



Review and Update of National Implementation Plan for Stockholm Convention on Persistent Organic Pollutants in Indonesia



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FOREWORD

The Stockholm Convention on Persistent Organic Pollutants (POPs) reflects a global commitment towards the protection of human health and the environment from adverse impacts of POPs and proclaims parties to take measures to reduce or eliminate the release of POPs to the environment. Indonesia as one of the parties to the Stockholm Convention pronounced its commitment by ratifying the Stockholm Convention through Law No. 19 of 2009 concerning the Ratification of the Stockholm Convention on Persistent Organic Pollutants.

Hence, we appraise the document on a national implementation plan (NIP) on the management of POPs in Indonesia in fulfilling one of the provisions of the Convention. This document provides a review and update to the first NIP developed in 2008 including the advent of new POPs chemicals under the Stockholm Convention. It is developed based on provisions under the “Guidance for Developing a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants” by the Secretariat of the Stockholm Convention and takes into account the challenges faced in technology and information in the management of POPs in Indonesia. By introducing aspects of policy, strategy and action plans into the document, it will serve as a comprehensive guideline and will benefit as a reference for all stakeholders in the management of POPs in Indonesia.

The success in the development of this NIP document could not have been realized without the cooperation and support of all stakeholders whether government, industry and the public at large. We express our gratitude to United Nations Industrial Development Organization (UNIDO) and the Global Environment Facility (GEF) for their support and assistance toward the development of the document. My highest appreciation goes to the National Steering Committee on the Review and Update of NIP for the Stockholm Convention on POPs in Indonesia for their inputs, guidance and support in the realization of this document. My appreciation also goes to the Basel Convention Regional Centre for South East-Asia (BCRC-SEA) and all the task team and experts involved in the finalization of this document and to government/national institutions and other related stakeholders who have assisted in the realization of this document.

May this NIP document serve as a guidance for all in providing a healthy and sustainable environment in our beloved homeland.

Jakarta, 8 October 2014

Minister of Environment,
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EXECUTIVE SUMMARY

As one of the Parties to the Stockholm Convention since 2009, Indonesia is required to:

- Prohibit and/or eliminate the production and use, as well as the import and export of intentionally produced POPs;
- Restrict the production and use, as well as import and export, of unintentionally produced POPs;
- Reduce or eliminate releases from unintentionally produced POPs;
- Ensure that stockpiles and wastes consisting of or containing POPs are managed safely and in an environmentally sound manner;
- Comply with other provisions of the Convention relating to the establishment of implementation plans, information exchange, public information, awareness and education to the people, research, development and monitoring, technical assistance, financial resources and mechanism, reporting, effective evaluation and non-compliance.

In fulfilling its requirement to the Convention, Indonesia has finalized a NIP document in 2008 for the 12 initial POPs, i.e.:

- Pesticides: aldrin, chlordane, 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (DDT), dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene;
- Industrial chemicals: hexachlorobenzene (HCB), polychlorinated biphenyls (PCB);
- By-products: hexachlorobenzene (HCB), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).

At the 4th Conference of the Parties in 2009, nine new POPs were listed in the Annexes A, B and C of the Convention, namely:

- Pesticides: chlordecone, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, lindane, pentachlorobenzene (PeCB);
- Industrial chemicals: hexabromobiphenyl (HBB), hexabromodiphenyl ether and heptabromodiphenyl ether, PeCB, perfluorooctane sulfonic acid (PFOS), its

- salts and perfluorooctane sulfonyl fluoride (PFOSF), tetrabromodiphenyl ether and pentabromodiphenyl ether;
- By-products: alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane and PeCB.

The 5th Conference of the Parties in 2011 listed one pesticide, technical endosulfan and its related isomers in Annex A of the Convention, with specific exemptions for production and use for some crop-pest complexes as listed in accordance with the provisions of part VI of this Annex. Furthermore, the 6th Conference of the Parties in 2013 amended Annex A of the Convention by listing one more industrial chemical, hexabromocyclododecane (HBCD) with time-limited exemptions for production and use in expanded polystyrene (EPS) and extruded polystyrene (XPS) insulation foams in buildings.

With the addition of these newly listed POPs chemicals, Indonesia is required to carry out a review and update of the National Implementation Plan (NIP). This document presents a review and update to the previous NIP by accomodating the newly listed POPs as a reference in the management of POPs in Indonesia.

In principle, on the subject of the management of POPs in Indonesia, all life cycle stages of POPs substance and pesticides are already regulated in various laws and regulations, i.e. their existence, import, utilization, emission and fate in the environment, wastes containing POPs leading to remediation of contaminated soil. However, existing laws and regulations do not cover all POPs chemicals. They instead mainly govern some of the chemicals and pesticides under POPs. There are three POPs whose life cycle stages are not regulated namely PFOS and related substances, PBDEs (to include: tetrabromodiphenyl ethers and pentabromodiphenyl ethers (commercial pentaBDEs) and hexabromodiphenyl ethers and heptabromodiphenyl ethers (commercial octaBDEs) and lately hexabromocyclododecanes (HBCDs), which was recently added to the list of POPs during COP 6 in 2013.

Law enforcement instruments on POPs as well as inspectors and investigators are available in Indonesia. Law No 32 of 2009 concerning Environmental Protection and Management and Law No 12 of 1992 concerning Plant Cultivation System govern sanctions, both in terms of imprisonment and penalty. Various regulations also govern the monitoring of POPs, albeit not all the POPs chemicals have been covered yet.

Status of POPs in Indonesia

In general, information on quantitative data of POPs, stockpiles and contaminated soil in Indonesia is still limited. Inventory results in 2013 showed that organochlorine pesticides were and are still registered in Indonesia (1992-2012). Endosulfan was registered until 2008. Lindane is still used for second line head lice treatment. Indonesia is not a pesticides producing country and Government Regulation No. 74 of 2001 regulates their import ban. At present no export data on pesticides is available, neither any information on stockpiles.

Regarding PCBs, present inventory result estimates that the amount of oil contaminated with PCBs in concentrations exceeding 50 ppm is 22,878 tonnes. The State Electricity Company (PLN) estimates that 14,967 tonnes of oil are contaminated with PCBs, whereas within industries outside of PLN, the estimated amount is 7,911 tonnes.

