Out of the 84% respondents, none used PFOS.
COMPOUNDERS (Aviation Hydraulic Fluids)	Private users do not use PFOS. Public users (army) did not respond.
PLASTIC AND RUBBER PRODUCTS	8 rubber manufacturers were contacted for indicative purposes, and all confirmed not to have used any PFOS containing chemicals in their production.

Figure 19 - Summary of PFOS assessment findings (2004-2014)

2.5.6 Assessment of Releases of Unintentional Produced Chemicals (Annex C)

The following groups and their related sub-categories have been investigated in Lebanon, as potential sources of PCDD / PCDF release:

Source Group 1: Waste Incineration
Source Group 2: Metal Production
Source Group 3: Heat and Power Generation
Source Group 4: Production of Mineral Products
Source Group 5: Transport
Source Group 6: Open Burning Processes
Source Group 7: Chemicals and Consumer Goods
Source Group 8: Miscellaneous
Source Group 9: Disposal
Source Group 10: Hot Spots / Contaminated sites

2.5.6.1 Summary of PCDD/PCDF Emission Sources

Table 13 below shows the PCDD/PCDF emissions to air, land, water, residues and products from each source group and their share of the total PCDD/PCDF emissions released during the study period (2004-2014).

Table 13 - PCDD/PCDF emissions from each source group to different matrices

Group	Source Groups	Annual Releases (g TEQ/a)					
		Air	Water	Land	Product	Residue	%
1	Waste Incineration	14.5	0.0	0.0	0.0	0.1	**1**
2	Ferrous and Non-Ferrous Metal Production	11.9	0.0	0.0	0.0	10.3	**1**
3	Heat and Power Generation	3.7	0.0	0.0	0.0	0.0	**0**
4	Production of Mineral Products	36.4	0.0	0.0	0.0	0.9	**2**
5	Transportation	2.2	0.0	0.0	0.0	0.0	**0**
6	Open Burning Processes	400.4	0.0	10.1	0.0	0.0	**26**
7	Production of Chemicals and Consumer Goods	0.0	0.0	0.0	44.4	0.0	**3**
8	Miscellaneous	0.0	0.0	0.0	0.0	0.3	**0**
9	Disposal	0.0	22.6	0.0	35.5	917.7	**61**
10	Identification of Potential Hot-Spots				86	0.0	**5.4**
1-10	**Total**	**469.2**	**22.6**	**10.1**	**165.9**	**929.3**	**100**
	Grand Total			**1597**			

Source Group 9 – Disposal; is responsible for the majority (61%) of the total PCDD/PCDF release during the study period, their release to residues accounted for the highest release level and the remaining is divided between release to product and water.

Source group 6 - Open Burning Processes; is the second source contributing around 410.5 g TEQ to the total release of PCDD/PCDF (26%) noting that more than 97% of PCDD/PCDF from this source group is released to air.

Source Group 10 - Identification of Potential Hot-Spots; namely the PCB containing equipment are responsible for 5.4% of the PCDD/PCDF emissions during the study period .

Source Group 7 - Production of Chemicals and Consumer Goods; released around 44.4 g TEQ PCDD/PCDF to product contributing to 3% of the total release during the study period.

Source Group 4 - Production of Mineral Products; is responsible for 2% of the total estimated release of PCDD/PCDF during the study period.

Source Group 1 - Waste Incineration and Source Group 2 - Ferrous and Non-Ferrous Metal Production; are each responsible for approximately 1% to the total PCDD/PCDF release during the study period.

2.5.6.2 Source Group 1 - Waste Incineration

In this assessment, two (2) source categories were found to exist in Lebanon; Medical Waste Incineration and Animal Carcasses Burning. Based on the detailed assessment of the mentioned above two (2) categories, the findings came as below:

Medical Waste Incineration accounted on average to 99.86% of the release to air and 100% of the release to residues. Table 14 below shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 1.

Table 14 - Contribution of each category to PCDD/PCDF emissions - Source Group 1

Categories	Share - Source Group 1
Medical Waste Incineration	99.86 %
Animal Carcasses Burning	0.14 %

Whereas, Table 15 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 15 - Estimated UPOPs emissions - Source Group 1

Categories	PCDD / PCDF (g TEQ)	
	Air	Residues
Medical Waste Incineration	14.452	0.082
Animal Carcasses Burning	0.02	----

2.5.6.3 Source Group 2 - Ferrous and Non-Ferrous Metal Production

In this assessment, six (6) source categories were found to exist in Lebanon:

1- Iron and Steel Production;
2- Copper Production;
3- Aluminum Production;
4- Lead Production;
5- Brass and Bronze Production; and
6- Metal Shredders

Table 16 below shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 2.

Table 16 - Contribution of each category to PCDD/PCDF emissions - Source Group 2

Categories	Share - Source Group 2
Iron and Steel Production	1.13 %
Copper Production	0.05 %
Aluminum Production	65.06 %
Lead Production	31.65 %
Brass and Bronze Production	0.07 %
Metal Shredders	2.05 %

Whereas, Table 17 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 17 - Estimated UPOPs emissions - Source Group 2

Categories	PCDD / PCDF (g TEQ)			HCB (g TEQ)	Dioxin-like PCB (g TEQ)
	Air	Residues	Water	Air	Air
Iron and Steel Production	0.04182	0.20886	---	36.3	----
Copper Production	0.00598	0.00598	0.00003	----	----
Aluminum Production	4.828	9.656	----	24.140	1.931
Lead Production	7.047	----	----	88.093	0.1762
Brass and Bronze Production	0.00225	0.013	----	----	----
Metal Shredders	0.0175	0.4380	----	----	----

2.5.6.4 Source Group 3 - Power Generation and Heating

In this assessment, four (4) source categories were found to exist in Lebanon;

1- Fossil fuel power plants;
2- Biogas combustion;
3- Household heating and cooking with biomass; and
4- Household heating and cooking with fossil fuels.

In Source Group 3 during the study period; fossil fuel power plants accounted for the largest share of PCDD/PCDF emissions to air. Heating and cooking with biomass is the only category to release emissions in residues.

Table 18 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 3.

Table 18 - Contribution of each category to PCDD/PCDF emissions - Source Group 3

Categories	Share - Source Group 3
Fossil fuel power plants	46.86 %
Biogas /landfill gas fired boilers, motors/turbines and flaring	0.74 %
Household heating and cooking with biomass	21.86 %
Household heating and cooking with fossil fuels	30.54 %

Whereas, Table 19 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 19 - Estimated UPOPs emissions - Source Group 3

Categories	PCDD / PCDF (g TEQ)			HCB (g TEQ)		Dioxin-like PCB (g TEQ)	
	Air	Residues	Water	Air	Residues	Air	Residues
Fossil fuel power plants	1.752	----	----	----	----	----	----
Biogas /landfill gas fired boilers, motors/turbines and flaring	0.027616	----	----	----	----	----	----
Household heating and cooking with biomass	0.817	0.000097	----	0.051641	0.099951	0.051641	0.000050
Household heating and cooking with fossil fuels	1.142	----	----	----	----	----	----

2.5.6.5 Source Group 4 - Mineral Production

In this assessment, seven (7) source categories were found to exist in Lebanon:

1- Cement Production;
2- Lime Production;
3- Brick Production;
4- Glass Production;
5- Ceramic Production;
6- Asphalt Mixing; and
7- Oil Shale Processing.

Cement production accounts for the largest share of the total PCDD/PCDF emissions to air in Source Group 4 during the study period; this is predominantly due to significantly larger production quantities than other mineral production. Brick production is the only category to release emissions in the products. Asphalt mixing and Brick production are the only two categories that release PCDD/PCDF emissions into residues with Asphalt accounting for over 99% of emissions.

Table 20 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 4.

Table 20 - Contribution of each category to PCDD/PCDF emissions - Source Group 4

Categories	Share - Source Group 4
Cement Production	91.91 %
Lime Production	0.77 %
Brick Production	0.00 %
Glass Production	4.62 %
Ceramic Production	0.03 %
Asphalt Mixing	2.68 %
Oil Shale Processing	0.00 %

Whereas, Table 21 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 21 - Estimated UPOPs emissions - Source Group 4

Categories	PCDD / PCDF (g TEQ)			HCB (g TEQ)			Dioxin-like PCB (g TEQ)		
	Air	Residues	Products	Air	Residues	Products	Air	Residues	Products
Cement Production	34.315	----	----	----	----	----	----	----	----
Lime Production	0.288	----	----	----	----	----	----	----	----
Brick Production	0.0001685	0.0000168	0.0000505	0.2695680	0.00084	0.1684800	0.0000084	0.0000008	0.0000084
Glass Production	1.724	----	----	----	----	----	----	----	----
Ceramic Production	0.00966	----	----	----	----	----	----	----	----
Asphalt Mixing	0.104	0.895	----	----	----	----	----	----	----

2.5.6.6 Source Group 5 - Transport

Four (4) source categories are included in this group:

1- 4-stroke engines (gasoline fueled engines with spark ignition);
2- 2-stroke engines (gasoline fueled engines with spark ignition);
3- Diesel engines (diesel fueled engines with compression ignition); and
4- Heavy oil fired engines (HFO)

HFO accounts for the largest share 43.8% of the total PCDD/PCDF emissions to air in Source Group 5 during the study period followed by Diesel engines 35.72%.

Table 22 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 5 in each of year 2004 and 2012. Due to lack of information about the vehicles fleet (4-stroke engines and 2-stroke engines) from years 2005-2014 (except 2012).

Table 22 - Contribution of each category to PCDD/PCDF emissions - Source Group 5

Categories	Share - Source Group 5	
	2004	2012
4-stroke engines	24.25 %	17.32 %
2-stroke engines	59.14 %	61.68 %
Diesel engines	4.65 %	12.1 %
Heavy oil fired engines	11.96 %	8.9 %

Whereas, Table 23 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 23 - Estimated UPOPs emissions - Source Group 5

Categories	PCDD / PCDF (g TEQ)	HCB (g TEQ)	Dioxin-like PCB (g TEQ)
	Air	Air	Air
4-stroke engines	0.985	----	----
2-stroke engines	0.3	----	----
Diesel engines	0.429	----	----
Heavy oil fired engines	0.526	36.82	144.65

2.5.6.7 Source Group 6 - Open Burning Processes

Three (3) source categories are included in this group:

1- Biomass Burning;
2- Waste Burning; and
3- Accidental Fires.

Both waste burning and biomass burning source categories exist in Lebanon. Waste Burning accounts for over 95% of both air and land PCDD/PCDF emissions.

Table 24 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 6.

Table 24 - Contribution of each category to PCDD/PCDF emissions - Source Group 6

Categories	Share - Source Group 6
Biomass Burning	0.09 %
Waste Burning	95.26 %
Accidental Fires	4.65 %

Whereas, Table 25 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 25 - Estimated UPOPs emissions - Source Group 6

Categories	PCDD / PCDF (g TEQ)		Dioxin-like PCB (g TEQ)	
	Air	Land	Air	Land
Biomass Burning	0.304	0.079	0.03008	0.01426
Waste Burning	400.087	10.002	20.004	---

2.5.6.8 Source Group 7 - Production of Chemicals and Consumer Goods

Two (2) source categories are included in this group:

1- Pulp and Paper Mills; and
2- Leather Production

Table 26 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 7.

Table 26 - Contribution of each category to PCDD/PCDF emissions - Source Group 7

Categories	Share - Source Group 7
Pulp and Paper Mills	5.61 %
Leather Production	94.39 %

Whereas, Table 27 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 27 - Estimated UPOPs emissions - Source Group 7

Categories	PCDD / PCDF (g TEQ)
	Products
Pulp and Paper Mills	2.483
Leather Production	41.957

2.5.6.9 Source Group 8 - Miscellaneous

In this assessment, three (3) source categories were found to exist in Lebanon:

1- Smoke Houses;

2- Dry Cleaning; and

3- Tobacco Smoking.

PCDD/PCDF emissions to air from Source Group 8 are due to tobacco smoking and smoke houses but are considered negligible in comparison to emissions in residues.

Dry Cleaning accounts for 61% of emissions to residues, smoke houses account for 37% and Tobacco smoking for 2%.

Table 28 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 8.

Table 28 - Contribution of each category to PCDD/PCDF emissions - Source Group 8

Categories	Share - Source Group 8
Smoke Houses	39.37 %
Dry Cleaning	57.03 %
Tobacco Smoking	3.6 %

Whereas, Table 29 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 29 - Estimated UPOPs emissions - Source Group 8

Categories	PCDD / PCDF (g TEQ)	
	Air	Residues
Smoke Houses	0.017	0.104
Dry Cleaning	---	0.197
Tobacco Smoking	0.00622	0.00622

2.5.6.10 Source Group 9 - Disposal

In this assessment, four (4) source categories were identified:

1- Landfills and waste dumps;
2- Sewage and sewage treatment;
3- Open water dumping; and
4- Composting.

PCDD/PCDF emissions released to water are accounted from;

- 59%: Open water dumping;
- 39%: Landfills and Waste dumps; and
- 2%: Wastewater Treatment

PCDD/PCDF emissions released to residues are accounted from;

- 96%: Landfills and Waste dumps; and
- 4%: Wastewater Treatment

PCDD/PCDF emissions released to products are accounted 100% from composting.

Table 30 shows the contribution of each category to the total PCDD/PCDF emissions from Source Group 9.

Table 30 - Contribution of each category to PCDD/PCDF emissions - Source Group 9

Categories	Share - Source Group 9
Landfills and dumping	91.42 %
sewage treatment	3.57 %
Open water dumping	1.37 %
Composting	3.64 %

Whereas, Table 31 provides the estimated UPOPs emissions to the related different matrices during the study period.

Table 31- Estimated UPOPs emissions - Source Group 9

Categories	PCDD / PCDF (g TEQ)		
	Water	Residues	Products
Landfills and dumping	8.832	883.248	---
Sewage treatment	0.398	34.443	---
Open water dumping	13.402	---	---
Composting	---	---	35.478

2.5.6.11 Source Group 10 - Identification of Hot Spots

PCB based-filled Transformers and Capacitors

The quantity of Askarel transformers was used in combination with PCB leakage rates to estimate the quantity of PCDD/PCDF and dioxin-like PCB released annually from the inventoried PCB equipment. Given that no PCB has been imported or exported during the study period, data from the 2011 inventory was generalized to all years. The estimated PCDD/PCDF emission from Askarel transformers is shown in the table below.

The askarel transformers were associated to the PCB type of “High chlorinated, e.g., Clophen A60, Aroclor 1260”.

Table 32 - Estimated PCDD/PCDF emission from askarel transformers

Year	Emission Factors in Potential Release Route (µg TEQ/t)	Production (t/a)	Annual release (g TEQ/a)
	Product		Product
2004-2014	1,500,000	57	86

The total PCDD/PCDF emissions from askarel transformers during the study period was estimated to be 86 g TEQ to products.

2.5.7 Assessment of Stockpiles, Potentially Contaminated Sites, and Wastes

For the various categories and forms of POPs, the 2016 inventory assessed and determined the stockpiles, wastes and potentially contaminated sites.

2.5.7.1 POPs Pesticides including DDT

There are no stockpiles for POPs or pesticides empty containers, as most of them are burned in the field or thrown with municipal solid waste. However, in Akkar, where 5% of empty containers are thrown in rivers; some piles may exist temporarily at the end of the dry season (summer) before being washed out by the river flow in winter. It is worth monitoring streams like Estouane, Aarqa and Bared in Akkar, and Litani in Central Bekaa. These streams and their surrounding fields could be potential contaminated sites (Figure 16). Furthermore all sites where historically POPs pesticides have been stored or disposed are potentially POPs pesticides contaminated sites.

2.5.7.2 PCBs

During the **2011 PCB Inventory Update and Project Preparation Study** samples of oil, sludge and water were taken from the on-site well in EDL Bauchrieh storage site, and also samples of drinking water were taken from nearby wells. An estimation of 55 tonnes of contaminated oil from the Bauchrieh well was found. Extensive contamination was also found under Askarel transformers in Zouk power plant. It was recommended that the site and repair shop is remediated by removing the contaminated soil and concrete and by cleaning equipment. As for the well, it was recommended to empty it and investigate effective remediation measures. A range of other sites where PCBs have been stored or disposed likely exist.

2.5.7.3 HBCD

The main stockpiles of concern for HBCD are stockpiles of EPS/ XPS at construction sites and CDW dumps, in addition to dumps and landfills in general for textiles from vehicles and others.

2.5.7.4 PBDE

The main PBDE containing stockpile is the end-of-life vehicles (buses) in Mar Mikhael, Beirut and Sahet el Aabed, Beirut. PBDE was identified in MSW dumps and landfills, including the Bsalim landfill of bulky waste, in the form of flame retardant EEE waste, decommissioned cars, used furniture and possibly flame retardant uniforms.

Potentially contaminated sites might have resulted from informal WEEE recycling with open burning including open burning of WEEE plastic and cables.

2.5.7.5 PFOS

As for PFOS, no stockpiles were identified, generated wastes were either landfilled or disposed of in open dumps throughout the country, and potential contaminated sites were mainly areas of fire accidents, as well as areas of firefighting incidents, where PFOS foams were used.

Between 2006 and 2014, ten (10) fire incidents were considered potential contaminated sites for PFOS (in addition to potential PCDD/PCDF contaminated sites), where 6,240L of firefighting foam was used as shown in Table 33.

Since the major use of PFOS was from 1970s to 2002 the environmental and in particular groundwater contamination is at considerably more sites but was not included in the first inventory.

Table 33 - Fire sites considered as hotspots

Year	Type of PFOS containing Firefighting Foam Used	Quantity Used	Location	Land use Type	Estimated Surface Area Burnt
2006	AFFF	500 L	Ashrafieh	Residential	1,500 m^2
	AFFF	300 L	Beirut Port	Industrial	150 m^2
2007	AFFF – FFFP	1,500 L	Jnah	Commercial/ Residential	2,000 m^2
2010	AFFF	120 L	Zokak Belat	Residential	100 m^2
2011	AFFF	2,000 L	Koraytem	Commercial/ Residential	700 m^2
	AFFF	300 L	Zarif	Commercial/ Residential	60 m^2
2012	AFFF	370 L	Zokak Belat	Commercial/ Residential	350 m^2
	AFFF	550 L	Karantina	Industrial	400 m^2
2014	AFFF	375 L	Talet Khayat	Commercial/ Residential	300 m^2
	AR-AFFF	225 L	Biel	Recreational/ Commercial	400 m^2
TOTAL	**-----**	**6,240 L**	**-----**	**-----**	**5,960 m^2**

2.5.7.6 Unintentional Produced POPs

In 2011, the MoE and UNDP had published the "Master Plan for the Closure and Rehabilitation of Uncontrolled Dumps in Lebanon". As part of the preparation of that Master Plan, existing uncontrolled dumps were surveyed. A total of 670 dumps sites were identified; of which 504 are Municipal Solid Waste (MSW) dumps and 166 are Construction and Demolition Waste (CDW) dumps. These are presented in Figure 20 below.

This report identified the most critical sites to be closed and rehabilitated, but due to shortage in funds, the only closed and rehabilitated site was the Saida dumpsite.

This report is currently being updated and a new inventory of uncontrolled dump sites is being prepared by the MoE and UNDP as well.

These sites are all considered as potentially contaminated with UPOPs given that the below Table 34 shows that most generated waste are openly dumped in the country and also based on the fact that open burning of waste is a common practice in Lebanon.

In addition to open dump sites, the landfills of Naameh, Bsalim, Zahle, and the controlled dumpsite of Tripoli are considered as potential contaminated sites.

Table 34 - Waste management and disposal per category

Category	Waste management practices
Medical Waste Incineration	Incineration residues are disposed of in landfills and open dumps
Animal Carcasses Burning	Residues are disposed of in landfills and open dumps
Iron and Steel Production	Residues in the form of oxides are reused in production, slag is open dumped and wastewater is treated
Copper Production	Residues in the form of oxides are reused in production, slag is open dumped and wastewater is discharged into sewage networks
Aluminum Production	Scrap is sold to other producers, residues in the form of oxides are reused in production, slag is open dumped and wastewater is discharged into sewage networks with the exception of one facility
Lead Production	Residues in the form of oxides are reused in production, slag is open dumped and wastewater is discharged into sewage networks
Brass and Bronze Production	Residues in the form of oxides are reused in production, slag is open dumped and wastewater is discharged into sewage networks
Shredders	By-products of process are landfilled or open dumped
Household Heating and Cooking Biomass	Ash is generated from the process and is assumed to be open dumped or landfilled, or spread on land in rural areas
Biomass Burning	Ash is generated from the process and is assumed to stay at the site where it is burned
Waste Burning and Accidental Fires	Burned waste and materials are disposed of in landfills or located in open dumps
Pulp and Paper	Small share is recirculated or sold as scrap and the remainder is landfilled; wastewater is discharged into sewage networks
Leather Production	Scrap waste are either exported or disposed of in landfills; wastewater is discharged into sewage networks
Smoke Houses	Residues in the form of ash are landfilled
Dry Cleaning	Residues are open dumped or landfilled
Composting	Product is applied to agricultural lands or disposed of in open dumps or landfills
Sewage Treatment	Sludge is applied to agricultural lands or disposed of in open dumps or landfills

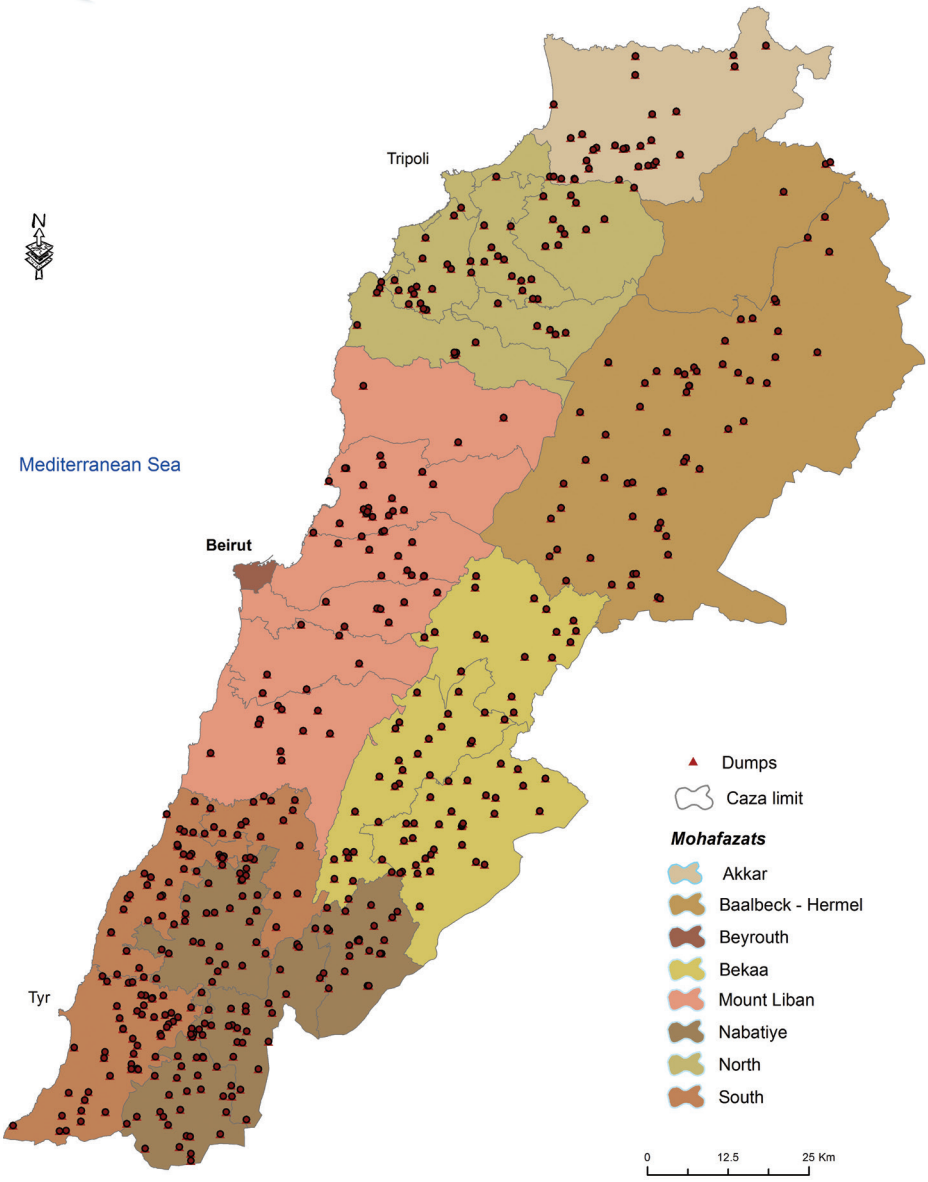


Figure 20 - Distribution of uncontrolled dumpsites surveyed (October 2010-January 2011)

Various fire accidents that occurred in Lebanon were expected to have released POPs, due to the nature of their facilities, and are therefore considered potentially contaminated sites. These include;

a) **Bourj Hammoud-Tires Burning** (tire burning occurred multiple times during the study period for the purpose of reclaiming steel wires);

b) **Ain El Remmaneh-Chemicals Storage Fire Incident** (approximately 1,000 tonnes of chlorine based products caught fire during the incident);

c) **Jnah-UNHCR Warehouse** (3,753 tents, 36,642 blankets, 3,753 mattresses, 2,730 plastic sheets and 62 rolls of plastic caught fire);

d) **Warehouse of Transmed** (PUR insulated structure that can contain flame retardants and detergents which may contain chlorinated compounds as well as consumer product packaging that may contain PFOS);

e) **Safra-Carpet Factory** (carpets may contain flame retardant and stain resistant additives, thus POPs);

f) **Dbayeh-Carpet Plus Show Room** (carpets may

contain flame retardant and stain resistant additives, thus POPs);

g) **Mazraat Yashou-General Packaging Industry** (potential presence of PBDE in disposable cups and dishes);

h) **Energy Sector Fire Incidents** (key energy-related infrastructure were damaged during the 2006 war including the Jieh power plant fuel storage tanks, the kerosene fuel storage tanks of the Beirut Rafic Hariri International Airport, transmission and distribution networks, and petrol stations);

i) **Petrol Station Fire Incidents** (several petrol stations were directly hit during the July 2006 war);

j) **Industrial Fire Incidents;**

According to the 2006, Lebanon Rapid Environmental Assessment for greening Recovery Reconstruction and Reform, thirty one (31) industrial facilities in South Lebanon, Bekaa and Beirut Suburbs were reported to have been completely or partially destroyed. A total of seven (7) might have potentially contributed to PCDD/PCDF emissions, these being:

- Al Arz Textile Factory (Bekaa),
- Ghabris Detergent Factory (South),
- Saffieddine Plasti-med (South),
- Maliban Glass Factory (Bekaa),
- Fine Tissue Factory (South), and
- Lebanon Co. for Carton Mince & Industry (Mount Lebanon),
- Dalal Steel (Bekaa)

Figure 21 presents the locations of the hotspots outlined in this section, with the exception of petrol stations that caught fire during the July 2006 war, due to the unavailability of their specific locations, and dumpsites that are shown in Figure 20.

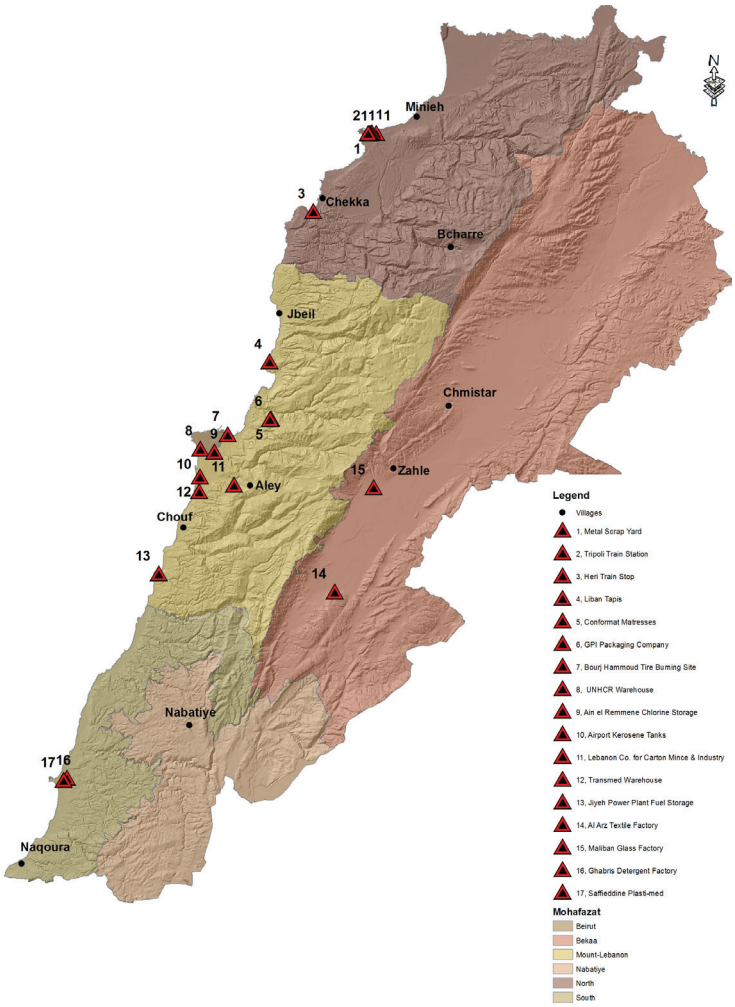


Figure 21 - Map of potential hotspots

2.5.8 Summary of Requirements for Exemptions (and Future Use, and Releases of POPs)

To enable Parties to the Convention to take measures to reduce or eliminate releases of POPs from intentional production and use, for which alternatives do not exist yet or are not readily available, the Convention allows Parties to register specific exemptions for a specific period of time. Annexes A and B to the Convention describe specific exemptions, as well as acceptable purposes, that are available with respect to the relevant POPs. Parties need to register in order to benefit from the Convention's provisions on specific exemptions listed in Annexes A or B.

Based on findings from the sectoral assessment for POPs usage and releases conducted in 2016 (Pesticides, IPOPs and UPOPs), Lebanon did not request at this stage any exemptions for the listed Annex A substances. No production or use has been identified to currently exist.

For Annex B substances, Lebanon has not registered for any exemptions for the use of PFOS.

During the 2016 IPOPs inventory, specifically for PFOS, a main gap was defined in the metal plating sector as;

- Potential inaccurate statement from national manufacturer stating that big producers in the country now use the "silver strike" method where the main ingredients used are sodium and potassium cyanide; which are mainly imported from the Czech Republic;
- Statement from big manufacturers that small illegal metal platers might still be using PFOS;
- Lack of cooperation from some industries in providing information on production quantities and processes as well as alternative chemicals used in production processes;
- Only 50% of metal-platers responded, all of which were decorative silver metal-platers.

Given the above, and due the common presence of the chroming industry in Lebanon, there may be a need to register for acceptable uses in the future.

2.5.9 Existing Programmes and Studies for Monitoring Releases and Environmental Levels Including Findings

Currently there is no established national program for monitoring of releases and environmental levels of POPs. The monitoring of POPs releases and environmental levels is mainly taking place at academic and research levels.

POPs Pesticides

Several universities were visited to shed the light on any research regarding POPs or other pesticides.

Most of the publications focused on water streams, and to a lesser extent on soil analysis. Some publications addressed bioaccumulations. POPs were found once in two locations: DDT and HCB in Akkar, in the watersheds of Nahr El Kabir shared with Syria, and DDT in Saida as mentioned in the 2006 National Implementation Plan (NIP), nonetheless monitoring the presence of POPs or a systematic sampling were never conducted. Actual works in research and academic institutions are not directly targeting POPs impact on the environment or conducting systematic sampling or monitoring of these pollutants into the soil, surface or underground water.

Industrial Research Institute (IRI) laboratories in Haddath tested the presence of some active ingredients (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Toxaphene, Lindane, and Endosulfan) in water samples nonetheless; the results of these tests (date, location, concentrations) were not shared, due to client confidentiality.

The Lebanese Agriculture Research Institute (LARI) has one equipped laboratory in Fanar that does the analysis of pesticides residues in food, soil and water. POPs are analyzed in samples from different locations in the country. Based on shared data, since 2011, no POPs were found in tested fruits, cereals, and vegetables. No data was provided regarding food samples, and no data was provided for the time period before 2011. However, the institute recorded the presence of POPs before 2011, as confirmed by the interviewed concerned responsible. However, these

results were not shared at the time of finalizing this report.

The Ministry of Agriculture's Phyto – Pharmacy laboratory in Kfarshima was approached to collect available data on POPs detection in samples analysis. The laboratory personnel mentioned that as part of a project in 2009, 30 strawberry samples collected from all over the country (Akkar, Beirut, Barbir, Chweifet, Nabatiyeh, Saida, Tyr, etc.) were analyzed for Endosulfan residues but none were detected. Moreover, the laboratory personnel also mentioned that since 2011, no POPs residues were found in fruits, vegetables, or cereals.

IPOPs and UPOPs

During the study period, there had been identification of some POPs related researches and studies, as per below:

- The Lebanese American University (LAU) is conducting a study on POPs and heavy metals levels in breast milk collected from Lebanese lactating mothers, but results were not available at the time of this publication;
- University of Saint-Joseph (USJ) is carrying out an epidemiological study on a population of students and employees in their Beirut campus. The aim of the study is to determine, for the first time, the serum levels of 6 indicator PCBs (28, 52, 101, 138, 153, 180) and of selected OCPs (DDT, DDE, HCB and β-HCH) in a sample of students and employees. Furthermore, possible difference in POPs levels by gender, age, body mass index (BMI) and diet can be evaluated.
- In 2015, Merhaby et al, published an article entitled "Organic pollution in surficial sediments of Tripoli harbour, Lebanon"; Tripoli harbour is among the most important ports on the Mediterranean Sea eastern basin. The persistent organic pollutants (POPs) were monitored (28 PCBs, 16 PAHs and 18 Me-PAHs) in 15 stations of Tripoli harbour basins, which are influenced by anthropogenic activities. Total PAHs concentrations ranged from 243 to 2965 μg kg^{-1} dw, total Me-PAH concentrations ranged from 54 to 1638 μg kg^{-1} dw, while total PCB levels ranged from 18 to 302 μg kg^{-1} dw. PCBs profiles were dominated by four and six-chlorinated congeners while the PAHs were dominated by four and five rings. For identifying pollution emission sources of PAHs, different ratios were used. The results show that the pollution origin was predominated by pyrogenic process related to the deposition of coal dust and the combustion of biomass and coal. Based on Sediments Quality Guidelines the biological adverse effects on aquatic ecosystems were expected rarely to occasionally for PAHs and PCBs contamination.

2.5.10 Current Level of Information, Awareness, and Education among Target Groups; Existing Systems to Communicate such Information to the Various Groups

Although governmental stakeholders such as the MoE, MoA and MoI are generally informed on the presence and emissions of POPs, there is a need for further training in order to reach a competent level of knowledge on the subject. Currently, there is no existing system to communicate such information to various target groups. As well as, there is no national exchange system between ministries and institutions. Activities mostly depend on staff individual initiatives from ministries to communicate with each other.

According to findings from the sectoral assessment of POPs releases and uses (2016), target groups including industrialists, farmers, concerned importers and traders have limited knowledge and awareness of POPs chemicals, their releases and impacts;

- Regarding POPs Pesticides: it is to be noted that upon the issuance of ban decision for pesticides (including POPs) from the Ministry of Agriculture, the latter is disseminated through official notifications to all concerned authorities and MoA regional offices. Also, the importers, suppliers and distributors are aware of the updated list of POPs and banned decisions and get regular updates from the MoA.

- Regarding IPOPs / UPOPs: due to the fact that some manufacturers do export their products, their knowledge on the list of POPs is broader.

In terms of education, Lebanon has a large number of universities relative to its size. Nevertheless, a number of universities provide programs in the environmental sector (water, air, science, health, engineering, chemistry, biodiversity, management, technology) and in the agricultural sector. The existing national specialties within the academic sector in Lebanon had been listed under *section 2.2.7* of this report.

At the level of schools, topics on POPs chemicals are not yet integrated within the offered disciplines of the Lebanese curriculum.

However, as mentioned earlier under *section 2.5.9,* POPs chemicals are known at the level of experts in scientific institutions, laboratories and research centers.