Regarding POP-PBDEs, no information on production, use, export and import of c-Penta- and c-OctaBDE can be gathered. The cumulative estimation of POP-PBDEs calculated from imported CRTs and their origin from local production minus (deducted by) exported CRTs during 1975-2012 is 112,197 kg for heptaBDE and at 28,702 kg for hexaBDE. The estimated amount of CRTs containing PBDEs in use based on Tier 1 calculation was 1,049,918 tonnes, out of which the polymer fraction is approximately 315,000 tonnes. The total amount of c-OctaBDE in CRTs based on the Stockholm Convention PBDEs inventory guidance emission factors ranges between 274 tonnes – 800 tonnes with POPs. The average POP-PBDEs based on Tier 1 was calculated at 231 tonnes for heptaBDE and 59 tonnes for hexaBDE.

Based on domestic car sale data of 1975-2004 and that of second-hand imported car, the cumulative estimation of tetraBDE was at 19,697 kg, pentaBDE at 34,619 kg, hexaBDE at 4,775 kg and heptaBDE at 298.7 kg. The potential amount of POP-PBDEs in stockpiles of end-of life vehicles during the 2013 inventory was estimated at 15,185 kg for tetraBDE, 26,689 kg for pentaBDE, 3,681 kg for hexaBDE and 230 kg for heptaBDE.

DDT has been banned in Indonesia and was never registered as pesticide. This material is no longer used to eradicate malaria in Indonesia. Monitoring data indicates that DDT residue and its derivative is still present in high concentrations in the environment.

Regarding PFOS assessment, priority sectors within the preliminary inventory were: (1) specialized paper industries, (2) firefighting foam, (3) textile/apparel and (4) synthetic carpets and synthetic carpet manufacturers. Assessment of the firefighting sector showed that PFOS containing foams are present in Indonesia, but the information on the total volume could not be assessed in this preliminary inventory. Assessment of statistical data using the specific Harmonized Commodity Description and Coding System or Harmonized System (HS) codes of imported and exported articles and products that possibly contain PFOS and its related substances has been conducted to acquire information on PFOS. However, due to the fact that it is a highly preliminary approach, the results have not been satisfactory. No meaningful result was attained since the HS codes were not adequately specified resulting in highly unrealistic numbers above global production volumes. Nonetheless, the experience of this first inventory in gathering information on PFOS in articles and products revealed the gaps in controlling these substances within the current regulatory frame of chemicals in articles and products.¹ Therefore, it is necessary to take another approach in conducting inventory activities within the NIP implementation.

The total release of dioxins and furans in Indonesia reached 9,881 g TEQ for the inventory year of 2013. The ranking of sectors contributing to dioxins and furans release from the highest to the lowest are open burning process (5,547.2 g TEQ), chemical and consumable products (2,388.5 g TEQ), wastes incineration (812.1 g TEQ), ferrous and non-ferrous metal products (749.8 to 1,260 g TEQ), power and heat generators (204.8 g TEQ), disposal (111.0 g TEQ), mineral products (38.7 g TEQ) and transportation (22.6 g TEQ). The release of unintentionally PCBs was estimated at 4.32 kg TEQ with major release coming from heavy oil combustion (4.31 kg TEQ) in particular due to the relative high emission factor for heavy oil. The release of unintentionally HCB was estimated at 1.91 tonnes yearly and the major release came from the production of chlorinated aromatic chemical, particularly pigments (1.76 tonnes).

There are many potentials in terms of stockpiles and contaminated sites by POPs in Indonesia both for initial POPs and the newly listed POPs. Endosulfan stockpiles, for instance, can be found in small kiosks, although the amount and absolute volume of

¹ A similar experience has been made in the PFOS inventory of Turkey (Korucu MK, Gedik K, Weber R, Karademir A, Karakus PBK. 2014. Inventory development of perfluorooctane sulfonic acid (PFOS) in Turkey: challenges to control chemicals in articles and products. Environ Sci Pollut Res Int. DOI 10.1007/s11356-014-3924-2).

stockpiles is not very well documented. Further inventory is required to gather more information on the amount of existing pesticides stockpiles.

Within the PCDDs/Fs inventory a range of potential site categories have been discovered, however, their assessment has not been conducted. Potential contaminated sites for PFOS and for PBDEs have also been recognised and need further assessment.

Monitoring of POPs release and assessment of its impact on the environment and human health are crucial as a basis in developing a management policy of POPs. Even though several POPs substances have been reported to have been detected in various environmental, biota and human samples, research and monitoring institutions are still hampered by infrastructure and limitations in human resources.

Review of the 2008 NIP

Generally most of the action plans for the 2008 NIP have been realized. However, based on its review, some of the action plans are yet to be accomplished. Assessments show that institutional issues (such as the Commission on Hazardous Substances, has not been established) should be an important issue to be heeded seriously for the next NIP implementation. Another factor to consider is to improve coordination between related stakeholders, which has not run as well as desired.

Strategic and action plan of the National Implementation Plan

The National Implementation Plan is formulated based on priority setting following several criteria with the purpose of reaching towards the protection of human health and the environment through strengthening policies, regulations, institutional capacity building and awareness raising and ensuring effective implementation of POPs in Indonesia, including but not limited to identifying, controlling and reducing and/or eliminating POPs stockpiles in an environmentally sound manner and routinely monitoring POPs and their impact on human and the environment.

Implementation strategy for NIP covers: (a) a strong institutional initiative to foster active collaboration between ministries and non-ministry agencies for the effective implementation of NIP, (b) an achievable action plan in which the priorities of each POPs

chemical are determined differently starting from more detailed inventory activities down to the operational activities for full eradication and (c) reaping benefits from other relevant activities/programs (*co-benefiting*) through the mapping of benefits of such activities/programs and their integration with the management of POPs.

In short, the NIP POPs action plans cover:

- Regulatory strengthening measures;
- Institutional strengthening and capacity building measures;
- Measures to reduce and eliminate release from intentional production and use;
- Register of specific exemptions and the continuing need for exemptions;
- Measures to reduce release from unintentional productions;
- Identification of stockpiles, articles in use and wastes;
- Management of stockpiles and appropriate measures for handling and disposal of articles in use;
- Identification of contaminated sites and remediation in an environmentally sound manner;
- Facilitating or undertaking information exchange and stakeholder involvement;
- Public awareness, information and education;
- Reporting;
- Research, development and monitoring;
- Technical and financial assistance.