Public awareness on POPs and other hazardous chemicals does not still have its own national campaign in Lebanon. A campaign targeting different groups is highly needed to raise the level of knowledge especially at groups that are directly related to POPs; farmers, customs, industries, electric stations, waste recyclers, firefighters, and municipalities.

Noting that media is an important component that can be exploited for the education and awareness on POPs related issues especially now with the addition of the newly listed POPs.

2.5.11 Mechanism to Report under Article 15 on Measures taken to implement the Provisions of the Convention and for Information Exchange with other Parties to the Convention

The Ministry of Environment, being the national leading agency for the implementation of Stockholm Convention on POPs in Lebanon, has implemented measures under the Article 15 of the Stockholm Convention on reporting mechanism as follow: information collection from related ministries and stakeholders, follow up on the 2006 NIP implementation and outputs, following reporting regime for meeting among parties and as required by the Convention's Secretariat.

To ensure Stockholm Convention's regulations, Lebanon has deployed different solutions such as establishing an implementing unit for the PCBs management in the power sector.

At this stage of the new requirements for POPs management and control as well as reporting regime, and in order to secure optimal implementation, Lebanon shall establish a national implementing unit at the Ministry of Environment to provide oversight for implementation of the 2017 NIP as a near-term priority. The unit should be supervised by a steering committee made of representatives of key ministries and their agencies involved with POPs management for instance (MoE, MoI, MoPH, MoA, MoIM, MoET, MoEW, MoPWT, MoL, Customs Authority and EDL), with a broadened constituency, inclusive of stakeholders, as needed to implement specific actions.

In addition, throughout the years, Lebanon has developed multiple reports tackling measures taken to implement the Convention, effectiveness of such measures, statistical data on production, import / export of the listed chemicals, revision of the strategies aimed in reducing UPOPs releases and progress reports on elimination of PCBs.

The main reports include the following:

a. Preliminary Pesticides Inventory (2005)
b. Preliminary PCB Inventory (2005)
c. National Inventory on Persistent Organic Pollutants: Dioxins & Furans Releases (2005)
d. National Profile on Management of Chemicals in Lebanon (2005)
e. Persistent Organic Pollutants Health and Environment Profile (2005)
f. National Implementation Plans for the Management of Persistent Organic Pollutants (2006)
g. PCB Inventory Update and Project Preparation Study (2011)

In addition, during the exercise of updating and developing the current 2017 National Implementation Plan (NIP), the following reports had been prepared:

1) Regulatory and Institutional Framework Assessment - 2016
2) Assessment of POPs Pesticides - 2016
3) Assessment of Industrial POPs and Unintentionally Released POPs - 2016
4) Socio-Economic Impact Assessment of POPs - 2016

2.5.12 Relevant Activities of Non-Governmental Stakeholders

Non-governmental activities addressing POPs issues are mostly uncoordinated and independently operated; however, they have played a significant role in control of POPs emissions and POPs waste.

As per the 2006 NIP, several associations representing the interests of various industrial sectors in general and within the field of chemicals do exist. These organizations' major objective is to bring together the industries belonging to their sector or region and promote material output and export, with limited or no concerns in relation to health, safety and the environment. Some institutions and groups that involve chemical management in their activities or support such initiatives are further described in the subsequent paragraphs.

Association of Importer and Distributors of Supplies for Agriculture Production in Lebanon (ASPLANTE)

The Association of Importer and Distributors of Supplies for Agriculture Production in Lebanon (ASPLANTE) is a private organization embedding representatives of pesticide suppliers and distributors. The association is represented as well within the pesticide committee at the MoA.

The Association does practice technical activities related to agrochemicals licensing and development of regulatory issues concerning the importation, registration, use, labeling and awareness of pesticides manipulation and disposal.

Based on an interview with ASPLANTE representative during the 2016 POPs Pesticides Assessment, the following messages were carried out:

- The association is involved in awareness raising and capacity building for farmers through extension programs (e.g. the safe use of pesticides),
- The association is following up on all the procedures of registry of pesticides at MoA as well as the defined regulations for registering, importing, formulating, packaging, labeling and marketing pesticides in Lebanon,
- ASPLANTE is also involved in reviewing, commenting, or even opposing ministerial legal texts regarding the elaboration of lists of banned pesticides in Lebanon,
- The interviewed representative confirmed that Decision 310/1 dated 24/06/2010 which provides the regulations for pesticide imports is not fair in terms of procedure requirements from importers from reference countries (i.e. Western Europe, North America, Japan) compared to those who import from other countries (i.e. China, India, Turkey, Eastern Europe…) or formulate pesticides locally. For instance, those who import from the reference countries should provide a certificate from an accredited laboratory to prove that breakdown products, impurities, synergists and solvents as well as the active ingredient are within the rate that is accepted by the FAO code of conduct. Whereas, those who import from other countries or that is formulated locally, they should provide samples from their shipment to be analyzed in the MoA laboratory in Kfarshima,
- Based on above, there is a concern that the list of smuggled pesticides might increase, and that importers will be inclined to import their pesticides from non-reference countries, to avoid passing through accredited laboratories, reduce costs and increase the competiveness of their products on the market. This will decrease the transparency of imports, and opens the door to the use of products that are not necessarily under the regulations of FAO code of conduct.

Federation of Chamber of Commerce, Industry and Agriculture of Lebanon

The federation has its juridical personality as well as financial and administrative autonomy. The Federation coordinates between the different chambers of commerce and industry in Lebanon and has the following main activities:

- Holds economic conferences, local and international exhibition,
- Represents the chambers in common interests with official authorities, economic talks with Arab, foreign and international delegations,
- Cooperates with official authorities in order to organize, develop and promote the national economy, collect and coordinate economic and commercial information and statistics, issue newsletters and prepare studies and researches in this purpose,
- Exchanges opinions, information and reports with international and foreign organizations and institutions interested by economic and commercial matters, while giving opinion to competent authorities before approving the establishment of new chambers and giving new permits to establish mixed chambers between Lebanese and foreigners.

The regional chambers have the following activities:

- Approval of bills and the issuance of the necessary certificates of the authenticity of exports' prices as well as certificates that prove the commercial or industrial or agricultural nature of a product,
- Approves the authenticity of signatures of traders, industrialists and agriculture producers registered in the Chamber and issues certificates of origin for exports since the chamber has been entrusted by the government with the task of attesting invoices and issuing certificates of origin and submitting of commercial documents relating to the export of goods from Lebanon,
- Provides solution to problems and hindrances impeding commerce, industry and agriculture, and work on solving them as well as helping within its capacity.

Association of Lebanese Industrialists (ALI)

The Association of Lebanese Industrialists is a Lebanese economic organization grouping industrialists from all Lebanese regions in a concerted and balanced effort at promoting and developing industry in Lebanon. The association seeks to create and maintain an atmosphere which is favorable to industrial growth and development.

The association lobbies for certain policies, negotiates with labor unions, fosters cooperation between industrialists and organizes seminars and activities to help modernize industrial firms.

The association has a wide range of activities on the national and international level:

- Vocational training development
- Technical education program
- Sales promotion of Lebanese manufactured products in the local markets
- Rehabilitation of infrastructures, transport, etc…
- Participation in meetings and discussions related to industrial activities

The association has 17 specialized committees that play a significant role in policy formulation, among those committees is the "Sustainable Development, Energy and Environment Committee".

Industrial Syndicates

Lebanon has a wide range of business associations that are mainly concerned with promoting their business interests and maintaining good working relations with policy makers. With regards to POPs related sectors, the linked syndicates are as follows:

1- Syndicate of hotels;
2- Syndicate of hospitals;
3- Syndicate of textile manufacturers;
4- Syndicate of leather producers and tanneries;
5- Syndicate of electrical equipment manufacturers;
6- Syndicate of dry cleaners;

7- Syndicate of aluminium and glass manufacturers;
8- Syndicate of paper industries;
9- Syndicate of paints manufacturers

In addition, to the non-governmental stakeholders that have been listed and elaborated in the 2006 NIP, there are some non-governmental initiatives (among others) addressing POPs in an indirect manner and include the following:

- Arcenciel: Organization current collecting and treating infectious medical waste through autoclave techniques therefore providing an alternative to medical waste incineration causing the release of POPs;
- L'ecoute and Beeatouna: NGOs currently collecting, processing and exporting EEE waste including polymers and as a result diverting waste that potentially contain PBDE;
- NGOs and international / national organizations (such S.O.I.L.S) are promoting sustainable farming practices and providing trainings to farmers, thus reducing the usage of pesticides;
- NGOs are promoting and implementing the 3 Rs concept (Reduce, Reuse and Recycle) on the municipal solid waste, therefore reducing the waste quantities to be landfilled or dumped;
- Several private organizations include Souk Akkar (fruits and vegetables wholesale market), Safadi Foundation, and Qobayyat cooperative. All institutes organize awareness campaigns for local farmers to educate them on the safe use of pesticides and inform them on new pesticides and banned ones.

2.5.13 Overview of Technical Infrastructure for POPs Assessment, Measurement, Analysis, Alternatives and Prevention Measures, Management, Research and Development – Linkage to International Programmes and Projects

The national laboratories whether private, public, semi-public, academic or research centers were identified to the extent possible during an assessment conducted on the capacity of local laboratories to test for POPs.

Following is a list of the responders identified national laboratories:

Table 35 - Responders identified national laboratories

Nb.	Ownership	Institution	Laboratory	Abbreviation
1	Private	Advanced Construction Technology Services		ACTS
2	Private	American University of Beirut (AUB)	Environmental Health Department	FHS
3	Private	Apave Liban/ Apave Sudeurope - LEM - Chateauneuf Marseille	Apave	
4	Private – Research Lab	Lebanese American University	Environmental and Water Quality Laboratory	LAU
5	Private – Research Lab	University of Balamand	Chemistry Research Lab	UOB
6	Private, Academic	American University of Beirut (AUB)	Environment Core Lab	
7	Private	American University of Beirut (AUB)	Faculty of Agricultural and Food Sciences	
8	Academic – Research Lab	Lebanese University (LU)	Doctoral School for Science and Technology	DSST
9	Academic Research Lab	Lebanese University (LU)	Laboratory of Analysis of Organic Compounds	LAOC
10	Academic	American University of Beirut (AUB)	Kamal A. Shair Central Research Sciences Lab	

Table 35 - Responders identified national laboratories

Nb.	Ownership	Institution	Laboratory	Abbreviation
11	Academic	Notre Dame University (NDU)	Environmental Engineering Lab.	NDU
12	Semi Public	Industrial Research Institute	Wet Chemistry and Physical Chemistry Laboratories	IRI
13	Public / Research Lab	National Center for Scientific Research	National Centre for Marine Sciences	CNRS
14	Public	Beirut and Mount Lebanon Water Establishment	Beirut and Mount Lebanon Water Establishment	EBML
15	Public – Service Lab	Lebanese Agriculture Research Institute (LARI)	Antibiotic and pesticide residue laboratory	APRL
16	Public – Service and Research Lab	Lebanese Agriculture Research Institute (LARI)	Mycotoxins Laboratory	
17	Public – Service and Research Lab	Lebanese Agriculture Research Institute (LARI)	Soil and Water Lab	
18	Public	Lebanese University (LU)	Platform for Research and Analysis in Environmental Sciences	PRASE
19	Public – Service Lab	Ministry of Agriculture (MOA)	Phyto pharmacy Laboratory	Kfarshima lab

For the sake of the assessment, a questionnaire was developed in order to identify the following:

- General information: to know more about the nature of the laboratory, the contact person, contacting details, the responsible and a general description of the laboratory
- Analytical Information: to identify the Analyte (including POPs)
- Analyzed Environmental Matrices: to identify each analyte in what matrices can be or is being tested
- Available Analytical Techniques: to identify the availability of analytical techniques at each Lab
- Analytical Methodologies: to connect each analyte to the testing matrices and analytical techniques availability, and to the availability of accreditation
- Experience and needs: to identify the laboratories that have experiences in POPs testing and sampling and to assess their needs in this regards whether technical, accreditation, equipment's ….

Based on the assessment, all listed POPs can be tested at one of the laboratories available in the country with the exception of PCP, HCBD, and PCNs. However, some tests are not available for all relevant matrices. While some academic institutions have received accreditation for testing certain parameters, public and semi-public laboratories are not accredited. Table 36 provides a national summary of the parameters assessed, matrices and analytical techniques.

Whereas, Table 37 shows the availability of POPs analyte testing according to matrices at each of the surveyed laboratories.

Table 36 - Assessment of the analytical capacity of local laboratories

Analyte	Testing	Matrices	Analytical Techniques
Chlordecone	YES	N/A	HRGC-HRMS and GC-ELCD
Aldrin	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	GC-ELCD
Alpha-HCH	YES		HRGC-HRMS and HPLC-MS
Beta-HCH	YES		HRGC-HRMS and HPLC-MS
Chlordane	YES		HRGC-HRMS and GC-ELCD
DDT	YES		GC-ELCD and ELISA
Lindane	YES		HRGC-HRMS and GC-ELCD
Endrin	YES		HRGC-HRMS and GC-ELCD
Dieldrin	YES		HRGC-HRMS and GC-ELCD
PeCB	YES		HRGC-HRMS
Endosulfan	YES		ELISA
Heptachlor	YES		ELISA
HCB	YES		HRGC-HRMS and GC-ELCD
Mirex	YES		HRGC-HRMS and GC-ELCD
Toxaphene	YES	N/A	HRGC-HRMS and GC-ELCD
HBB	YES	N/A	HPLC-MS
Hexa BDE and Hepta BDE	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS and Colorimetric methods (UV-VIS/ fluorescent spectroscopy)
PFOs, its salt and PFOS-F	YES	N/A	HPLC-MS
HBCD	YES	Fish, Sediments and Water	HPLC-MS
Tetra BDE and Penta BDE	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HPLC-MS
PCDF	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS and GC-ELCD
PCDD	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS and GC-ELCD
PCBs	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS and GC-ELCD
Toxic gases	NO	N/A	N/A

Table 36 - Assessment of the analytical capacity of local laboratories

Analyte	Testing	Matrices	Analytical Techniques
Drugs/ Pharmaceuticals	YES	N/A	HRGC-HRMS and GC-ELCD and HPLC-MS
Fumes	NO	N/A	N/A
Solvents	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS, GC-ELCD and HPLC-MS
PAHs	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS, GC-ELCD, HPLC-MS, and Colorimetric methods
Petrochemicals	YES	N/A	HRGC-HRMS, GC-ELCD
Alcohols/ Glycols	YES	Air, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	HRGC-HRMS, GC-ELCD
Heavy metals	YES	Air, Compost, Fish, Hazardous wastes, Industrial wastes, Leachate, Municipal solid wastes, Municipal wastewater, Sediments, Sludge, Soils, Water	Flame AAS
Food additives	YES	N/A	HRGC-HRMS, GC-ELCD, and colorimetric methods
Natural toxins	YES	N/A	HPLC-MS
PCP	NO	N/A	N/A
HCBD	NO	N/A	N/A
PCNs	NO	N/A	N/A

Table 37 - Availability of POPs analyte tests according to matrices by laboratories

Labs	POPs Analyte														
	POPs Pesticides														
	Chlordecone	Aldrin	Alpha–HCH	Beta– HCH	Chlordane	DDT	Lindane	Endrin	Dieldrin	PeCB	Endosulfan	Heptachlor	HCB	Mirex	Toxaphene
ACTS	√ compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal waste water, sediments, sludge, soils, water														
Env core Lab (AUB)	x	√ industrial wastewater, municipal wastewater, sediments, soils, water			x	√ industrial wastewater, municipal wastewater, sediments, soils, water				x	√ industrial wastewater, municipal wastewater, sediments, soils, water		x	x	x
FHS (AUB)	x	√ water	x	x	√ water					x	x	x	x	x	x
Apave (France)	x	√ air, compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal wastewater, sediment, sludge, soils, water													x
EBML	x	√ water												√	√ water
IRI	√	√ water	x	x	√ water					x	√ water		x	x	x water
LARI (APRL)	x	√ fish, soils, water, food	x	x	√ fish, soils, water, food		x	√ fish, soils, water, food		x	√ fish, soils, water, food				x
LU (DSST)	x	√ air, Pine	√ air, Pine, honey		x	√ air, Pine, honey	√ honey	x	√	x	√ air			x	x
LU (LAOC)	x	√ water, Food						x	√ water, food	x	√ water, Food			x	x
LU (PRASE)	√ compost, sediments, soils, water													x	x
MoA (Kfarshi-ma)	x	√ fish, soils, water, food	x	x	√ fish, soils, water, food		x	√ fish, soils, water, food		x	√ fish, soils, water, food				x
UOB	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Labs	POPs Analyte							
	Industrial chemicals					Unintentional POPS		
	HBB	Hexa and Hepta BDE	PFOS and PFOS-F	HBCD	TetraBDE and penta BDE	PCDF	PCDD	PCB
ACTS	√ compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal waste water , sediments, sludge, soils, water				x	√compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal waste water, sediments, sludge, soils, water	x	√ compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal waste water, sediments, sludge, soils, water
Env core Lab (AUB)	x	x	x	x	x	x	x	√ industrial wastewater, municipal wastewater, soils, water
FHS (AUB)	x	x	x	x	x	x	x	√ water
Apave (France)	x	√ sediments, water, fish	x	√ air, compost, fish, hazardous waste, industrial wastewater, leachate, municipal solid waste, municipal wastewater, sediment, sludge, soils, water				
EBML	√	x	x	x	x	x	x	√ water
IRI	x	x	x	x	x	x	x	√
LARI (APRL)	x	x	x	x	x	x	x	x
LU (DSST)	x	x	x	x	x	x	x	√
LU (LAOC)	x	x	x	x	x	x	x	√ water, food
LU (PRASE)	x	x	x	x	x	x	x	√
MoA (Kfarshima)	x	x	x	x	x	x	x	x
UOB	x	x	x	x	x	x	x	√ sediments, sludge, soil, food products, fatty tissues

2.5.14 Details of any Relevant System for the Assessment and Listing of new Chemicals and Details of any Relevant System for the Assessment and Regulation of Chemicals already in the Market

No well-defined procedure is available for the assessment and listing of new chemicals. Lebanon lacks a comprehensive chemicals management regulation to adequately control the listing and regulation of new chemicals. The MoE is currently in the process of developing a chemicals management decree that is aimed to address this issue.

As mentioned previously under *section 2.4.1*, the chemicals management including POPs falls under the mandate of the **Ministry of Environment - Service of Environmental Technology – Department of Chemical Safety** as per Decree 2275/2009. This department is currently working on developing the necessary assessment and decrees for the management of hazardous waste.

In addition, through the submitted EIAs, EAs, and IEEs, the MoE is able to assess the chemicals usage among industries.

Regarding the pesticides, and as mentioned in *section 2.4.1*, the approval of registrations for new active ingredients is not solely the responsibility of the Phyto Pharmacy Department at MoA, thus it is approved or denied by a decision from the pesticides committee.

2.5.15 Assessment of Socio-Economic Impacts of POPs

Within the NIP update and development, a 2016 socio-economic impact assessment has been prepared enabling the government to analyze, monitor and manage the social consequences of actions on POPs in Lebanon.

2.5.15.1 Economic Implications and Social Risks

Pesticides

Despite the low contribution that agriculture has on the overall Lebanese GDP, it still plays a significant role in the livelihood of a sizeable segment of the population. A Food and Agricultural Organization (FAO) study surveyed over 800 households throughout the country in November 2014. The survey found that the usual primary income of 18.4% of the respondents is from agriculture-related activities and 37% declared that their first source of income (for respondents who had more than one source of income) is from agriculture related activities.

Therefore, any drastic changes in the economy of agriculture, particularly raw materials in this case, would have significant socioeconomic impacts on the country.

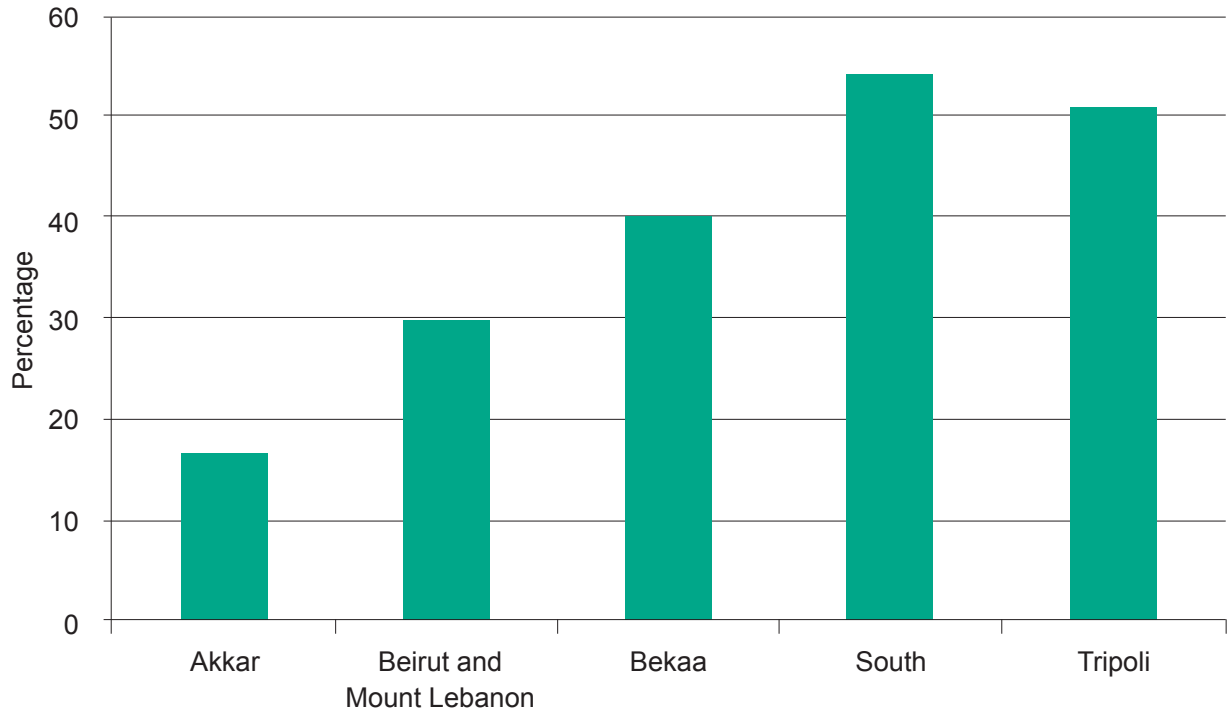
The 2016 Pesticides Assessment did not find any widespread use of POPs pesticides in Lebanon but the interviewees did state that they suspect some illegal use of Endosulfan. However, the accuracy and exact extent of its consumption is unknown. This assessment assumed that the usage of POPs pesticides, mainly Endosulfan, was restricted to illegal usage by certain farmers.

The local price of smuggled endosulfan was stated by a Lebanese supplier at US 15$ per kg which could produce 600 liters. It has been consistently used by farmers before its ban due to its cheap price, and wide range of usability.

Many farmers are unaware and do not have access to the information on pesticides and their characteristics. They often rely on the sellers and agricultural engineers for guidance.

Other common pesticides that are used and do kill a wide range of pests are Floramite and Demise. Three barrels of Floramite mix sells for about US$ 66 and 3 barrels of Demise mix sells for US$ 80. This is 340% and 433% more than Endosulfan's price respectively. The alternative pesticides may also have negative environmental and public health impacts. Therefore, it is important to study any alternatives to get a better understanding of potential impacts associated with it. It is also important to note that pests and rodents build resistance to pesticides over time; therefore, other pesticides could be more effective than Endosulfan.

Farmers who rely on Endosulfan may incur substantially larger costs if they change pesticides. This will probably affect their income since they cannot influence the market price of their products. The FAO survey found that more than half of their respondents reported their income decrease in the last 24 months (2012 till 2014). Figure 22 shows the percentage of respondents that stated increase in raw material prices as the main factor that contributed to the decrease of their income.



Source: FAO, 2015

Figure 22 - Decrease of income from increase in price of raw material for farmers (2012-2014)

Depending on how widespread Endosulfan usage is, the total cost of switching pesticides could be significant.

The transition between two pesticides could be problematic for the farmer if managed incorrectly. One of the possible outcomes is a decrease of agricultural production. For the farmer, this would be less revenue leading to less profit. If this happens to a high number of farmers then this could potentially shock the food market. This would increase costs for consumers and also increase food import costs.

Another alternative option for farmers is to minimize pesticides altogether. Integrated Pest Management and organic farming are farming methods that do not rely on pesticides or chemicals that are harmful. Such a switch would eliminate the health and environmental impacts caused by pesticides. The FAO has already started training farmers under the Regional Integrated Pest Management Programme in the Near East in Lebanon and organic products can be found in supermarkets. However, disseminating such agriculture methods will require the proper institutional arrangements and financial resources.

There has been some evidence of a demand increase for organic products in Lebanon, however, the majority of organic consumers are affluent people. The

lack of certification and support from the government are major obstacles for the organic market (CIHEAM, 2003). With the proper support mechanisms, organic production could increase, leading to cheaper prices due to economies of scale and resulting in a higher demand from other segments of the Lebanese population.

PCBs

The MoE has recently (starting 2015) been provided with funds from the GEF through World Bank for PCB management in the power sector. Part of these funds will be used towards the disposal of PCB equipment and waste. The project is currently carrying out a national inventory to identify the PCB equipment in Lebanon. This will be followed by the development of a 10-12 year action plan that will ultimately phase out and replace all the identified PCB equipment. The replacement of all the identified PCB equipment will be expecting to cause a financial burden on the Lebanese government.

It is to be noted that since the onset of the unfortunate Syrian crisis in 2011, Lebanon has been hosting displaced Syrians reaching a total of around 1.5 million in 2015. Thus, this crisis have caused a significant impact on the Lebanese power sector. This impact has major implications on the EDL network among which are the transformers. The increase of population, have led to an overload on power demand, thus damaging the distribution transformers.

In case the damaged transformers are assessed to be PCB contaminated equipment, then the number of out-of-service PCB equipment would be increasing in Lebanon, enabling the need for further funding for a proposal environmental storage and disposal.

Furthermore, the probability of the occurrence of PCB contaminated sites could be considered high in Lebanon, thus their identification, assessment and remediation would be costly.

HBCD

The 2016 IPOPs assessment concluded that the amount of HBCD in circulation is low, since it is not a common component in the construction sector. Thus, the economic impact of phasing it out is not expected to be very high. However, significant costs are expected if the prevalence of HBCD in existing buildings needs to be determined and eradicated.

PBDE

One of the main sources of PBDEs in Lebanon is the vehicles that are manufactured before 2004. Although it is legally not permitted to import cars older than 8 years according to the Law 150/1992, there is no regulation that prohibits the use of old cars that are already in the country.

There are currently over one (1) million cars that were manufactured in Lebanon before 2004. In particular, cars and buses from the United States that might contain PBDEs and other halogenated flame retardants due to specific flammability standards. It is estimated that about 50% of the cars and trucks manufactured in the USA are treated with PBDEs and contain ca.160 grams of PBDE and American manufactured buses before 2004 contain 1,000 grams of PBDE. Cars imported from other regions are considered to have low/no use of PBDEs. Additionally, also DecaBDE (suggested for listing at COP8 04/2017) and HBCD are detected in cars.

An important issue to keep in mind is that any donation that Lebanon receives, such as used trucks, cars, ambulances are not subject to the regulation of prohibiting old cars from entering the country. This is an issue that needs to be further addressed.

In order to reduce the prevalence of PBDE associated with these old vehicles, they need to be taken out of circulation. People driving old cars will likely need incentives, such as a tax break or soft loan on a new car, in order to give up their vehicles. Otherwise, they would not give up their private mode of transport, considering the public transportation system in the country is not properly developed. Any change in the number of cars in circulation will have an impact on taxes and maintenance fees associated with these cars. This is an issue that needs to be taken into consideration when formulating policy to reduce the overall numbers of old cars.

Banks currently offer a lower interest rate for new cars than used ones and this has resulted in more new cars being sold in the market (Blom, 2016). A few decades ago, there was a significant difference between the prices of new and old cars, this is not the case today. New cars, as cheap as US$10,000, can be found in the market and the access to loans means consumers can buy the car by paying a few hundred dollars a month for a few years. Between 2009 and 2013, "KIA" car sales increased by about 135% and "Hyundai" sales have increased by about 185%. This increase is due to the number of inexpensive cars both these companies produce. During this time, the market share of German and Japanese car brands have decreased (Blom, 2014).

There are very little number of cars manufactured before 2004 being sold on car selling websites. So it is safe to assume that any consumer that wants to upgrade its car will probably not purchase a car manufactured prior to 2004.

The annual income for poor households in Lebanon is between US$ 4000 and US$ 8,400 (Oxfam, 2016). The households that own cars and fall in this income bracket will face the biggest financial burden if they are to upgrade their cars. The monthly payments and down payment would take a significant portion of their annual income.

Once the cars are removed from circulation then there will be a need to dispose them. Disposing old cars needs to follow the best management practices to minimize the emissions linked with this activity. Given the high number of old cars that are in circulation, proper disposal will require significant financial resources. However, it could be an economic opportunity for actors involved in the sector.

Another issue that should be taken into consideration is the electronic equipment. Most stores sell new equipment that likely does not contain any PBDE; however, many people have old equipment stored in their homes that may contain PBDE. These equipment need to be disposed properly to reduce the sources of PBDE indoors. Currently, the technical know how to manage electronic waste is very limited in Lebanon. There are currently no rules or regulations for electronic waste management in Lebanon. The first step is to develop such a legal framework to regulate this sector. Once this has been established, then the government should consider creating incentives to attract firms that are specialized in this area and devise a plan to dispose all the old equipment in Lebanon in a proper manner and to avoid further contamination of the existing landfills. There is already a legal basis for such incentives, as one of the main principles of Law 444 dated 29/07/2002, is to offer economic incentives to encourage pollution control.

PFOS

Between 2006 and 2014, ten (10) fire incidents were put out with PFOS containing firefighting foam and many more between 1970s and 2005. These areas were different residential, commercial, and industrial areas throughout Lebanon. Any contaminated site located near groundwater sources may pose a serious threat to the overall water supply. This would be particularly harmful for Lebanon since groundwater is a major source of potable water and a large percentage of precipitation in Lebanon infiltrates into the aquifers (MoEW/UNDP, 2016). Drought and misuse of water resources have put a lot of pressure on Lebanese water resources and any contamination would exacerbate this problem. Groundwater resources near any potential hotspot need to be identified in order to assess the risk on the groundwater resource.

The costs linked with assessing groundwater resources and remedying contaminated sites are very costly. For instance, the assessment cost for a groundwater site that was polluted with 42 m^3 of PFOS/PFAS firefighting foam was 10,000 Euros. The cost for remediation of this site was estimated to be 10,000,000 Euros (Valentin, 2015).

During the 2016 IPOPs assessment, concerning firefighting training sites, none of the respondents used PFOS-based foams and according to the Civil Defense Department in Beirut, very little foam is used in Lebanon for training purposes now. Most training

relies on the use of powder-based firefighting equipment as being more affordable. Based on the above, the ban of usage of PFOS based firefighting equipment, might have a significant economic impact on the government (namely fire departments, civil defence and Lebanese army).

UPOPs

Inadequate waste management practices are the main sources of UPOPs emissions in Lebanon. An improvement in practices would reduce UPOPs emissions. This would require the government to develop and implement a national solid waste management plan that defines the roles and responsibilities of the different government levels and agencies. The government would incur a lot of costs implementing such plan; however, this would create a lot of business and employment opportunities. Reducing the amount of wastes disposed in a landfill, and decreasing the amount of wastes being disposed inadequately, would generate more raw materials for the recycling industry.

Until a comprehensive solid waste plan is implemented throughout the country, there will likely be more open waste burning and some attention is to be given to the more vulnerable segments of the population. For instance, burning wastes near schools will be particularly harmful for young children because they are more vulnerable to POPs exposure. Hospitals are also areas that house a portion of the population that is more susceptible to POPs exposure because of their medical condition and the presence of pregnant women, old people and children.

Other sources of UPOPs emissions need a more comprehensive review. The Stockholm Convention has developed a series of Best Available Techniques (BAT) and Best Environmental Practices (BEP) guidelines for the various source categories. A review of the processes in Lebanon needs to be reviewed and compared to the BAT/BEP guidelines. These guidelines cover all source categories such as motor vehicles, thermal processes in the metallurgical industry, waste incinerators, and metal shredders. The main objective of the review is to identify which areas fall short of BAT/BEP practices. Once the results of the review are complete, the full economic cost to adopt these practices by the private sector could be determined.

Site Remediation and Disposal Costs

The contaminated hotspots in Lebanon need to be properly localized, where POP levels would be measured and identified. And since the infrastructure to properly quantify POPs and identify their location is not developed in Lebanon, its establishment will have an additional cost. Nevertheless, the greatest portion of the costs will be the remediation of these sites.

2.5.15.2 Population at Risk

The identified segments of the population that are more prone to exposure include (i) stakeholders that directly interact with POPs in their professional settings, (ii) segments of the general public that are within the areas of contaminated sites and (iii) segments of the population that are more prone to the food intake exposure pathway. The socioeconomic assessment also identified populations that are likely living in dwellings with poorer indoor air quality. The focus was done on residents of houses that have poor ventilation or little natural light as these are likely located in denser urban areas with poor circulation and therefore worse indoor air quality.

The external health cost estimated for the endocrine effects of POPs are high for the general population. For the United States it was estimated that due to PBDE exposure about 11 million IQ points were lost costing US$ 266 billion (Attina TM et al, 2016).

3 STRATEGY AND ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

3.1 Policy Statement

The Government of Lebanon (GoL) is determined to safeguard its environment, population and future generations from exposure to hazardous chemicals including Persistent Organic Pollutants.

Mindful that Persistent Organic Pollutants (POPs) possess toxic properties, resist degradation, bio-accumulate, and move in the environment through air, water and migratory species across international boundaries.

Conscious of the need for actions and activities to protect human health and the environment through effective and tangible measures reducing and/or eliminating emissions and discharges of persistent organic pollutants.

The Ministry of Environment formally endorses the second National Implementation Plan (NIP) and commits itself to undertake the activities set forth in this plan, in coordination with relevant stakeholders, and meet its obligations under the Stockholm Convention within its existing national conditions and capabilities.

This NIP had been developed through mobilizing the participation of relevant and essential stakeholders to ensure the reduction and elimination of the usage and release of POPs. Such approach will guarantee the effective implementation of the objectives and activities on the management of POPs.

3.2 Implementation Strategy

The NIP includes (i) the measures that need to be adopted by the GoL through each of the responsible parties and (ii) the necessary resources (human, financial and technical) required for its proper implementation in order to fulfill the provisions of the Stockholm Convention and protect the Lebanese environment and population from exposure to POPs.

The activities in the NIP are aimed at improving management of POPs while fully taking into consideration the need to address hazardous chemicals and wastes at large. The NIP addresses different aspects of managing and monitoring POPs throughout their entire life cycle, thus enabling the fulfillment of all the specific requirements of the Stockholm Convention.

The GoL is to establish a National Implementation Unit (NIU) at the Ministry of Environment (MoE) through a funded technical assistance project, to provide oversight for implementation of the NIP as a near-term priority. The NIU is to be supervised by a Steering Committee including representatives from key ministries and their agencies involved with chemicals management (including POPs). The Steering Committee members are proposed to be representatives from the MoE, MoI, MoA, MoL, MoPH, Customs Authority, MoIM, MoET, MoEW/EDL, and MoPWT. Representatives from other stakeholders and donor agencies will be invited to attend specific meetings based on the progress of implementation and their roles.

NIU will be staffed with a team dedicated specifically to implement the NIP. This will ensure that NIP implementation is not hindered for reasons of understaffing of certain ministries or lack of dedicated personnel to manage its implementation. This is a main lesson from the previous NIP implementation, which suffered from lack of sufficient resources.

The NIU's responsibilities will include among others the following tasks:

- Resource mobilization to implement the NIP;
- Preparation of Terms of References (ToRs) for the various activities;
- Supervision of NIP activities and coordination with different stakeholders;
- Support in integration of POPs relevant actions in ministerial plans and projects;
- Acting as secretariat to the steering committee to ensure it is operational;
- Compilation of databases relevant to assessing and controlling POPs;
- Upgrading POPs inventories and NIP on regular basis as prescribed by the Convention in-

cluding the POPs newly listed in 2015 (PCP, PCN, HCBD) and upcoming 2017;
- Evaluating progress of NIP implementation every three years;
- Dissemination of information about POPs;
- Leading implementation of the research component of the NIP;
- Integrating POPs management activities with general hazardous chemical management activities including synergies with SAICM emerging issues, mercury and ODS were appropriate;
- Promoting green and sustainable chemistry;
- Arrangement for training of appropriate specialists (e.g., customs officer, border control officers, engineers, technicians) responsible for management of POPs;
- Monitoring and Evaluation of NIP implementation and reporting to the Secretariat as well as NIP updating as required.