NIP POPs is to be implemented for the duration of 5 years involving relevant stakeholders.

Capacity requirements

Effective NIP implementation requires several resources criteria, i.e.:

- A strong institution with strong coordination capabilities in NIP implementation;
- Corresponding regulation harmony in the management of hazardous substances and wastes, especially those related to POPs;
- Active involvement of all related stakeholders;
- Effective law enforcement on POPs;
- Adequate financing and financial sources, including allocation from central and local governments and grants from donor agencies.

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ABBREVIATIONS AND ACRONYMS

ABS	acrylonitrile butadiene styrene
AFFF	aqueous film-forming foam
Bappenas	National Development Planning Agency of Indonesia
BAT/BEP	best available technique/best environmental practises
BCRC-SEA	Basel Convention Regional Centre for South-East Asia
BEHTBP	bis(2-ethylhexyl)-3,4,5,6-tetrabromo phthalate
BPOM	National Agency of Drug and Food Control
BPPT	Agency for the Assessment and Application of Technology
BPS	Statistics Indonesia
BSN	National Standardization Agency of Indonesia
BTBPE	1,2-bis (2,4,6 – tribromophenoxy) ethane
CAS	Chemical Abstracts Service
COP	Conference of the Parties
CRT	cathode ray tube
DBDPE	decabromodiphenyl ethane or 1,2-bis (pentabromodiphenyl) ethane
DDD	dichloro diphenyl dichloroethane
DDE	dichloro dichlorodiphenyl ethylene
DDT	1,1,1-trichloro-2,2-bis(4-chlorophenylethane
DGCE	Directorate General of Customs and Excise
DKI Jakarta	Jakarta Capital City
DRE	destruction and removal efficiency
EDCs	endocrine disrupting chemicals
EEE	electrical and electronic equipment
EHTBB	2-ethylhexyl-2,3,4,5-tetrabromo benzoate
EPS	expanded polystyrene
ESM	environmentally sound management
EtFOSA	N-ethyl perfluorooctane sulfonamide
EtFOSE	N-ethyl perfluorooctane sulfonamidoethanol
FAO	Food and Agriculture Organization
FIELD	Farmer's Initiatives for Ecological Livelihoods and Democracy
FSP	full-scale project
GAIKINDO	Association of Indonesia Automotive Industries
GC-HR	gas chromatography-high resolution
GCTOFMS	gas chromatography-time-of-flight mass spectrometry
GDP	gross domestic product
GEF	Global Environment Facility
GoI	Government of Indonesia
GR	Government Regulation
ha	hectare
HBB	hexabromobiphenyl
HBCD	hexabroocyclododecane
HCB	hexachlorobenzene
HCDBCO	hexachlorocyclopentadienyldibromo cyclooctane
HCHs	hexachlorocyclohexanes
HIPS	high impact polystyrene
HS	Harmonized System
IPB	Bogor Agricultural University

IPEN	International POPs Elimination Network
IPEP	International POPs Elimination Project
IPM	integrated pest management
ISO	International Organization for Standardization
ITB	Bandung Institute of Technology
IVM	integrated vector management
Ka BPOM	Head of National Agency of Drug and Food Control
KAN	National Accreditation Committee
kg	kilograms
LD50	lethal dose fifty
LEMIGAS	Research and Development Centre for Oil and Gas Technology
LIPI	Indonesian Institute of Sciences
LPG	liquefied petroleum gas
MIPA	Mathematics and Natural Sciences
mm	milimeter
MoA	Ministry of Agriculture
MoCI	Ministry of Communication and Information
MoD	Ministry of Defense
MoE	Ministry of Environment
MoEC	Ministry of Education and Culture
MoEMR	Ministry of Energy and Mineral Resources
MoF	Ministry of Finance
MoFor	Ministry of Forestry
MoH	Ministry of Health
MoHA	Ministry of Home Affairs
MoI	Ministry of Industry
MoMPT	Ministry of Manpower and Transmigration
MoT	Ministry of Trade
MoTransp	Ministry of Transportation
MRL	maximum residue limits
MSDS	material safety data sheet
NBFRs	novel brominated flame retardants
NCDs	non-communicable diseases
NGO	non-governmental organization
NIP	national implementation plans
NSC	national steering committee
OCs	organochlorines
OCPs	organochlorine pesticides
OECD	Organisation for Economic Co-operation and Development
PBBs	polybrominated biphenyls
PBDEs	polybrominated diphenyl ethers
PBT	polybutylene terephthalate
PCBs	polychlorinated biphenyls
PCDDs	polychlorinated dibenzo-p-dioxins
PCDFs	polychlorinated dibenzofurans
PeCB	pentachlorobenzene
PFOS	perfluorooctane sulfonate
PFOSF	perfluorooctane sulfonyl fluoride
PLN	State Electricity Company
PLTU	steam powered electric generator
POPs	persistent organic pollutants

PP/CP	pollution prevention/cleaner production
PPG	project preparation grant
Pusarpedal	Central Facility for Environmental Pollution Control
Puslitbang	Research and Development Centre
RENPAP	Regional Network of Pesticides for Asia and the Pacific
RPP	Draft of Government Regulation
SCP	Sustainable Consumption and Production
SIKER	Information centre on poisoning
SIPOPs	Information system on POPs
SNI	Indonesian National Standard
TBB	2-ethylhexyl-2,3,4,5-tetrabromo benzoate
TBBPA-DBPE	tetrabromobisphenol A-bis (2,3-dibromopropylether)
TBPH	bis(2-ethylhexyl)-3,4,5,6-tetrabromo phthalate
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxins
TCLP	toxicity characteristic leaching procedure
TEQ	toxic equivalent
TPH	total petroleum hydrocarbons
UGM	Gadjah Mada University
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
 UNU	United Nations University
UPOPs	unintentionally produced POPs
UPTD-BPTPH	Technical Implementing Service Unit – Agency for Food Crop and Horticulture Protection
USD	US Dollar
WHO	World Health Organization
XPS	extruded polystyrene
YLKI	Indonesian Consumer Institution Foundation

I. INTRODUCTION

1.1. Background

The Stockholm Convention on POPs is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife and have harmful impacts on human health and on the environment. POPs are toxic and cause adverse effects to human and to the biological integration into the environment. POPs may stimulate cancer, allergies and hypersensitivities, damage the nerve and reproductive systems and cause disturbance in the immune system.