Implementation Framework

The NIP will be implemented in three (3) main Implementation Packages (IPs) (Figure 23) as follows:
- IP1: Technical assistance package including implementation of SO1 (Legal and Institutional Framework), SO5 (Research and Development) and SO6 (Monitoring, Evaluation and Reporting);
- IP2: IPOPs and UPOPs implementation package (SO2 and SO3);
- IP3: POPs pesticides implementation package (SO4)

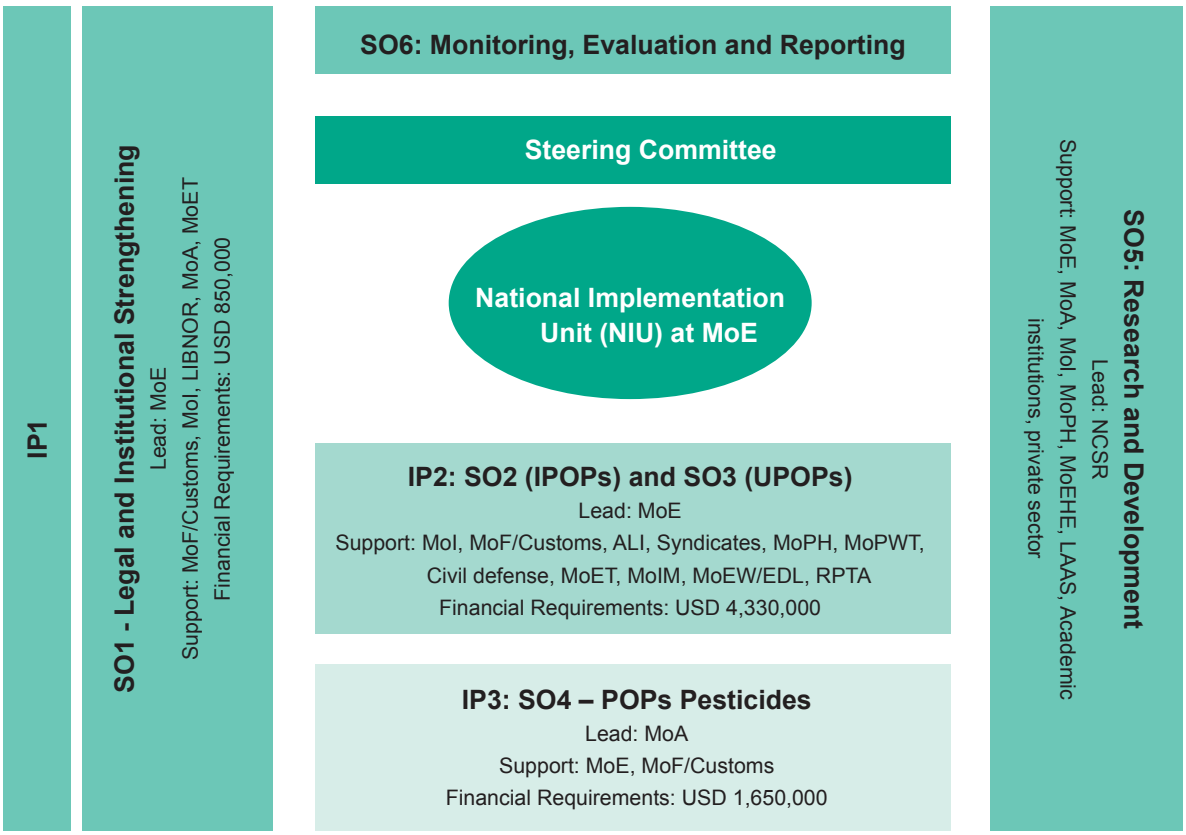


Figure 23 - NIP implementation framework

3.3 Action Plan and Prioritization

The action plan has been developed in a highly participatory manner. Key stakeholders that have direct role in the implementation of the plan were involved in its preparation via the steering committee, and wider stakeholders have reviewed and validated the action plan in a participatory workshop held on 6 March 2017. Following the workshop, the draft action plan was circulated to all stakeholders for review; consequently, the received comments were integrated in the final action plan.

The action plan includes information on the strategic objectives, objectives, activities, responsible parties (lead implementer and supporting agencies), anticipated outcomes, timeframe for implementation, human and technical resources, financial resources and potential sources of funds. A description of each attribute of this action plan is provided below:

Attribute	Description
Strategic Objective	High-level objective that supports achievement of the overall goal of the NIP, which is protection of the Lebanese environment and its population from exposure to POPs contaminants as well as compliance with the convention's requirements
Objective	Desired state that in conjunction with other objectives, shall lead to the achievement of the strategic objective
Activity	Specific task, which in conjunction with other activities, shall lead to the achievement of the objective
Lead Implementer	Lead entity responsible for the implementation of a specific activity
Supporting Agencies	Ministry, public administration, NGO or private institution that has a role in the implementation of a specific task, under the supervision of the lead implementer
Outcomes	Provide information on the expected achievements from the implementation of each activity and can be used as a qualitative indicator to monitor implementation of the NIP
Human and Technical Resources	The necessary expertise and staff to execute a certain activity
Financial Resources	Estimated financial resources to implement each activity
Timeframe	Define the timeframe in which the activity should be initiated, which could be short-term (within 3 years), medium-term (between 3 and 6 years) or long-term (after 6 years)
Potential Sources of Funds	Determine whether a certain activity can be funded through internal funds (public budget) or requires external sources of funding such as through bi-lateral or multi-lateral funding mechanisms

3.3.1 Strategic Objectives and Action Plan

3.3.1.1 Strategic Objective 1: Strengthening the Legal and Institutional Framework for POPs Chemicals Management in Lebanon

This strategic objective will be achieved through the implementation of two (2) objectives:
(1) Strengthening the legal framework; and
(2) Strengthening the institutional framework

O1.1: Strengthening the legal framework

Effective management of POPs is only possible in the presence of a strong legal framework. Because POPs are only one aspect of chemicals management and waste management, whereby both areas are currently poorly legislated in Lebanon, it is of primary importance that overarching regulatory frameworks for chemicals management and waste management be established, while taking into consideration specific requirements for the management of POPs.

The Lebanese Framework Law for the Protection of the Environment (Law 444/2002) does establish the framework for chemicals management; however, the necessary implementation decrees have not yet been prepared. The same applies for a decree related to the management of hazardous wastes, which is currently under preparation by the Ministry of Environment. Both legal instruments need to carefully integrate requirements related to the control of POPs through the import, production, distribution and trade of chemicals as well as management of resulting wastes, which could contain POPs. Such framework legislation would also address issues related to end-of-life vehicles, EEE and other special types of wastes, which could contain POPs.

Another important element of this framework is to establish effective ambient quality standards and emission limit value (ELV) standards by replacing decisions 52/1/1996 and 8/1/2001 with a decree stipulating those standards. This decree should also integrate limits related to POPs. The EU Environmental Quality Standards and the Water Framework Directive could provide guidance in developing effective Lebanese standards.

Several actions aiming at updating existing legal texts or developing new texts have also been proposed to strengthen the legal framework for POPs management in Lebanon. This includes, among others, the development of environmental guidelines for sectors where POPs are likely to be present, which would be effective to build the capacity of stakeholders in the management of POPs.

O1.2: Strengthening the institutional framework

In order to achieve an effective management of chemicals in general, and POPs in specific, it is instrumental to have a strong institutional framework that would be characterized by the following:

- Operational coordination mechanism among key stakeholders involved in the management of chemicals in Lebanon;
- Clear mechanism for the management of data regarding chemicals in Lebanon, such as a unified database for chemicals management, including POPs, that can be used by different ministries for various purposes; existing databases at both MoI and MoE could be a starting point for such a mechanism. A good guidance to establish such mechanism could be the IOMC Toolbox (IOMC Internet-based Toolbox for Decision Making in Chemicals Management aimed at countries who wish to address specific national issues regarding chemicals management);
- Competent staff in the different ministries and authorities whom are well-trained about all aspects related to POPs management to be able to effectively control and monitor their entry in the country, production, release and disposal;
- Reliable capabilities in the analysis and identification of POPs in various products and matrices.

Table 38 - Strengthening the legal framework (O1.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.1: Strengthening the Legal Framework	1.1.1	Issue Ministerial Decisions that list and ban POPs in products which characteristics have been deemed to contain or potentially contain POPs as considering low POPs limits per the defined by Basel/ Stockholm Convention	MoE	Customs	Products that contain POPs are banned from entry into Lebanon	Internal at MoE		ST	
	1.1.2	Update Law 659 dated 4/2/2005 "Consumer Protection" to integrate green and sustainable chemicals and alternatives including POPs free products and goods	MoET	MoE	Reduced exposure of population to POPs and POPs like containing products and goods	Internal at MoET and MoE		MT	
	1.1.3	Issue a decree replacing Minister of Environment Decision 52/1 dated 29/7/1996 "Definition of standards and maximum allowance limits for the reduction of air, water and soil pollution" and Minister of Environment Decision 8/1 dated 30/1/2001 "Specifications and Standards for air emissions, liquid effluents generated from classified institutions and for waste water treatment plants" to integrate POPs limits in matrices where appropriate and assess emission limit values (ELVs) for UPOPs resulting from major identified sources	MoE	MoI, MoA, MoEW, MoPH, MoL, MoIM, ALI, LIBNOR, private sector, syndicates and laboratories	New standards and ELVs including POPs in relevant matrices and sources are established	External assistance from technical experts with experience in development of ambient standards in different media and ELVs	50,000	ST	Bi-lateral or multi-lateral donors
	1.1.4	Update Minister of Environment Decision 71/1 dated 19/5/1997 "Organization of wastes import" in order to integrate POPs containing waste (new and old POPs) into the list of waste and link them with the related updated HS codes (activity 2.1.2)	MoE	Customs	List of wastes including new and old POPs containing wastes is updated	Internal at MoE and Customs		ST	

Table 38 - Strengthening the legal framework (O1.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.1: Strengthening the Legal Framework	1.1.5	Issue Decree defining the following (Law 444 /2002 - Article 40): - List of harmful and hazardous waste containing product that may harm public health and safety in order to regulate its import, trade, stock, deal, or transport on the Lebanese territory - List of waste that can be a subject to import, trade, stock, deal, or transport on the Lebanese territory - Develop terms and conditions for the import of waste generating materials and products, its entry, trade, stock, usage deals or transport on the Lebanese territory	MoE	MoI, Customs, MoA, MoPH, ALI	Comprehensive restrictions for the import and management of hazardous wastes in Lebanon including POPs containing wastes are included in the national legislation	Hazardous waste management expert and POPs expert	25,000	ST	Bi-lateral or multi-lateral donors
	1.1.6	Issue Decree managing the prior clearance and the monitoring by MoE for import, trade, production, marketing, transport, usage, distribution of hazardous chemicals (Law 444/2002 - Article 44)	MoE	MoI, Customs, MoA	Procedure for MoE prior clearance for the import, trade, production, marketing, transport, usage, distribution of hazardous chemicals is put in place and enforced	Internal at MoE		ST	
	1.1.7	Issue Decree to specify the standards for water quality (surface water, groundwater and drinking water) and the necessary decrees to implement prevention, protection and mitigation measures (Law 444/2002 - Article 36)	MoE	MoA, MoI, MoIM, LIBNOR	Water quality standards in line with international norms including POPs, as applicable, are up-to-date	External technical expert	*Included in 1.1.3*	ST	Bi-lateral or multi-lateral donors

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.1: Strengthening the Legal Framework	1.1.8	Develop the necessary Decrees to set definitions, packaging, transport, storage and disposal requirements (e-waste, end-of-life vehicles, etc.) and to implement the draft law for the integrated management of solid waste as per Decree 8003/ 2012 (ISWML transfer from COM to Parliament) once adopted	MoE	MoIM	Procedures for management of e-waste, special wastes, end-of-life vehicles waste potentially containing POPs are put in place	Hazardous waste management expert	25,000	ST	Bi-lateral or multi-lateral donors
	1.1.9	Develop appropriate legislation to cover: - UPOPs limits in chemicals and products - Management of UPOPs in the relevant chemicals and industries (pesticides, pigments, solvents, general chemicals production, leather, waste oil refineries, …) - Measures to limit UPOPs releases and improve management of UPOPs containing wastes (metal production, waste incineration, and others …) - Set exemptions for low POPs content in accordance with limits set by Basel Convention guidelines - Requirements for POPs containing waste disposal/destruction and management in an environmentally sound manner - Environmental conditions for establishment/ licenses and/or investment of industries that generates POPs or POPs containing waste taking into account the environmentally sound disposal of these wastes - Management of PBDEs and PFOS containing waste	MoE	MoA, MoI	Comprehensive Hazardous waste and chemicals management legislation considering POPs	POPs and industrial experts	25,000	MT	Bi-lateral or multi-lateral donors

Table 38 - Strengthening the legal framework (O1.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.1: Strengthening the Legal Framework	1.1.10	Issue regulation requiring relevant industries that have the potential to release POPs, to submit an annual report on relevant industrial activities including production quantities, industrial processes, chemical inputs, waste generation and discharge rates towards a PRTR or similar system	MoE	MoIM, MoI	Comprehensive databases of industrial processes in the country are established	MoE and MoI staff		ST	
	1.1.11	Assess international flammability regulations and develop national flammability standards for different products (textile, synthetic carpets, paints, foams, mattresses, pillows, furniture, rubber, firefighting PPE, etc.). Standards should include non-flame retardant approaches and list of authorized chemicals to be used as flame retardants	MoE	LIBNOR, MoPH, ALI, MoI, Syndicates	Flammability standards are adopted and issued in official gazette. List of authorized chemicals to be used as flame retardants is issued and approved	National committee of experts		ST	
	1.1.12	Develop standards for firefighting foams that include a list of permitted chemicals to be used	MoE	LIBNOR, MoPH, ALI, Civil Defense, Fire Departments	Firefighting foam standards are adopted and issued in official gazette	National committee of experts		ST	
	1.1.13	Develop environmental conditions covering manufacturing processes, BAT/BEP, and mitigation measures taking into account health and environment for the following industries. Those conditions are also to identify permitted chemicals to be used (POPs alternatives), measures to reduce releases and acceptable treatment/disposal methods including evaluation of the EU IPPC process and BAT/BEP documents:	MoE	MoI, LIBNOR, MoPH, Syndicates, ALI	Environmental Conditions are readily available for industries	BAT expert and POPs expert	75,000	ST	Bi-lateral and multi-lateral donors

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.1: Strengthening the Legal Framework		- Textile - Synthetic carpets - Leather production - Metal plating - Ferrous and non-ferrous metal - Paints and varnish manufacturing - Paper/Pulp - Plastic - Rubber - Furniture - Mattresses and foam - Minerals production - EPS/XPS/PUR							
	1.1.14	Develop waste management conditions covering recycling activities to minimize the amount of POPs that re-enter the market within the establishment of a more circular economy and sustainable consumption and production (SCP)	MoE	MoI, Syndicates, ALI	Reduction in POPs reentering the market through recycled goods is achieved and linked to SCP activities	POPs expert	10,000	MT	Bi-lateral and multi-lateral donors
	1.1.15	Develop guidelines on scrapping end-of-life vehicles including a section on identifying POPs and other hazardous chemicals disposal requirement. To be followed by training for scrapping establishments and exporters on implementation of guidelines	MoE	MoI, MoIM, MoPWT	Improved disposal of end of life vehicles including polymer fraction	POPs expert	10,000	ST	Bi-lateral and multi-lateral donors
	1.1.16	Enforce Article 4 of Law 444/2002 through implementation Decrees for cleaner production techniques, best available technologies, Polluter-Pays Principle and Prevention of natural resources degradation in order to ensure that costs of managing industrial POPs are covered by the industry generating them and the industries receive guidance on how to reduce the generation of POPs	MoE	MoI	Reduction in industrial UPOPs emissions is achieved	CP and BAT experts	100,000	LT	Bi-lateral and multi-lateral donors

Table 39 - Strengthening the institutional framework (O1.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.2: Strengthening the Institutional Framework	1.2.1	Establish a new or adopt an existing institutional mechanism to enhance cooperation and bilateral coordination among ministries related to chemicals management	MoE	MoI, MoA, MoF/Customs, MoPH, MoET	Effective coordination mechanism is put in place	Institutional expert	10,000	ST	Bi-lateral or multi-lateral donors
	1.2.2	Develop a unified database for chemicals management in industries (pilot project) to include a list of all operational industries, their licensing, previous assessments, audits and inspections conducted and historical information on their production rates, processes and emissions. The MoE and MoI databases can be used as a starting point to develop a unified database. The list of industrial and classified establishments should be most importantly developed for the following categories: - Pulp and paper industries - Textile production - Synthetic carpets producers and retailers - Metal platers - Leather refining industries - Plastics manufacturers - Chemical manufacturers and retailers - Paint, coating and varnish producers and retailers - Plastic and rubber producers and retailers - Furniture, mattresses, pillows and foam producers and retailers - EPS/XPS/PUR producers and retailers	MoE	MoI, ALI, OMSAR	Electronic database with secured access for MoE and MoI personnel to all information gathered on industrial activities in the country is operational	IT and database management expert, Industrial expert and Surveyors	450,000	MT	Bi-lateral or multi-lateral donors

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.2: Strengthening the Institutional Framework	1.2.3	Develop unified form for environmental data requirements from industries (pilot project) and integrate it into national processes (such as EIA, Audits, Industrial Certificate, Industrial Licenses, Environmental Compliance Certificate, etc.)	MoE	MoI, ALI	Unified data requirements form that consolidates Lebanon's international commitments and ensures consistent data collection from industrial establishments based on their categories is developed	Internal at MoE		ST	
	1.2.4	Assess local analytical capacity and priority of pollutants to be measured based on their relevance in the country and build capacities of public and semi-public laboratories to test for POPs parameters and SAICM emerging issues and FAO/WHO priorities and receive international accreditation for quality control/assurance for related analysis	MoE	CNRS, MoI, MoA, MoEW	Laboratories have in place capacities able to test for POPs, SAICM emerging chemical parameters and other identified priorities thus received accreditation	Expert in analytical methods	*To be defined after the assessment*	MT	CNRS Bi-lateral donors
	1.2.5	Strengthen the capacities of customs inspection personnel to improve the control and monitoring of the import of banned and mislabeled goods (including implementation of activity 1.1.1)	MoE	Customs	Customs personnel has enhanced competences in identifying goods with potential to contain POPs and are consistently reporting such information	Technical support from POPs expert	10,000	ST	Bi-lateral or multi-lateral donors
	1.2.6	Provide training for MoE and MoI inspection personnel in identifying industrial practices that have the potential to contain and release POPs Chemicals (PCDD/PCDF, PBDE, HBCD, PFOS/PFAS and PCB) and SAICM emerging chemical issues and prepare fact sheets per industrial sector showing the product cycle including recycling and disposal	MoE	MoI	The presence of POPs and (where appropriate) SAICM priority chemicals in locally made products is reduced and/or eliminated	POPs expert	50,000	ST	Bi-lateral and multi-lateral donors

Table 39 - Strengthening the institutional framework (O1.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O1.2: Strengthening the Institutional Framework	1.2.7	Provide training for MoE inspection personnel in identifying industrial practices and wastes/residues that have the potential to contain POPs Chemicals (PBDE, HBCD, PFOS/PFAS and PCB)	MoE		MoE Inspection personnel is actively assessing and reporting the potential presence of POPs	POPs expert	10,000	ST	Bi-lateral and multi-lateral donors

3.3.1.2 Strategic Objective 2: Managing the import and export, production, use, recycling and disposal of Industrial POPs

This strategic objective targets the management of IPOPs and can be achieved through four (4) objectives;

(1) Improve control of import/trade of IPOPs;
(2) Enhance knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks;
(3) Identify and manage IPOPs stockpiles and wastes/residues (current and future) in an environmentally sound and integrated manner; and
(4) Identify, assess and remediate potential contaminated sites including water bodies.

O2.1: Improve control of import/ trade of IPOPs

Improving the control of the import of IPOPs requires;

(1) Elaborating on certain HS codes to better identify products potentially containing POPs;
(2) Cooperate with the Customs Authority on the Global Harmonized System implementation for Lebanon;
(3) Providing training and equipment for customs inspection personnel to identify imported goods and chemicals that have the potential to contain POPs; and
(4) Disseminating information among relevant product importers on the presence of POPs chemicals in certain products.

It also requires taking into consideration Basel Convention definitions of low content POPs in order to effectively channel resources and maximize benefits of outcomes.

O2.2: Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks

Activities in this section can be divided into two (2) types: activities for the management of POPs chemicals and activities for the control. To support this objective, it is recommended to issue regulation (included in O1.1) requiring all industries that have the potential to release POPs to submit an annual report on all industrial activities including production quantities, industrial processes, chemical inputs, waste generation and discharge rates. This is necessary for the continuous monitoring and logging of POPs emissions. This of course, should be done under an overarching framework of chemicals/emissions management and reporting, including POPs similarly to Pollutant Release and Transfer Register (PRTR), which the MoE is currently working on implementing.

As part of the regulation for better management of POPs information, it is recommended to update the list of industries at MoI to clearly distinguish between retailers, distributors, raw material manufacturers and secondary processors in order to easily pinpoint potential emitters. This action is recommended due to barriers faced, during the 2016 assessments phase, in identifying the manufacturers with the potential to release POPs.

One of the main gaps identified during the inventory is the lack of awareness among industrialies, government stakeholders and consumers on the importance of managing, producing and using POPs free products. Increasing awareness is important in order to get the population, government and the private sectors active in the management and reduction of POPs releases. Such an awareness campaign should be conducted in the larger framework of hazardous chemicals as part of sustainable consumption and production principles and implementation. A broader approach such as education on green and sustainable chemistry is recommended and should be promoted.

O2.3: Identify and manage IPOPs stockpiles and wastes / residues (current and future) in an environmentally sound and integrated manner

For the identification and management of IPOPs stockpiles, recommended activities are mainly focused on assessing stockpiles such as end-of-life vehicles, firefighting equipment, and EEE wastes.

During the 2016 assessments, those sectors were not adequately assessed given the limited access to information and lack of resources. Therefore, further elaboration should be done on the identification of the relevant appropriate management approach.

In addition, actions for the identification of feasible options for the collection, recycling, treatment and disposal of these wastes were included.

Whereas regarding PCBs, it was found important to develop a preliminary inventory of PCBs in open applications and to dispose the remaining identified PCB-containing equipment in the power sector. Further training sessions with owners of PCB-containing equipment on the sound management of in-service and out-of-service equipment are also recommended.

O2.4: Identify, assess and remediate potential contaminated sites including water bodies

For potential contaminated sites, actions are based on finding from the 2016 inventory and mainly involve conducting surveys and sampling of sites near the existing industries, the previous industrial sites and fire incidents locations in order to assess the need for remediation and implement remediation plans.

Activities can be organized as follows:

- Build the capacities on the identification and management of POPs contaminated sites;
- Prioritize the POPs contaminated sites based on risk assessment analysis;
- Identify the appropriate and most cost-effective methods to secure and remediate the contaminated sites with the highest risk ranking;
- Restrict access, if needed, the POPs contaminated sites awaiting for remediation;
- Raise awareness on the potential risks generated by POPs contaminated sites;
- Secure and perform remediation and appropriate monitoring of the POPs contaminated sites.

Table 40 - Improve control of import/ trade of IPOPs (O2.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.1: Improve control of import/ trade of IPOPs	2.1.1	Cooperate with the Customs Authority on the Global Harmonized System implementation for Lebanon	MoE	Customs	GHS successfully implemented	Internal		ST	
	2.1.2	Generate sub-sections for national HS codes to distinguish products based on chemical constituents (assess the use of CAS numbers at customs level). This should be done for the following: - Leather, textile, synthetic carpet, paint products that have received applications for fire resistance, water repellency and stain resistance - Expandable foams based on the existence of a flame retardant agent - Used EEE to be distinguished from refurbished and new EEE - Scrap cars to be distinguished from new cars	MoE	Customs	HS codes or CAS number approach for distinguishing products based on chemical constituents are implemented allowing to enhance control of entry of POPs containing products	Internal		ST	
	2.1.3	Provide training for customs inspection personnel on new bureaucratic procedures to be required in a decision issued by MoE and on identifying imported goods and chemicals that have the potential to contain POPs Chemicals (PBDE, HBCD, PFOS/PFAS and PCB) (ref. activities 1.1.1, 1.2.5 and 2.1.2)	MoE	Customs	Customs personnel become competent in identifying goods with potential to contain POPs and consistently reporting such information	MoE staff		ST	
	2.1.4	Provide training and guidelines for the consumer safety inspection unit at the MoET on identifying distributors of POPs containing products and raw materials and develop a reporting mechanism to the MoE for suspected violations	MoE	MoET	MoET consumer safety inspection unit knowledgeable in identifying POPs containing product and consistently reporting violations	MoE staff		MT	

Table 40 - Improve control of import/ trade of IPOPs (O2.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.1: Improve control of import/ trade of IPOPs	2.1.5	Identify and secure scanning equipment (such as WD-XRF machines or equivalent) and provide training for personnel on equipment usage to test materials for the presence of heavy metals and chemicals such as brominated and fluorinated POPs and SAICM emerging chemicals	MoE	Customs	Screening tools made available at MoE and Customs	MoE and Customs staff	*100,000 for 4 machines*	MT	Bi-lateral donors
	2.1.6	Information dissemination among relevant product importers on the presence of POPs chemicals in certain products, the impact of such product on health and environment and information on what products can be imported as an alternative	MoE	Customs, MoPH, MoI, MoA	Product importers are more knowledgeable and aware about the chemical constituent of products and their risks	POPs expert	30,000	ST	Bi-lateral donors
	2.1.7	Establish restrictions for the import of donated utility vehicles manufactured before 2004	MoE	Customs	Donated utility vehicles are assessed for PBDE	MoE staff		ST	

Table 41 - Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks (O2.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.2: Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks	2.2.1	Update the list of industries in collaboration with MoI to clearly distinguish between retailers, distributors, raw material manufacturers and secondary processors	MoE	MoI, Syndicates, ALI	Comprehensive list of industries that clearly segregates establishments from the different parts of the value chain is compiled	Expert	10,000	ST	Bi-lateral and multi-lateral donors
	2.2.2	Conduct training sessions and awareness raising activities for industries (textile, paints, rubber, furniture, leather, paper and packaging) on choosing appropriate chemicals for manufacturing including those that are free of POPs chemicals (following activity 1.1.13)	MoE	MoI, Syndicates, ALI	Producers are more knowledgeable and aware of the chemical inputs and available alternatives (alternative assessment and green/ sustainable chemistry)	POPs expert	25,000	ST	Bi-lateral and multi-lateral donors
	2.2.3	Raise awareness and provide training for environmental auditing and assessment consultancies on how to identify the use of POPs chemicals and what are appropriate chemicals to be used as an alternative	MoE		EA submitted to MoE to contain information on the use of POPs and alternatives recommended	POPs expert	10,000	ST	Bi-lateral and multi-lateral donors
	2.2.4	Raise awareness among consumers on the presence of hazardous chemicals in products including POPs	MoE	MoPH, MoET	Reduced demand for products containing POPs is achieved	POPs expert and communications expert	50,000	MT	Bi-lateral and multi-lateral donors
	2.2.5	Raise awareness among government stakeholders on the importance of tackling the use of POPs containing chemicals in industries and how to support industry in moving towards a POPs free production	MoE	MoI, MoPH, MoA, MoIM, MoF	Increase in POPs related projects and initiatives is achieved	POPs expert and communications expert	*included in 2.2.4*	MT	Bi-lateral and multi-lateral donors

Table 41 - Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks (O2.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.2: Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks	2.2.6	Survey and sample concerned industries for the: (1) presence of PFOS/PFAS (paints, paper, leather, synthetic carpet, metal-plating, rubber and textile industries) in output products and in manufacturing site, (2) presence of HBCD (EPS/XPS/PUR and Textile, especially for industries that use recycled materials); and (3) presence of PBDE (furniture manufacturers, foam mattresses, textiles and rubber, especially important for industries that use recycled materials)	MoE	MoI	Better understanding of the extent of use of PFOS/PFAS, HBCD, and PBDE containing products	POPs expert and Laboratories	300,000	MT	Bi-lateral and multi-lateral donors

Table 42 - Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner (O2.3)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.3: Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner	2.3.1	Assess stockpiles of firefighting equipment and foams and their POPs content at the Civil defense, Fire department and national army or any other identified institutions	MoE	Fire department, civil defense, national army	Comprehensive inventory of existing firefighting equipment stockpiles is carried out	MoE staff		ST	
	2.3.2	Develop National EEE Inventory that (1) assess the types and quantities of EEE (Electrical and Electronic Equipment) waste generated, recovered and disposed of, (2) assess the restricted flame retardants present in EEE plastic and related recycling and (3) identify feasible options for the collection, recycling, treatment and disposal of EEE waste (to encompass all other hazardous chemicals including POPs in their life cycle (SAICM) and to recover resources)	MoE	MoI, importers and syndicates	National EEE inventory is carried out and effective management scheme of EEE wastes is developed	External surveyors, EEE expert	150,000	MT	Bi-lateral and multi-lateral donors
	2.3.3	Assess the presence of POPs and other pollutants in end of life vehicles through testing and sampling existing decommissioned stocks	MoE	MoPWT	Better understanding of presence of PBDE	Laboratory analysis	50,000	LT	Bi-lateral and multi-lateral donors
	2.3.4	Develop in-depth preliminary inventory of PCBs in open applications	MoE	MoI, MoPWT, MoEHE, MoC	Inventory of PCBs in open applications	Technical PCB consultant	250,000	MT	Bi-lateral and multi-lateral donors
	2.3.5	Disposal of remaining identified PCB containing equipment in power sector	MoE	MoEW, EDL, industries	PCBs containing equipment exported and properly disposed	Technical PCB consultant	2,000,000	MT	Bi-lateral and multi-lateral donors

Table 42 - Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner (O2.3)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.3: Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner	2.3.6	Carrying out further training sessions with PCB equipment owners on sound management of in-service and out-of-service PCB equipment	MoE	MoEW, EDL	Training sessions for owners of PCBs equipment are carried out	Technical PCB consultant	50,000	ST	Bi-lateral and multi-lateral donors
	2.3.7	Raise awareness and provide training for waste management companies on the identification of waste that have the potential to contain POPs and other hazardous chemicals and the proper handling of these materials	MoE	MoIM	Waste management facilities effectively segregating hazardous chemicals from waste stream	Waste management expert	25,000	ST	Bi-lateral and multi-lateral donors

Table 43 - Identify, assess and remediate potential contaminated sites including water bodies (O2.4)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O2.4: Identify, assess and remediate potential contaminated sites including water bodies	2 .4.1	Conduct national survey on potentially POPs contaminated sites and sampling, taking into consideration all the existing industries and fire incidents locations for the following types of industries: - Metal Industries - PCB use, storage and disposal - Pulp and paper industries - Textile production - Synthetic carpets producers - Metal platers - Leather production and refining industries - Wood treatment sites - Plastics and rubber manufacturers - Chemical manufacturers and retailers - Paint, coating and varnish producers and retailers - Firefighting foam use - Furniture, mattresses, pillows, and foam producers - EPS/XPS/PUR producers - Incinerators	MoE	MoI, Civil Defense, Fire departments	Identification of contaminated sites of POPs and other pollutants related to the respective industries is carried out	Surveyors Laboratories	250,000	LT	Bi-lateral and multi-lateral donors

3.3.1.3 Strategic Objective 3: Controlling and gradually reducing unintentionally released POPs

Strategic Objective 3 aims at controlling and gradually reducing unintentionally released POPs through the implementation of three (3) main objectives:

(1) Controlling and gradually reducing unintentionally released POPs,

(2) Identify and manage UPOPs wastes/residues (current and future) in an environmentally sound and integrated manner, and

(3) Identify, assess and remediate potential contaminated sites.

O3.1: Controlling and gradually reducing unintentionally released POPs

The control and reduction of unintentionally released POPs cover many sectors, thus actions had been developed to;

- Require the enforcement of existing regulation for the proper treatment of waste,
- Set environmental conditions and ELVs,
- Develop databases for different sectors,
- Support relevant industries in adopting BEP/BAT, and
- Conduct surveys, assessments and sampling of sectors that needed further investigation based on the 2016 POPs inventory results.

One of the main recommended actions is to require all industries that have the potential to release or use POPs to submit an annual report on all industrial activities including production quantities, industrial processes, chemical inputs, waste generation and discharge rates (refer to possible PRTR mentioned under O2.2). This is crucial for the close monitoring of POPs emissions and it is to be accompanied by a database to easily store and retrieve information.

While most actions are aimed to address general POPs issues, some are aimed to address specific management deficiencies such as the need for an improved database for transport sector including information on current vehicles on the road, their country of origin and of manufacturing and ensure differentiation between trucks, buses and mini-buses. This is necessary for the calculation of POPs emissions from vehicles.

O3.2: Identify and manage UPOPs wastes/residues (current and future) in an environmentally sound and integrated manner

Three priority activities had been identified for this objective:

- Establish a comprehensive national inventory of all types of fire events including those in vehicles, houses, industrial buildings, warehouses, showrooms, forest fires, grassland fires, and agricultural fires. The Database should include information on the size of the fire, the chemical used / foam type to extinguish it and the type and amount of materials burned;
- Assess the presence of POPs in sediments at river outlets especially near industries and in the ports and develop inventory of sediment dredging operations including the quantity of material removed and their disposal location and determine need for remediation; and
- Map out vulnerable segments of the population that are susceptible to open burning of waste (ex. schools, hospitals, etc.) to determine priority areas of intervention.

O3.3: Identify, assess and remediate potential contaminated sites

Actions under this objective involve the development of a database for contaminated sites from concerned industries such as ferrous and mineral production to determine need for remediation. In addition, actions recommend the sampling of water bodies and soil near contaminated sites and contamination sources for the presence of PCDD/PCDF and other unintentional POPs and determine need for remediation.