In response to this global problem, the Stockholm Convention, adopted in 2001 and entered into force in 2004, requires its Parties to take measures to eliminate or reduce the release of POPs into the environment. As set out in Article 1, the objective of the Stockholm Convention is to protect human health and the environment from POPs.

Initially, there were 12 POPs listed, which are categorized as follows:

- Pesticides: aldrin, chlordane, 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (DDT), dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene;
- Industrial chemicals: HCB, polychlorinated biphenyls (PCBs);
- By-products: HCB, polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs) and PCBs.

The provisions of the Stockholm Convention requires Parties to, among others:

- Prohibit and/or eliminate the production and use, as well as the import and export, of intentionally produced POPs that are listed in Annex A to the Convention (Article 3);
- Restrict the production and use, as well as the import and export, of intentionally produced POPs that are listed in Annex B to the Convention (Article 3);
- Reduce or eliminate releases from unintentionally produced POPs that are listed in Annex C to the Convention (Article 5);

- Ensure that stockpiles and wastes consisting of, containing, or contaminated with POPs are managed safely and in an environmentally sound manner (Article 6);
- To target additional POPs (Article 8);
- Other provisions of the Convention relate to the development of 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 mechanism (Article 13), reporting (Article 15), effectiveness evaluation, (Article 16) and non-compliance (Article 17).

At its fourth and fifth meeting held in 2009 and 2011, the Conference of the Parties (COP), by decisions SC-4/10 to SC-4/18 and decision SC-5/3, adopted amendments to Annexes A (elimination), B (restriction) and C (unintentional production) of the Stockholm Convention to list ten additional chemicals identified as POPs.

The ten additional POPs are classified into categories of pesticides, industrial chemicals and by-products as follows:

- Pesticides: chlordecone, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, lindane, pentachlorobenzene; technical endosulfan and its related isomers;
- Industrial chemicals: hexabromobiphenyl (HBB), hexabromodiphenyl ether and heptabromodiphenyl ether, pentachlorobenzene (PeCB), perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF), tetrabromodiphenyl ether and pentabromodiphenyl ether;
- By-products: alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane and pentachlorobenzene.

The 6th COP of the Stockholm Convention held in 2013 decided to amend Part I of Annex A to the Convention by listing hexabromocyclododecane, with specific exemptions for production as allowed to the Parties listed in the register of specific exemptions and for use in expanded polystyrene and extruded polystyrene in buildings.

Implications of the listing of the new chemicals for the implementation of the Stockholm Convention include:

- Implement control measures for each newly listed chemical (Article 3 and 4);
- Develop and implement action plans for unintentionally produced chemicals (Article 5);
- Develop inventories of the chemical's stockpiles (Article 6);
- Review and update the National Implementation Plan (Article 7);
- Include the newly chemicals in the reporting (Article 15);
- Include the newly listed chemicals in the programme for effectiveness evaluation (Article 16).

Indonesia ratified the Stockholm Convention on Persistent Organic Pollutants as confirmed in Law No. 19 of 2009 concerning the Ratification of the Stockholm Convention on Persistent Organic Pollutants.

As a State Party Indonesia is obliged to conduct Review and Update of National Implementation Plan on Elimination and Reduction of Persistent Organic Pollutants as required under Article 7 of the Stockholm Convention in regard to the addition of the newly listed POPs under the Annexes of the Convention.

1.2. Objectives

The document has been prepared to review and update Indonesia's NIP to the Stockholm Convention, as well as to fulfill Indonesia's obligation as State Party to the Convention.

1.3. Benefits

The NIP document contains national implementation plans in fulfilling Indonesia's obligations to the provisions under the Stockholm Convention which can be used as:

- a. A guidance for relevant agencies and stakeholders in developing a more detailed action plan;

- b. A reference for institutions and relevant stakeholders in carrying out coordination efforts to fulfill the obligations of the Stockholm Convention for the next five years;
- c. Proof of commitment by the Government of Indonesia (GoI) in the management of POPs;
- d. Material to enhance the strengthening of infrastructure and resources in implementing the provisions of the Stockholm Convention;
- e. A reference in enhancing regulation strengthening and institutional development.

1.4. Socio-economic Assessment

The NIP can further elaborate the government's 2015-2019 National Medium-Term Development Plan due in mid-January 2015.¹ This document contains policies related to national, sectoral and regional development agenda, among others the policy in mainstreaming and in cross-sectoral development to achieve an inclusive economic growth to promote economic self-reliance, sustained social livelihood and public welfare, reduced inter-regional inequity and the enhancement of environmental quality and improved management of sustainable development. To achieve a sustained economic development, one of the strategies is through promoting the implementation of production pattern/economic activities and an environmentally friendly consumption pattern. Provisions on action plans contained within the NIP document will be valuable in elaborating the strategy and could contribute to Indonesia's prevailing socio-economic condition reflected by its increasing population growth and middle-class economic capacity and rising urbanization.

1.5. Gender Assessment

One of the ways to enforce the government's policy on mainstreaming a sustained social development is through a strategy of promoting gender equality in gaining access to education, economic activities and in increasing women representativeness in organizations. Gender perspective should be accommodated in every NIP activity related to POPs through women's representation, which is foremost in the development of gender responsive policies

¹ Ministry of National Development Planning (BAPPENAS), Rancangan Awal Pembangunan Jangka Menengah Nasional 2015-2019. http://www.bappenas.go.id/files/7714/1557/5291/RT_RPJMN.PDF. Accessed in January 2015.

and programmes, i.e. during planning, financing, implementation, monitoring and evaluation phases. In the early development stage of NIP on POPs, gender-based representatives were accommodated by involving a midwife association as well as allowing an evenly proportioned men and women participating in the NIP workshops. The appointment of a woman as Head as well as the involvement of several women representatives in the National Steering Committee on POPs and the recruitment of a senior woman expert in the development of POPs have strengthened the role of gender equality and role through their contribution in raising public awareness of the adverse affect of POPs in human health as experienced by working women (in the industrial and agricultural fields) and household as well as through promoting measures to reduce and eliminate the use of POPs.