Table 44 - Controlling and gradually reducing unintentionally released POPs (O3.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O3.1: Controlling and gradually reducing unintentionally released POPs	3.1.1	Develop a database for transport sector including information on current vehicles on the road, their country of origin and of manufacturing. Ensure differentiation between trucks, buses and mini-buses	MoPWT	MoE, Customs	Comprehensive database for transport sector that is compiled into an annual report is developed	Database expert	30,000	MT	Bi-lateral and multi-lateral donors
	3.1.2	Conduct in depth assessment of leather and textile and other manufacturing sector to identify the use of UPOPs containing chemicals (e.g. PCP, Chloranil and other hazardous chemicals) and support concerned industrials in shifting towards POPs free and low-POPs alternatives	MoE	MoI, ALI, Syndicates	Identification of all leather and textile manufacturers using PCP and other hazardous chemicals and promoting the use of alternatives	Chemical engineers/Industrial engineers	25,000	MT	Bi-lateral and multi-lateral donors
	3.1.3	Conduct survey of the national consumption of biomass for domestic heating and cooking	MoE	MoA, MoEW	National consumption of biomass for domestic heating and cooking is known	Surveyors	100,000	MT	Bi-lateral and multi-lateral donors

Table 45 - Identify and manage UPOPs wastes/residues (current and future) in an environmentally sound and integrated manner (O3.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O3.2: Identify and manage UPOPs wastes/residues (current and future) in an environmentally sound and integrated manner	3.2.1	Establish a comprehensive national inventory of all types of fire events including those in vehicles, houses, industrial buildings, warehouses, showrooms, forest fires, grassland fires, and agricultural fires. The Database should include information on the size of the fire, the chemical used to extinguish it and the type and amount of materials burned	MoIM	MoE, AFDC, Civil Defense, Fire departments	Comprehensive database that is compiled into an annual report	Surveyors	25,000	ST	Bi-lateral and multi-lateral donors
	3.2.2	Assess the presence of POPs in sediments at river outlets especially near industries and in the ports and develop inventory of sediment dredging operations including the quantity of material removed and their disposal location and determine need for remediation	MoE	MoPWT, MoIM, MoEW, NCRS	Extent of sediments contamination with POPs at river outlets is determined	Surveyors	200,000	MT	Bi-lateral and multi-lateral donors
	3.2.3	Map out vulnerable segments of the population that are susceptible to open burning of waste (ex. schools, hospitals, etc.) to determine priority areas of intervention	MoE	MoPH, MoSA, MoEHE	Priority areas for intervention are identified	GIS expert	50,000	ST	Bi-lateral and multi-lateral donors

Table 46 - Identify, assess and remediate potential contaminated sites (O3. 3)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O3.3: Identify, assess and remediate potential contaminated sites	3.3.1	Develop an e-platform for the exchange of data and information on UPOPs contaminated sites, their presence in the country, their geographical distribution, and their management. Database should include contaminated sites from the industries listed below to determine need for remediation. Potential contaminated sites to include previous production sites and waste disposal locations. - Ferrous and Non-Ferrous industries - Ceramic, Brick, Glass, Asphalt Mixing - Pulp and paper, Leather, textile	MoE	MoI, ALI, MoPH, MoA, Syndicates, MoIM	Database for national UPOPs waste generation and management practices established and contaminated sites are identified along with their need for remediation	IT expert, waste management expert, surveyors and remediation expert	300,000	MT	Bi-lateral and multi-lateral donors
	3.3.2	Conduct sampling and testing of: (1) soil near land emitting PCDD/PCDF generating industries and municipal compost application sites, and (2) water bodies near contaminated sites and contamination sources for the presence of PCDD/PCDF and other unintentional POPs, and determine need for remediation	MoE	MoA, MoI	Contaminated sites are identified and need for remediation is determined	Surveyors and remediation expert	300,000	LT	Bi-lateral and multi-lateral donors

3.3.1.4 Strategic Objective 4: Managing the import, trade, use, and disposal of POPs pesticides

This strategic objective aims at ensuring the country remains free of POPs pesticides.

This is achieved through four (4) main objectives:

(1) Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides;
(2) Strengthen the capacity of public institutions in the management of POPs pesticides;
(3) Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner; and
(4) Identify, assess and remediate potential contaminated sites including water bodies.

O4.1: Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides

Activities in this section are mainly focused on conducting assessments including sampling and testing, identification of alternatives and promoting better agricultural practices. This should be done under the framework of hazardous pesticides and not only POPs pesticides, as per FAO initiatives.

In order to improve the control of POPs pesticides, an action is proposed for the enhancement of the inspection of pesticide outlets and distribution retailers with respect to labeling requirements, expiry dates and related standards.

This should also be accompanied by a detailed assessment including sampling and testing on crops, and products to establish the extent of use of POPs pesticides in Lebanon. These recommendations are based on observations made during the 2016 POPs Pesticides assessment.

Cost-benefit analysis for alternatives to POPs pesticides (and possibly highly hazardous pesticides) is important to justify incentives for such alternatives to make them more affordable to farmers. This action is important to ensure that recommendations for alternatives are economically viable for farmers and can effectively be supplied.

In order to encourage farmers and suppliers to choose alternatives, a recommendation was made to develop and implement a nation-wide awareness program (with focus on Akkar and Bekaa) on the impacts of pesticides and their alternatives (including POPs pesticides); targeting the entire supply chain from distributors to users.

O4.2: Strengthen the capacity of public institutions in the management of POPs pesticides

Actions mainly cover strengthening the capacity of MoA personnel in different departments to maintain and ensure the necessary competence in managing pesticides (including POPs pesticides).

One action is for increasing the capacity of all the regional staff of the MoA as well as custom officers regarding POPs pesticides, which will allow for better management of POPs containing goods and an increase in awareness among farmers on the impacts of POPs.

While raising awareness and providing training, building the capacities of the laboratories to be both accredited and able to analyze wider range of POPs pesticides is crucial.

In parallel to assessing and analyzing stockpiles, it is recommended to strength capacity of MoA to be able to implement the FAO's Pesticides Stockpiles Management System (PSMS) database; this recommendation is based on findings of the 2016 POPs assessment and feedback from MoA representatives stating the lack of a database as a major monitoring gap.

O4.3: Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner

This objective includes actions for conducting surveys, assessments and for developing guidelines and necessary infrastructure to manage POPs Pesticides stockpiles.

Accordingly, there is the need to update the national survey for stockpiles of Pesticides (including POPs Pesticides) in Lebanon as a prerequisite database for planning an appropriate environmentally sound destruction of those identified stockpiles at the customs facilities and elsewhere. This activity is a response for a need to ensure a proper disposal of the pilling up stockpiles of pesticides nationally.

Actions also include an assessment of the feasibility of establishing a collection system of obsolete and illegal pesticides (including POPs) and the assessment of modes of implementation. This will also require an infrastructural improvement that should be assessed.

It is recommended also to assess the viability of treatment/disposal options of used empty containers in Lebanon. Last but not least, and in order to ensure the proper disposal of POPs pesticide wastes, it is recommended to develop and disseminate environmental guidelines for the safe disposal of pesticides (including POPs) wastes and management of stockpiles, preferably in the framework of highly hazardous pesticides to add further value to the initiative.

O4.4: Identify, assess and remediate potential contaminated sites including water bodies

The actions under this objective include conducting a nationwide survey focusing on potential hotspots to assess the existence and level of contamination with POPs pesticides including sampling and analysis of soil and groundwater at hotspot areas. If contamination is identified based on the assessment, remediation of these sites would be then required. Technical guidelines for the remediation of POPs pesticides identified contaminated areas are recommended to be developed.

Table 47 - Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides (O4.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O4.1: Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides	4.1.1	Enhance inspection of pesticides outlets and distribution retailers with respect to labeling requirements, expiry dates and related standards	MoA	MoET, MoIM	Better control of the pesticides market is achieved	Internal		ST	
	4.1.2	Conduct detailed assessments including sampling and testing in crops and products, to establish the extent of use of POPs pesticides that are not officially used in Lebanon	MoA	MoE	Understanding of the potential use of POPs Pesticides is improved	Researchers and laboratories	200,000	ST	Bi-lateral and multi-lateral donors
	4.1.3	Conduct cost-benefit analysis for alternatives to POPs pesticides and highly hazardous pesticides	MoA	MoE	CBA is available to lobby with policy makers on the adoption of mechanisms to encourage the use of alternatives to POPs pesticides	Agriculture economists	100,000	ST	Bi-lateral and multi-lateral donors
	4.1.4	Establish a mechanism to encourage the use of alternatives in the country based on the results of the CBA	MoA	MoE, MoF	Mechanisms to encourage use of alternatives to POPs pesticides is established	Economists, Fiscal experts, financial experts	100,000	ST	Bi-lateral and multi-lateral donors
	4.1.5	Promote and enhance the good agricultural practices such as organic farming and Integrated Pest Management (IPM)	MoA		Good agricultural practices are promoted	Internal		ST	
	4.1.6	Develop and implement a nation-wide awareness program (with focus on Akkar and Bekaa) on the impacts of POPs pesticides and other highly hazardous pesticides and the alternatives to pesticides available (targeting the entire supply chain from distributors to users (farmers))	MoA	MoE	Awareness on the impacts of POPs pesticides and other highly hazardous pesticides to health is increased	Communication experts	100,000	MT	Bi-lateral and multi-lateral donors

Table 48 - Strengthen the capacity of public institutions in the management of POPs pesticides (O4.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O4.2: Strengthen the capacity of public institutions in the management of POPs pesticides	4.2.1	Build the capacity of all the regional staff of the MoA as well as custom officers regarding POPs pesticides	MoA	MoE, Customs	Staff is well informed on the control of POPs pesticides	POPs expert, communication expert	50,000	ST	Bi-lateral and multi-lateral donors
	4.2.2	Build the capacity of LARI to be able to analyze POPs Pesticides	MoA, LARI		Laboratories are available for accurate and reliable testing POPs pesticides	Researchers, technicians	*To be determined following needs assessment*	ST	Bi-lateral and multi-lateral donors
	4.2.3	Strengthen the capacity of MoA to be able to implement the FAO's Pesticides Stockpiles Management System (PSMS) database	MoA		PSMS database is implemented	Technicians, researchers and inspectors		ST	FAO
	4.2.4	Build the capacity of Phyto-pharmacy Laboratory (Kfarshima laboratory) to obtain an accreditation (17025 - Standards and reference for quantitative testing as an example)	MoA		Laboratories are accredited	Researchers, technicians	400,000 *over 4 years*	ST	Bi-lateral and multi-lateral donors

Table 49 - Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner (O4.3)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O4.3: Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner	4.3.1	Update the national survey for stockpiles of pesticides (including POPs Pesticides) in Lebanon and destruction in an environmentally sound manner	MoA	MoE	Pesticides stockpiles are identified	Scientific expertise and service provider for the treatment	200,000 *(excluding destruction)*	MT	Bi-lateral and multi-lateral donors
	4.3.2	Assessment of the existing pesticides stockpiles (including POPs Pesticides) present at the customs facilities and destruction in an environmentally sound manner	MoE	Customs, MoA	Stockpiles are identified and eliminated	Scientific expertise and service provider for the treatment	25,000 *(excluding destruction)*	ST	Bi-lateral and multi-lateral donors
	4.3.3	Assess the feasibility of establishing a collection system of obsolete, counter fight and illegal pesticides (including POPs), including of empty containers, and assess modes of implementation	MoA	MoE, MoIM	Safe collecting system is set and operational	Private service provider	100,000	ST	Bi-lateral and multi-lateral donors
	4.3.4	Establish infrastructures for storage of obsolete, counter fight and illegal pesticides based on the outcomes of 4.3.3	MoA	Customs, MoE	A specialized collecting unit and center for a better disposal of pesticides created	Private service provider, MoA staff	*To be determined following 4.3.3*	MT	Private sector, financing institutions
	4.3.5	Assess the viability of treatment/disposal options of used containers in Lebanon (e.g. decree tackling rinsing and puncturing of empty containers with some incentives such as giving money back for returned empty containers and penalties)	MoA	MoE	Viability of treatment/ disposal options are established	Waste management expert, economists, legal expert	50,000	ST	Bi-lateral and multi-lateral donors
	4.3.6	Develop and disseminate national environmental guidelines for the safe disposal of pesticides including POPs pesticides wastes and management of stockpiles	MoE	MoA	Guidelines are developed and published for every stakeholder to use	Consultants for guidelines, communication expert	50,000	MT	Private sector, financing institutions

Table 50 - Identify, assess and remediate potential contaminated sites including water bodies (O4.4)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O4.4: Identify, assess and remediate potential contaminated sites including water bodies	4.4.1	Conduct a nationwide survey focusing on potential hotspots to assess the level of contamination with POPs pesticides; this shall include former storage and use sites and main river basins with focus on Estouane, Aarqa and Bared in Akkar and Litani in Central Bekaa as well as sampling and analysis of soil and groundwater at hotspot areas	MoE	MoA	Areas contaminated with POPs pesticides are identified and need for remediation is determined	Researchers and laboratories	250,000 *excluding remediation*	ST	Bi-lateral and multi-lateral donors
	4.4.2	Develop national guidelines for the remediation of contaminated sites	MoE	MoA	Guidelines are published for every stakeholder to use	Remediation expert	25,000	MT	Bi-lateral and multi-lateral donors
	4.4.3	Develop and implement a remediation program in case of identification of contaminated sites	MoE	MoA	Contaminated sites are remediated	Remediation expert	*To be determined based on outcomes of 4.4.1*	MT	Bi-lateral and multi-lateral donors

3.3.1.5 Strategic Objective 5: Promoting research related to POPs chemicals

O5.1: Establish a cooperation framework between Government and academia/research centers thus POPs research supports policymaking

This involves establishing a cooperation framework between Government and academia/research centers thus POPs research supports policy making and establish funding mechanism for research. This action is necessary to ensure optimal allocation of resources and the development of science-based legislative decisions.

O5.2: Identify priority research areas related to POPs and other hazardous chemicals and coordinate with academia to ensure these areas are effectively covered

Given the limited financial and human resources allocated to POPs, an important step in managing research is to identify priority research areas such as health costs of endocrine disruptors, impacts on biodiversity and reproduction, POPs levels in food, human body and the environment and coordination of research at a national level to promote coordinated research in the field. Also stimulate research on green and sustainable chemistry and alternative assessment.

O5.3: Disseminate research on POPs nationally

Action under this objective involves the organization of a bi-annual conference on waste management or health and environment, including sessions on POPs management in Lebanon and making available the existing research at the national and the regional level.

Table 51- Establish a cooperation framework between Government and Academia/Research centers thus POPs research supports policymaking (O5.1)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O5.1: Establish a cooperation framework between Government and Academia/Research centers thus POPs research supports policy making	5.5.1	Establish a cooperation framework between Government and academia/ research centers thus POPs and alternatives research supports policy making and establish funding mechanism for research	NCSR	MoE, MoPH, LAAS, MoA, MoI, MoE-HE, MoF	Research supports policy making related to POPs management and phase out				

Table 52 - Identify priority research areas related to POPs and other hazardous chemicals and coordinate with academia to ensure these areas are effectively covered (O5.2)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O5.2: Identify priority research areas related to POPs and other hazardous chemicals and coordinate with academia to ensure these areas are effectively covered	5.2.1	Identify priority research areas such as health costs of POPs and other endocrine disruptors, impacts on biodiversity and reproduction, POPs levels in food, human body and the environment and coordination research at a national level	NCSR	MoE, MoPH, LAAS, MoA, MoI, MoEHE, MoF, Customs	National Research Program for POPs management is established and implemented				

Table 53 - Disseminate research on POPs nationally (O5.3)

Objective (O)	Activity ID	Activities	Lead Implementer	Supporting Agencies	Outcome	Human and Technical Resources	Financial Resources (USD)	Timeframe (ST/MT/LT)	Potential Sources of Funds
O5.3: Disseminate research on POPs nationally	5.3.1	Organize a bi-annual conference on chemicals and waste management (including POPs) in Lebanon and make available the existing research at the national and the regional level as well as peer reviewed publications	NCSR	MoE, MoPH, LAAS, MoA, MoI, MoEHE, MoF, Customs	A biannual chemicals and waste management conference (including POPs) is organized				

3.3.1.6 Strategic Objective 6: Monitoring, Evaluation and Reporting

Pursuant to the requirements under Article 15 of Stockholm Convention, the aim of this strategic objective is to report to the COP and Secretariat on:

1) Measures that were undertaken to implement the provisions of the SC and their effectiveness in meeting the obligations of this convention;
2) Data or data estimates on the quantities of production, import and export, as well as countries of origin, and destination, of the Annex A and Annex B chemicals.

Thus, in order to meet the obligations of the Convention, reporting on the activities related to POPs management at the national level is to be done, mainly including;

- Develop and submit national reports to the Conference of the Parties, in accordance with Article 15 of the Convention, and reply to other requirements of the Convention Secretariat;
- Develop reports and updates on the elimination and reduction of POPs use and releases;
- Develop a report on the progress of PCB eliminating status;
- Update the National Implementation Plan for the newly listed POPs in 2015 (PCP, PCNs, HCBD) and upcoming POPs in 2017;
- Develop periodic reports to the Government on the implementation status of the NIP;
- Develop a report on the adjustments/updates needed by the NIP taking into account the new requirements of the Convention and particularities of practical implementation.

This SO6 will be carried out by the NIU in close coordination and cooperation with all related stakeholders specifically with the appointed SC focal point at the Ministry of Environment.

3.3.2 Prioritization of Objectives

After the development of the action plan, a workshop was organized on 6 March 2017 by the MoE for the Steering Committee, Thematic Task Teams and other related stakeholders to review the recommended actions and prioritize the objectives listed in the action plan. The purpose of the prioritization is to allow the development of an effective plan for implementation of the NIP and the use of resources.

3.3.2.1 Prioritization Criteria

A scoring scheme had been developed for each sub-criterion. The total score reached after the evaluation ranged between 0 and 24 points; the final prioritization is translated as follows:

1. **High Priority** are issues that have received a score between 18-24 points
2. **Medium Priority** are issues that have received a score between 11-17 points
3. **Low Priority** are issues that have received a score below 10 points

Table 54 - Prioritization Criteria

Prioritization Criteria	Sub-Criteria and Scoring			
Feasibility	Availability of national/internal human resources and expertise to achieve the objective	**Yes**: 2 **Partially**: 1 **No**: 0	Constraints may hinder the achievement of the objective (including legal constraints)	**Yes**: 0 **Partially**: 1 **No**: 2
Financial	Financial requirements to achieve the objective	**High** *(more than USD 2,000,000):* 0 **Medium** *(between USD 500,000 and USD 2,000,000):* 1 **Low** *(less than USD 500,000):* 2	Availability of financial resources (how easy is it to mobilize financing)	**High**: 2 **Medium**: 1 **Low**: 0
Health and Environment	Expected public health benefits	**High**: 2 **Medium**: 1 **Low**: 0	Inaction leads to serious impact on the environment	**High Impact**: 2 **Medium Impact**: 1 **Low Impact**: 0
Socio-economic Impacts	Ability to generate socio-economic benefits	**High**: 2 **Medium**: 1 **Low**: 0	Likelihood to negatively affect the vulnerable or small businesses	**High**: 0 **Medium**: 1 **Low**: 2
Efficiency & Effectiveness	Duration to implement the objective's actions	**Long** *(more than 5 years):* 0 **Medium** *(2 to 5 years):* 1 **Short** *(less than 2 years) :* 2	How rapidly can the targets of the objective be felt?	**Immediate**: 2 **Medium-term** *(within 5 years):* 1 **Long-term** *(more than 5 years):* 0
Urgency	Objective is a prerequisite or supports the achievement of other objectives	**Yes**: 2 **Partial**: 1 **No**: 0	Inaction might lead to non-compliance to international obligations	**Yes**: 2 **Partial**: 1 **No**: 0

The rationale behind the scoring mechanism was to provide a rating scale for each sub-criteria that will translate into a priority ranking.

For example, for "Availability of national/internal human resources and expertise to achieve the objective"; if the answer is "Yes", then it is ranked as "2" and will translate positively on the priority of a certain objective given the availability of the necessary technical resources.