1.6. Correlation with GEF Strategies

The significance of the NIP document becomes more considerable when used as a reference in mobilizing resources for POPs related issues from various donor institutions. Foremost among them is the GEF which plays a special role as the financing institution for several environmental conventions including the Stockholm Convention on Persistent Organic Pollutants. Issues put forward under the NIP will be of relevance to GEF's key strategic priorities, i.e. in addressing the drivers of environmental degradation, the pursuit of integrated solutions and finding the right influencing model when faced with the challenges of the reduction and elimination of POPs.¹ Strategy and action plan elements of the NIP correlate with the GEF's programming directions mainly in the development of new tools and economic approaches for managing harmful chemicals and wastes in a sound manner and in the reduction and elimination of POPs.²

¹ Global Environment Facility. 2014. GEF2020-Strategy for the GEF.

² Global Environment Facility. 2014. GEF-6 Programming Directions.

II. COUNTRY BASELINE

2.1. Country profile

2.1.1. Geography and population

2.1.1.1. Geography

Geographical location: Indonesia is located between 6°08' north and 11°15' south latitude and from 94°45' to 141°05' east longitude. Indonesia is the largest archipelago in the world. There are 17,508 islands along the equator, in which approximately 6,000 islands are inhabited. The archipelago is on a crossroad between two oceans, the Pacific and the Indian and bridges two continents, Asia and Australia. This strategic position has shaped the cultural, social, political and economic life of the country.

Administration:¹ Since 2001, the Republic of Indonesia is divided administratively into 33 provinces, two special regions and one greater capital city. Since 1999, East Timor was no longer part of Indonesia. The provinces are further subdivided into 399 regencies, 98 municipalities, 6,879 subdistricts and 79,702 villages.

Land area: Indonesia is a maritime country with a coastline of 54,716 km. The total area is 1.91 million square kilometres, comprises 0.09 million square kilometres (4.9%) of land and about 1.8 million square kilometres (95.1%) of water. It is a country with many active and non-active volcanoes and rivers.

Climate:¹ Indonesia's weather is tropical, hot, humid, but moderate in the highlands. Dry season starts in June through September and the rainy season from December to March. Variation in temperature depends on altitude. In 2012, minimum, average and maximum temperatures were 14.4 °C, 26.9 °C and 38.8 °C, respectively. Humidity is usually relatively

¹ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

high, ranging from 73.9% to 87%. Amount of annual rainfall ranges from 760 mm to 5,041 mm.

2.1.1.2. Population

Size and demographic distribution:¹ In 2013, population was 248.818 million. Population growth rate decreased, from 1.49% in the period of 2000-2010 to 1.42% in the period of 2010-2013. Almost 58% of the population resides in Java Island; the second populated island is Sumatra (21%).

Age distribution and gender:² Indonesian has population aged 0-14 years of 26.4%; therefore it can be categorized as young population. In 2012, sex population ratio is 99.4 per 100 females. Indonesia can benefit from “demographic bonus”, which is the high productive age in the next 20 years. From 2009 election results, 18.2 % of parliamentary seats are held by women. In 2011, female participation in the labour market is 51.2 % compared to 84.2 % for men.

Urban/rural distribution:² The percentage of urban population growth rate increased from 2.5% annually². Big cities, mainly Jakarta, have been a main destination of migrants. The main reason was to gain economic benefit particularly in informal sector. Other distressing factors as impacts of city development are environment problems, particularly water, soil and air pollutions, traffic congestion and social problems. Decentralization policy potentially will change migration rate.

2.1.2. Economic profile

Exports-imports:³ In 2013, Indonesia's exports decreased to USD 182,551.8 million. During the same period, imports decreased to USD 186,628.7 million. Therefore, in 2013, the trade balance recorded a deficit of USD 4,076.9 million.

¹ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

² World Statistic Pocketbook. Available on <https://data.un.org/CountryProfile.aspx?crName=Indonesia>. Accessed in August 2014.

³ Export and import data, available on: www.bps.go.id. Accessed in August 2014.

In 2013, exports of mineral fuels, lubricants and related materials were the main commodities with the percentage of 31.4%, 21.5% and 12.1% of total exported goods respectively. In the period of 2011-2013, major commodities were coal, briquettes, ovoids and similar solid fuels manufactured from coal (HS code 2701), petroleum gases and other gaseous hydrocarbons (HS code 2711) and palm oil and its fractions (HS code 1511). Major export partners were Japan (15.8% of total export), China (11.7%) and Singapore (9.1%).

In 2013, the main import commodities were machinery and transport equipment, mineral fuels, lubricants and related materials and also manufactured goods classified chiefly by material accounted for 30.3%, 24.4% and 15.3% of total imported goods respectively. In the period of 2011-2013, major import commodities were petroleum oils, other than crude (HS code 2710), petroleum oils and oils obtained from bituminous minerals, crude (HS code 2709) and electrical apparatus for line telephony or line telegraphy (HS code 8517) accounted for 15.4%, 14.0% and 11.1% respectively.

Table 2.1 Export, import and trade balance (million USD)¹

	2008	2009	2010	2011	2012	2013
Export	137,020.4	116,510.0	157,779.1	203,496.6	190,031.8	182,551.8
Import	129,197.3	96,829.2	135,663.3	177,435.6	191,691.0	186,628.7
Balance	7,823.1	19,680.8	22,115.8	26,061.0	(1,669.2)	(4,076.9)

2.1.3. Profile of economic sectors

Agriculture:² Indonesia is an agricultural country. In 2012, from the total country area of 191,093,000 ha, 54,500,000 ha were used for agriculture. It consists of arable land (23,500,000 ha), permanent crops (22,000,000 ha) and permanent meadows and pastures (11,000,000 ha). As an agricultural country, the use of pesticides in Indonesia to support agricultural activities is relatively high to prevent diseases and vectors. The effectiveness of pesticides usage should be emphasized, i.e. through integrated pest control program.

¹ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

² <http://www.fao.org/countryprofiles/index/en/?iso3=IDN>. Accessed in August 2014.

Manufacturing industries:¹ In 2013, the contribution of manufacturing sector to the GDP was 20.7%, while that from agriculture sector contributed only about 14.4%. Industrial production growth was 4.11%. Large and medium manufacturing industries used energy such as fuel, electricity and gas. These large and medium manufacturing industries are presented in Table 2.2, which shows the growth rate of non-oil and gas manufacturing industries based on types of business field.

Table 2.2. Growth rate of non-oil and gas manufacturing industries (in %)²

No.	Business Field	2010	2011	2012 (until Quarter I)
1.	Food, drink and tobacco	2.7805	9.1884	8.1857
2.	Textile, leather goods & footwear	1.7667	7.5181	1.4145
3.	Wooden goods & other forestry products	-3.4670	0.3497	-0.8573
4.	Paper and printed material	1.6695	1.4958	0.4987
5.	Fertilizer, chemicals & goods from rubber	4.7009	3.9508	9.1917
6.	Cement & non-metal mining products	2.1793	7.1883	6.1073
7.	Iron and steel base metal	2.3838	13.0567	5.5737
8.	Transportation, machinery and their equipment	10.3802	6.9999	6.2255
9.	Other goods	3.0026	1.8244	4.2099
Growth of non-oil and gas manufacturing industries		5.1165	6.8270	6.1265
GDP Growth		6.1954	6.4570	6.3077

Mining:³ Natural resources comprise petroleum, tin, natural gas, nickel, timber, bauxite, copper, coal, gold and silver. This sector is expected to serve as one important source of national income, especially due to the contribution of export of oil and gas. In 2013, the

¹ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

² Statistik Kinerja Industri Indonesia. http://kemenperin.go.id/statistik/pdb_growthc.php. Accessed on 26 October 2014.

³ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

contribution of mining sector to the GDP was 11.2%. Indonesia is also a potential coal producer. Coal production was about 359.4 million tons in 2012 and increased to 375.0 million tons in 2013. In 2013, other mineral productions, such as bauxite, nickel ores, tin and gold were 55.65 million metric tons, 36.24 million metric tons, 32,251 tons and 59,066 kgs respectively.

Table 2.3. Production of crude oil and natural gas¹

Production Unit		2008	2009	2010	2011	2012	2013*
Crude Oil	(x1000) Barrel	357,500	346,313	344,888	329,265	314,666	301,428
Natural gas	MMscf	2,891,929	3,060,467	3,407,592	3,256,379	3,174,639	3,072,514

*: temporary value

Marine:² In 2013, export value of fisheries was about 802,000 tons or USD 2.6 billion. Indonesian export mainly consists of shrimp and tuna, swordfish and skipjack, which accounted for USD 997 million and USD 515 million respectively. Total export of Indonesian fisheries in 2013 grew by 3.51% compared with the same period in the previous year of about 906,000 tons as of September 2013. The value of jelly fish and ornamental fish export grew by 72.64% and 262.16% respectively. Export volume of fat and fish oil decreased by 55.29% as value. Major partners in fisheries exports were Japan, China and Singapore.

Services: Most electricity used in Indonesia is supplied by the State Electricity Company (PLN), whereas the rest is produced by private companies. The construction industry contributes a significant share of the total economic activity in the country, with corresponding demands of materials, services and labour inputs. Therefore, it is generally sensitive to any changes to business activities.

¹ BPS, Statistics Indonesia. 2014.

http://www.bps.go.id/hasil_publikasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Accessed in August 2014.

² Marine and Fisheries in Figures 2013, Ministry of Marine Affairs and Fisheries.

2.2. Institutional Policy and Regulatory Framework

2.2.1. Environmental policy, sustainable development policy and general legislative framework

Formally, policies regarding environmental management in Indonesia were initiated in 1982 when Law No. 4 of 1982 concerning Fundamental Stipulations of Environmental Management was promulgated. Until then, the law was revised and renamed twice. The first revision was Law No. 23 of 1997 concerning Environmental Management. The current valid regulation is Law No. 32 of 2009 concerning Environmental Protection and Management. The dynamic of change reflects serious commitment expressed by the Government of Indonesia in continuously striving towards improving the protection and management of the environment. In order to manage the environment and its ecosystem in a more comprehensive manner, the Environmental Protection and Management Law is complemented by other corresponding laws (Table 2.4).

Table 2.4. Laws in Indonesia related to environmental management

No.	Law No.	Year of Enactment	Concerning
1.	3	2014	Industry
2.	7	2014	Trade
3.	21	2014	Geothermal
4.	18	2013	Prevention and Removal of Forest Destruction
5.	11	2013	Ratification of Nagoya Protocol
6.	10	2013	Ratification of Rotterdam Convention
7.	36	2009	Health
8.	32	2009	Environmental Protection and Management
9.	22	2009	Road Traffic and Transportation
10.	19	2009	Ratification of Stockholm Convention
11.	18	2008	Solid Wastes Management
12.	27	2007	Management of Coastal and Small Islands
13.	24	2007	Disaster Mitigation
14.	21	2004	Ratification of Cartagena Protocol
15.	19	2004	Amendment of Law Number 41 of 1999 on Forestry
16.	17	2004	Ratification of Kyoto Protocol
17.	7	2004	Water Resources
18.	41	1999	Forestry
19.	6	1994	Ratification of United Nations Framework Convention on Climate Change

No.	Law No.	Year of Enactment	Concerning
20.	5	1994	Ratification of United Nations Conference on Biological Diversity
21.	5	1990	Conservation of Natural Resources and Its Ecosystem
22.	1	1970	Occupational Safety

On the subject of regional autonomy, the government division of tasks between central, province and district/municipality is governed under Government Regulation No. 38 of 2007. Government tasks are functions of government that become the rights and obligations of every government level or structure which regulates and carries out its jurisdictional functions in order to protect, serve, strengthen and prosper the public. The regulation divides the division of government work into 31 fields of government work. One of the divisions' tasks is to provide provision on the management of hazardous wastes.

Related to POPs, one of the unique features of GR No. 38 of 2007 is that the government's role in the management of hazardous substance is placed under the subsubfield of management of hazardous wastes. There is no subfield that specifically regulates hazardous substances or chemicals. The division of tasks can be found in Table 2.5.