On the other hand, for "Likelihood to negatively affect the vulnerable or small businesses"; if the answer is "Yes", then it is ranked as "0" so that it would negatively impact the priority of a certain objective since it may have unintended consequences

3.3.2.2 Prioritization Results

The results of the prioritization exercise showed that nearly all the objectives were identified as medium to high priority. The highest considered priority for each

POPs category is as below:

- POPs Pesticides – O4.1 “Encourage the use of alternatives to POPs Pesticides while promoting best practices and reducing demand for potential smuggling of POPs Pesticides”;
- UPOPs – O3.1 “Controlling and gradually reducing unintentionally released POPs”;
- IPOPs – O2.1 “Improve control of import/trade of IPOPs”;

Noting that, during the mentioned-above prioritization exercise, the Objective O3.1 included the following activities (1.1.10, 1.1.16, 1.1.13 and 2.2.3). But after the final review and compilation of the action plan, and in accordance to the feedback of steering committee members, these activities were integrated in the objectives O1.1 and O2.2.

Tables 55, 56 and 57 below show the results of the prioritization exercise carried on by all the relevant stakeholders. The complete prioritization result provided during the workshop by all stakeholders is available in Appendix B.

Table 55 - POPs pesticides prioritization

Strategic Objective	Objective		Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	17	Medium
	O1.2: Strengthening the institutional framework	17	Medium
SO4: Managing the import, trade, use, and disposal of POPs pesticides	O4.1 Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides	19	High
	O4.2: Strengthen the capacity of public institutions in the management of POPs pesticides	18	High
	O4.3: Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner	15	Medium
	O4.4: Identify, assess and remediate potential contaminated sites including water bodies	15	Medium
SO5: Promoting research related to POPs chemicals	O5.1: Establish a cooperation framework between Government and academia/ Research centers thus POPs research supports policy making	17	Medium
	O5.2: Identify priority research areas related to POPs and other hazardous chemicals and coordinate with academia to ensure these areas are effectively covered	17	Medium
	O5.3: Disseminate research on POPs nationally	17	Medium

Table 56 - UPOPs prioritization

Strategic Objective	Objective		Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	15	Medium
	O1.2: Strengthening the institutional framework	15	Medium
SO3: Controlling and gradually reducing unintentionally released POPs	O3.1: Controlling and gradually reducing unintentionally released POPs	16	Medium
	O3.2: Identify and manage UPOPs wastes/ residues (current and future) in an environmentally sound and integrated manner	15	Medium
	O3.3: Identify, assess and remediate potential contaminated sites	11	Medium

Table 57 - IPOPs prioritization

Strategic Objective	Objective		Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	14	Medium
	O1.2: Strengthening the institutional framework	12	Medium
SO2: Managing the import and export, production, use, recycling and disposal of Industrial POPs	O2.1: Improve control of import/ trade of IPOPs	17	Medium
	O2.2: Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks	13	Medium
	O2.3: Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner	10	Low
	O2.4: Identify, assess and remediate potential contaminated sites including water bodies	10	Low

3.4 Timetable And Resource Requirements

NIP implementation shall be distributed into three 3-year plans addressing the identified short-term actions, medium-term actions and long-term actions.

This will allow a gradual approach to NIP implementation as follows:

- First NIP Implementation Period: 2018-2020 (Short Term);
- Second NIP Implementation Period: 2021-2023 (Medium Term);
- Third NIP Implementation Period: 2024-2026 (Long Term)

Table 58 summarizes the resourcing for the NIP for each of the three proposed periods, considering the following financial resources requirements:

1. **Activities budget:** this is based on the estimated budget for each activity in the action plan; these budgets are largely based on professional judgment based on similar work con-

ducted in Lebanon and abroad; these budgets were discussed and validated with stakeholders; some values were actually provided by stakeholders based on previous assessments conducted (e.g. Activity 4.2.4),

2. **Operational budget:** this is the estimated budget for the NIU based on salaries of staff (for instance Project Manager, Project Assistant) and estimation of running costs for the unit; NIU costs are based on similar project support units established in Lebanon in the past; this budget is allocated to Implementation Package 1 (technical assistance),
3. **Management budget and contingency:** this is an agency fee assuming NIP implementation will be managed by an international agency; a 10% margin has been added to the budget to account for management fees and budget contingency.

Whereas regarding the milestones and performance indicators of each activity, these latters had been elaborated in the action plan *(section 3.3.1)*.

NIP implementation can be gradually rolled up starting with the short-term activities under IP1 for a budget of about USD 620,000. This will enable mobilization of further resources to start implementing the other implementation packages.

Table 58 - Financial resources for NIP implementation

Implementation Period	Implementation Package	Activity Budget (USD)	Operational Budget (USD)	Management and Contingency Budget (USD)	Total (USD)
2018-2020 (ST)	IP1	265,000	300,000	56,500	621,500
	IP2	225,000	-	22,500	247,500
	IP3	1,275,000	-	127,500	1,402,500
	Sub-Total 1	**1,765,000**	**300,000**	**206,500**	**2,271,500**
2021-2023 (MT)	IP1	485,000	300,000	78,500	863,500
	IP2	3,505,000	-	350,500	3,855,500
	IP3	375,000	-	37,500	412,500
	Sub-Total 2	**4,365,000**	**300,000**	**466,500**	**5,131,500**
2024-2026 (LT)	IP1	100,000	300,000	40,000	440,000
	IP2	600,000	-	60,000	660,000
	IP3	-	-	-	-
	Sub-Total (3)	**700,000**	**300,000**	**100,000**	**1,100,000**
	TOTAL (USD)	**6,830,000**	**900,000**	**773,000**	**8,503,000**

Note 1: budgets do not include remediation or destruction costs, except for PCBs under IP2 (MT); these costs will depend on the confirmation of contaminated sites and the need for the remediation, as well as number of equipment / products requiring destruction.

Note 2: this is the estimated budget for activities where external financial assistance may be required; several other activities shall be conducted by government personnel directly and using government resources.

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APPENDICES

APPENDIX A - Record of Stakeholder and Public Consultation

Summary of consultation meetings

Ref	Date	Type	Objective	Involved Parties
01	28/07/2015	Inception workshop	Initiation of the project activities with the identified stakeholders	Stakeholders
02	25/11/2015	Steering committee meeting	Updating the Steering Committee on the project progress and discussion of the Workplan, Budget, Procurement Plan …	Steering Committee
03	26-28/01/216	Training workshop	Updating inventory of initial and new POPs	- Steering Committee - Thematic Task Teams - Stakeholders
04	02/06/2016	Round table discussion	POPs Pesticides Assessment Report	- Steering Committee - Thematic Task Teams - Stakeholders
05	02/06/2016	Round table discussion	Regulatory and Institutional Framework Assessment Report	- Steering Committee - Thematic Task Teams - Stakeholders
06	05/10/2016	Round table discussion	POPs Industrial Chemicals and POPs Unintentionally Released Chemicals Assessment Report	- Steering Committee - Thematic Task Teams - Stakeholders
07	30/11/2016	Training workshop	Roadmap to National Implementation Plan on POPs for SC	- Steering Committee - Thematic Task Teams - Stakeholders
08	23/01/2017	Steering committee meeting	NIP development work plan, actions priorities, and multi-criteria assessment methodology	Steering Committee
09	06/03/2017	Round table discussion	Strategy Development – POPs National Implementation Plan	- Steering Committee - Thematic Task Teams - Stakeholders

Ref 02	25 November 2015	Steering Committee Meeting

First Steering Committee Meeting

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
1	Chantal Akl	MoI	2	Dahlia Mansour	MoPH
3	Fatima Haraki	EDL	4	Jihad Ghadieh	EDL
5	Joelle Nacouzi	LCA	6	Lama Haidar	MoA
7	Maya Abi Zeid Daou	MoE	8	Marwan Khaddaj	MoL
9	Olfat Hamdan	MoE	10	Raghida Harb	LCA
11	Rima Chehny	MoA	12	Safaa Ibrahim	MoEW/GDO
13	Samar Malek	MoE	14	Viviane Sassine	MoE
15	Wassim Nasr	EDL	16	Zahra Ramadan	MoPWT/DGUP

Ref 04	2 June 2016	Round Table Discussion

POPs Pesticides Assessment Report

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Steering Committee					
1	Dahlia Mansour	MoPH	2	Joelle Nacouzi	LCA
3	Lama Haidar	MoA	4	Olfat Hamdan	MoE
5	Raghida Harb	LCA	6	Rima Chehny	MoA
7	Samar Malek	MoE	8	Viviane Sassine	MoE
Thematic Task Teams					
9	Amal Koubeissy	MoA	10	Salem Hayyar	LU
Other Stakeholders					
11	Adel Issa	ASPLANTE	12	Adel Yaacoub	MoE
13	Boulos Souaid	EBML	14	Darine Issa	LU
15	Desiree Azzi	USEK	16	Josephine Alam	LU
17	Julien Barhoum	LU	18	Lama Mghames	MoE
19	Marie Louize Hayek	FAO	20	Marwa Mokdad	MoE
21	Monia Hamdan	MoE	22	Nathalie Karam	MoE
23	Nohal Al Homsi	WHO	24	Pamela Teeny	LU
25	Rana Kobrosi Zbeidy	ELARD	26	Ricardo Khoury	ELARD
27	Sabine Azoury	LU - FS1			

Ref 05	2 June 2016	Round Table Discussion

Regulatory and Institutional Framework Assessment Report

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Steering Committee					
1	Joelle Nacouzi	LCA	2	Khadija Nour Eddine	MoEW
3	Lama Haidar	MoA	4	Olfat Hamdan	MoE
5	Raghida Harb	LCA	6	Rima Chehny	MoA
7	Samar Malek	MoE	8	Viviane Sassine	MoE
Thematic Task Teams					
9	Amal Koubeissy	MoA	10	Salem Hayyar	LU
Other Stakeholders					
11	Lama Mghames	MoE	12	Monia Hamdan	MoE
13	Maya Abi Zeid Daou	MoE	14	Nathalie Karam	MoE

Ref 06	5 October 2016	Round Table Discussion

POPs Industrial Chemicals and POPs Unintentionally Released Chemicals Assessment Report

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Steering Committee					
1	Fatima Al Harake	EDL	2	Jihad Ghadieh	EDL
3	Raghida Harb	LCA	4	Samar Malek	MoE
5	Joelle Nacouzi	LCA	6	Olfat Hamdan	MoE
Steering Committee					
7	Aline Ghanem	Lebanese University	8	Amal Koubeissy	Kfarshima Lab / MoA
9	Farouk Jaber	Lebanese University / CNRS CLEA	10	Salem Hayyar	Lebanese University
11	Samar Khalil	AUB			
Other Stakeholders					
12	Ali Sabra	MoE	13	Ali Yaacoub	Lebanese Cleaner Production Center /IRI
14	Amal Soufi	Urban community of Fayhaa	15	Assyl El Sabeh	Geoflint
16	Aurore Assaker	Lebanese University	17	Bassel Monzer	MoE

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Other Stakeholders					
18	Bilal Khoury	University of Balamand	19	Captain Saiid El Hage	MEA
20	Dominique Salameh	Chair/ Chemistry Dep. USJ	21	Fadia Zarzour	OCFTC
22	Georges Hassoun	Lebanese University - Health	23	Hala Mounajjed	MoE
24	Lama Bashour	ECOCENTRA	25	Lama Mghames	MoE
26	Layla Khalaf Keirouz	NDU	27	Marc Aoun	ELARD
28	Maroun Msallem	MoIM	29	Marwan Rizkallah	LEPAP/ MoE
30	Maya Abi Zaid Daou	MoE	31	Monia Hamdan	MoE
32	Nabil Salhani	MoIM	33	Nataly El Haddad	NDU
34	Nathalie Karam	MoE	35	Nohal Al Homsi	WHO
36	Nour Masri	UNDP / MoE	37	Omar Ghayed	UNRWA
38	Panagiotis Manolopoulos	POLYECO SA	39	Rana Tabcharani	ALI
40	Ricardo Khoury	ELARD	41	Robert Dib	NDU
42	Sleiman Iskandar	Regie / RLTT	43	Stephanie Audi	ELARD
44	Wassim Nasr	EDL	45	Wassim Toros	Regie

Ref 08	23 January 2017	Steering Committee Meeting

Workplan, Priorities, and Multi-Criteria Assessment Methodology

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Steering Committee					
1	Chantal Akl	MoI	2	Dahlia Mansour	MoPH
3	Joelle Nacouzi	LCA	4	Lama Haydar	MoA
5	Olfat Hamdan	MoE	6	Rima Chehny	MoA
7	Samar Malek	MoE	8	Viviane Sassine	MoE
Consultants					
9	Desiree Azzi	ELARD	10	Lama Bashour	ELARD
11	Marc Aoun	ELARD	12	Nathalie Antoun	ELARD
13	Ricardo Khoury	ELARD			

Ref 09	6 March 2017	Round Table Discussion

Strategy Development – POPs National Implementation Plan

List of Participants

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Steering Committee					
1	Chantal Akl	MoI	2	Dahlia Mansour	MoPH
3	Fatima El Harake	EDL	4	Joelle Nacouzi	LCA
5	Khadija Noureddine	MoEW	6	Lama Haidar	MoA
7	Raghida Harb	LCA	8	Rima Chehny	MoA
9	Olfat Hamdan	MoE	10	Samar Malek	MoE
11	Viviane Sassine	MoE	12	Zahraa Ramadan	MoPWT
Thematic Task Teams					
13	Adla Jammoul	MoA	14	Amal Koubeissy	MoA
15	Farouk jaber	UL	16	Samar Khalil	AUB
17	Salem Hayyar	UL			
Other Stakeholders					
18	Ahmad Damaj	MoE	19	Ali Haris	MoE
20	Ali Kataya	LCA	21	Desiree Azzi	ELARD
22	Desiree Dayeh	MoA	23	Hassan Hoteit	MoE
24	Jeff Gerges	MoE	25	Karim Jaroudi	MoE
26	Lama Bashour	ELARD	27	Lana Fawaz	LCA
28	Lea Kai	MoE	29	Marc Aoun	ELARD

Nb.	Name	Ministry/ Institution	Nb.	Name	Ministry/ Institution
Other Stakeholders					
30	Marie Chemaly	MoE	31	Marwa Mokdad	MoE
32	Marwan Rizkallah	MoE	33	Maya Abi Zaid Daou	MoE
34	Mirna Abou Chakra	LCA	35	Monia Hamdan	MoE
36	Najib Abi Chdid	MoE	37	Najwa Khansa	WHO
38	Nathalie Antoun	ELARD	39	Nohal Al Homsi	LCA
40	Pauline Eid	MoA	41	Ricardo Khoury	ELARD
42	Ricardo Mansour	MoE	43	Rola Darwish	LIBNOR
44	Tharwat Mokalled	MoE	45	Wafaa Halloum	LU

APPENDIX B - Objectives Prioritization

Pesticides Prioritization

Strategic Objective	Objective	A	B	C	D	E	F	G	H	I	J	K	L	Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	2	0	1	0	2	2	2	1	1	2	2	2	17
	O1.2: Strengthening the institutional framework	2	0	1	0	2	2	2	1	1	2	2	2	17
SO4: Managing the import, trade, use, and disposal of POPs pesticides	O4.1 Encourage the use of alternatives to POPs pesticides while promoting best practices and reducing demand for potential smuggling of POPs pesticides	1	1	2	0	1	2	2	2	2	2	2	2	19
	O4.2: Strengthen the capacity of public institutions in the management of POPs pesticides	1	1	1	1	2	2	2	1	1	2	2	2	18
	O4.3: Identify and manage POPs pesticides stockpiles and wastes (current and future) in an environmentally sound and integrated manner	1	1	1	0	2	0	2	2	2	2	0	2	15
	O4.4: Identify, assess and remediate potential contaminated sites including water bodies	1	0	0	0	2	2	2	2	1	1	2	2	15
SO5: Promoting research related to POPs chemicals	O5.1: Establish a cooperation framework between Government and academia/ research centers thus POPs research supports policy making	2	0	1	0	2	2	2	2	2	1	1	2	17

Strategic Objective	Objective	A	B	C	D	E	F	G	H	I	J	K	L	Priority
SO5: Promoting research related to POPs chemicals	O5.2: Identify priority research areas related to POPs and other hazardous chemicals and coordinate with academia to ensure these areas are effectively covered	2	0	1	0	2	2	2	2	2	1	1	2	17
	O5.3: Disseminate research on POPs nationally	2	0	1	0	2	2	2	2	2	1	1	2	17

UPOPs Prioritization

Strategic Objective	Objective	A	B	C	D	E	F	G	H	I	J	K	L	Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	2	1	2	1	1	2	1	1	0	1	2	2	15
	O1.2: Strengthening the institutional framework	2	1	1	1	1	2	1	1	0	2	2	2	15
SO3: Controlling and gradually reducing unintentionally released POPs	O3.1: Controlling and gradually reducing unintentionally released POPs	2	0	1	0	2	2	2	2	0	1	2	2	16
	O3.2: Identify UPOPs wastes/ residues (current and future) in an environmentally sound and integrated manner	2	1	1	1	1	1	1	1	1	1	2	2	15
	O3.3: Identify, assess and remediate potential contaminated sites	1	0	2	0	2	2	2	0	0	0	0	2	11

APPENDIX B - Objectives Prioritization

IPOPs Prioritization

Strategic Objective	Objective	A	B	C	D	E	F	G	H	I	J	K	L	Priority
SO1: Strengthening the legal and institutional framework for POPs chemicals management	O1.1: Strengthening the legal framework	1	1	2	1	1	2	0	0	1	1	2	2	14
	O1.2: Strengthening the institutional framework	1	0	1	1	1	2	0	0	1	1	2	2	12
SO2: Managing the import and export, production, use, recycling and disposal of Industrial POPs	O2.1: Improve control of import/ trade of IPOPs	1	1	2	1	2	2	1	1	1	2	2	1	17
	O2.2: Enhance the knowledge and capacity of industrialists, distributors and retailers to manage POPs and consider their risks	1	1	2	1	1	1	2	1	1	1	1	0	13
	O2.3: Identify and manage IPOPs stockpiles and wastes/ residues (current and future) in an environmentally sound and integrated manner	0	0	0	0	2	2	2	0	0	1	1	2	10
	O2.4: Identify, assess and remediate potential contaminated sites including water bodies	0	0	0	0	2	2	2	0	0	1	1	2	10