Table 2.5. Government division of work in the field of environment, subdivision environmental pollution control, subsubdivision management of hazardous wastes

No	Government (Central)	Provincial Government	City/District Government
1.	Decides policy regarding hazardous wastes management, that among other, consists of: <ul style="list-style-type: none"> a. Deciding the wastes as hazardous according to specific source, characteristics, lethal dose fifty (LD50), toxicity characteristic leaching procedure (TCLP), chronic characteristics and list; b. Deciding the status of hazardous substances; c. Temporary storage, 	-	-

No	Government (Central)	Provincial Government	City/District Government
	<p>collection, transportation, utilisation, treatment and disposal of hazardous wastes;</p> <p>d. Notification of hazardous substances and hazardous wastes;</p> <p>e. Inspection of hazardous wastes management;</p> <p>f. Inspection of national scale of emergency preparedness system;</p> <p>g. Inspection and mitigation of national scale of hazardous wastes management accident.</p>		
2.	Inspection of implementation of hazardous wastes management.	Inspection of implementation of hazardous wastes management in the provincial scale.	Inspection of implementation of hazardous wastes management in the city/district scale.
3.	Implementing registration of hazardous substances.	-	-
4.	Inspection of hazardous substances management.	-	-
5.	Granting recommendation of transportation of hazardous wastes.	-	-
6.	Granting permit of collection of hazardous wastes in the national scale.	Granting permit of collection of hazardous wastes in the provincial scale (the source of hazardous wastes are from intercity/inter district), except used oil/used lube oil.	Granting permit of collection of hazardous wastes in the city/district scale, except used oil/used lube oil.
7.	Granting license for utilisation of hazardous wastes.	-	-
8.	Granting permit for treatment of hazardous wastes.	-	-
9.	Granting operational permit for equipment for treatment of hazardous wastes.	-	-
10.	Granting operational permit for disposal of hazardous wastes.	-	-
11.	Inspection of implementation of clean-up of hazardous wastes management pollution	Inspection of implementation of clean-up of hazardous wastes	Inspection of implementation of clean-up of hazardous wastes management pollution

No	Government (Central)	Provincial Government	City/District Government
	in national scale.	management pollution in the provincial scale.	in the city/district scale.
12.	-	Granting recommendation for permit for collection of hazardous wastes in the national scale.	-
13.	-	Inspection of implementation of emergency preparedness system in provincial scale.	Inspection of implementation of emergency preparedness system in city/district scale.
14.	-	Inspection of mitigation of accident of hazardous wastes management in the provincial scale.	Inspection of mitigation of accident of hazardous wastes management in the city/district scale.
15.	-	-	Granting location permit for treatment of hazardous wastes.
16	-	-	Granting permit for temporary storage of hazardous wastes in industry or business activities.

With the passage of time the central government role will gradually shift to give room for a more substantial role for local autonomy.

2.2.2. The role and responsibility of government, non-ministerial agencies and other government bodies involved in the life cycle of POPs (from sources to disposal, its presence in the environment and health monitoring)

The role and responsibility of government, non-ministerial agencies and other government agencies involved in the life cycle of POPs are illustrated in Table 2.6

Table 2.6. Role and responsibility related to POPs and hazardous substances

No.	Ministry/Agency	Roles and responsibilities regarding POPs and hazardous substances
1.	Ministry of Environment.	Focal point of POPs management. Regulating and inspecting hazardous substances including registration of hazardous substances. Regulating and inspecting hazardous wastes.

No.	Ministry/Agency	Roles and responsibilities regarding POPs and hazardous substances
2.	Ministry of Industry.	Regulating and inspecting of the use of hazardous substances in industry.
3.	Ministry of Trade.	Regulating and inspecting of import, export and distribution of hazardous substances.
4.	Ministry of Health.	Regulating and inspecting of utilisation of hazardous substances and its impact to the community.
5.	Ministry of Manpower and Transmigration.	Regulating and inspecting of utilisation of hazardous substances in the workplace (occupational area).
6.	Ministry of Agriculture.	Regulating and inspecting of hazardous substances in pesticides.
7.	Ministry of Transportation.	Regulating and inspecting of transportation of hazardous substances.
8.	Ministry of Foreign Affair.	Enhancing international cooperation (bilateral, regional and multilateral) regarding management of hazardous substances.
9.	Ministry of Women Empowerment and Protection of Children.	Raising awareness regarding impacts of hazardous substances to women and children.
10.	Ministry of Energy and Mineral Resources.	Regulating utilisation of hazardous substances in energy and mineral resources sectors, including mining, oil and gas.
11.	Directorate General of Customs, Ministry of Finance.	Regulating and inspecting of import and export of hazardous substances.
12.	National Agency of Drug and Food Control.	Regulating and inspecting of hazardous substances in food and drug sectors.
13.	Commission on Pesticides.	Granting recommendation regarding pesticides management.
14.	Commission on Hazardous Wastes	To be established.
15.	Provincial Government	Regulating and inspecting of hazardous wastes management in accordance with their authority.
16.	City/District Government	Regulating and inspecting of hazardous wastes management in accordance with their authority.
17.	Police, Public Prosecutor, Court of Justice, Civil Inspector and Investigating Officer.	Inspection, examination, investigation and court trial of criminal and/or civil action regarding hazardous wastes.

2.2.3. Description of existing legislation and regulations regarding POPs management (intentionally and unintentionally produced POPs)

Existing legislation and regulation related to POPs management by the Goverment of Indonesia is illustrated in Tables 2.7 and 2.8.

Table 2.7. Government regulations and regulations related to POPs

No.	Laws and regulations	Regulations related to POPs
1.	Law No. 3 of 2014 concerning Industry	<ul style="list-style-type: none"> • The Law on Industry accommodates environmental management into the concept of Green Industry which harmonises industrial development and preservation of environmental functions as well as providing benefits to the society. • Central and local governments provide facilitation to (1) small and medium industrial companies that use natural resources efficiently, in ways that are environmentally friendly and sustainable and (2) Industrial companies that conduct efforts to establish Green Industry concepts. • Ministry of Industry has the right to conduct monitoring and controlling as well as to enforce compliance to industrial companies and industrial estates in some aspects, such as natural resources utilisation, Green Industry Standards and safety and security of machine, process, product, storage and transportation.
2.	Law No. 7 of 2014 concerning Trade	<ul style="list-style-type: none"> • Trade policy is developed based on principles, among others environmental principle (Article 2). • Producers and importers are obliged to conduct trading of goods that comply with aspects of security, safety, health, and environment, register the goods to the ministry and apply for registration number for their goods and/or their packaging. • Government imposes prohibition or restriction on Trade of Goods and/or Services for national interest in order to, among others, protect health and safety of human, animals, fish, plants and the environment (Article 35,1(d)). • Government prohibits import or export of goods for national interest in order to, among others, protect the health and safety of human, animals, fish, plants and the environment (Article 50, 2 (c)). • Government may restrict export and import of goods for national interest in order to, among others, protect the health and safety of human, animals, fish, plants and the environment (Article 54,1 (b)).
3.	Law No. 32 of 2009 concerning Environmental Protection and Management	<ul style="list-style-type: none"> • Every person who brings in hazardous substances into the territory of the Republic of Indonesia, produces, transports, distributes, stores, utilises, disposes, treats and/or landfills hazardous substances shall conduct a (proper) hazardous substances management (Article 58). • Every person generating hazardous wastes shall conduct (proper) management of the wastes (Article 59). • Expired hazardous wastes shall be managed as hazardous wastes requirements (Article 59). • Every person that is not capable of managing hazardous substances by himself shall hand the management over to other (capable) party

No.	Laws and regulations	Regulations related to POPs
		<p>(Article 59).</p> <ul style="list-style-type: none"> • Management of hazardous wastes shall obtain permit from Minister of Environment, Governor, Major or Head of District (Article 59). • Minister of Environment, Governor, Mayor or Head of Region shall in the permit stipulate environmental requirements and obligations that shall be fulfilled by manager of hazardous wastes (Article 59). • Decision of permit granting shall be announced to the public (Article 59). • Hazardous wastes management is a sequence of activities that consists of reduction, storage, collection, transportation, utilisation and/or treatment, including landfilling of hazardous wastes (explanation of Article 59).
4.	Law No. 4 of 2009 concerning Mineral and Coal	<ul style="list-style-type: none"> • All material produced from mining activities shall fulfill technical standards and environmentally friendly requirements. • Sanctions are imposed on those who do not fulfill the technical standards and environmentally friendly requirements.
5.	Law No. 22 of 2009 concerning Traffic and Road Transportation	<ul style="list-style-type: none"> • Knowledge regarding kinds of hazardous substances is special requirement for granting driving license for public vehicle/public transportation (Article 83). • The transporter of road cargo that handles special cargo (including hazardous substances and wastes) shall provide storage area and is responsible for preparing system and procedure for handling of the special or dangerous cargo before the cargo is loaded to the vehicle (Article 163). • If the cargo is not taken by the sender or receiver longer than the agreed time, the public cargo company has the right to destroy the dangerous cargo or cargo that disturbs storage system, in accordance with relevant regulations (Article 196). • Transportation of special cargo is transportation that requires specially designed cargo vehicle for transporting bulk, liquid, gas, container, plantation, living animal and heavy equipment, as well as hazardous cargo such as (a) explosive cargo, (b) pressured gas, liquid gas, dissolved gas at certain pressure and temperature, (c) flammable liquid, (d) flammable solid, (e) oxidator, (f) toxic and contagious materials, (g) radioactive materials and (h) corrosive material (explanation of Article 160).
6.	Law No. 30 of 2009 concerning Electricity	<ul style="list-style-type: none"> • All electricity installations must meet the requirements of Reliable, Safe and Familiar Environment. • Provision of sanctions to electricity installation owners who do not meet the reliable installation and environmentally friendly for safety standards
7.	Law No. 36 of 2009 concerning Health	<ul style="list-style-type: none"> • Government, local government and the community shall ensure the availability of healthy environment that does not have adverse impact on health (Article 163). • Healthy environment is free from elements that can lead to occurrence of adverse impact on health, such as (a) liquid wastes, (b) solid wastes, (c) gas wastes, (d) solid wastes that is not treated as required by government regulations, (e) creature bearing disease, (f) hazardous chemicals, (g) noise above threshold limit value, (h) ionic and non ionic radiation, (i) contaminated water, (j) polluted air and (k) contaminated food (Article 163).

No.	Laws and regulations	Regulations related to POPs
8.	Law No. 18 of 2008 concerning Solid Wastes Management	Does not govern specifically POPs. Regulates the solid wastes management in general, including the obligation to manage household solid wastes, household-like solid wastes, specific wastes, including prohibition of burning of wastes that do not comply with technical requirements of solid wastes management (which could be source of POPs emission).
9.	Law No. 22 of 2001 concerning Oil and Gas	<ul style="list-style-type: none"> • All material produced from oil and gas shall fulfill technical standards and shall be environmentally friendly. • Sanctions to those who do not fulfill the technical standards and environmentally friendly requirements.
10.	Law No. 12 of 1992 concerning Plant Cultivation System	<ul style="list-style-type: none"> • Every pesticide distributed in the Republic of Indonesia shall be registered, comply with quality standard, ensured its affectivity, safe for human and environment and labelled (Article 38). • Government regulates the quality standard of pesticides and kind of allowable pesticides for import (Article 38). • Government shall conduct registration and inspecting provision, distribution and utilisation of pesticides (Article 39). • Government is able to prohibit or restrict the distribution and/or utilisation of specific pesticides (Article 40). • Every person or legal entity that possesses prohibited pesticides and pesticides that do not meet the quality standard or defect pesticides shall destroy the pesticides (Article 41).
11.	Law No. 5 of 1984 concerning Industry	<ul style="list-style-type: none"> • In order to facilitate development in the form of coaching and dissemination, (central) government provides implementation guidelines regarding efforts to ensure safety and security of the use of equipment, raw material and its production results and also includes its transportation. On the other hand, it is necessary to inspect the efforts to prevent occurrence of damage and pollution to environment as well as securing of natural resources conservation and natural resources balance (Article 15). • Industrial corporation shall implement the effort to balance and conserve natural resources as well as prevent occurrence of damage and pollution to the environment due to their industrial activities.
12.	Government Regulation No. 1 of 2014 concerning Second Revision of Government Regulation No. 32 of 2010 on the Implementation of Mineral and Coal Mining Business Activities	<ul style="list-style-type: none"> • Business executors shall fulfill technical standards and environmentally friendly requirements for materials produced from mining activities.
13.	Government Regulation No. 14 of 2012 concerning Electricity Suppliers	<ul style="list-style-type: none"> • Business executors shall fulfill environmental impact assessment, safe and environmentally friendly requirements.
14.	Government Regulation No. 38 of 2007 concerning Distribution of Governance between	A detailed description of this regulation has been explained in Subchapter 2.2.1.

No.	Laws and regulations	Regulations related to POPs
	(Central) Government, Provincial Government and City/District Government.	
15.	Government Regulation No. 74 of 2001 concerning Hazardous Substances Management	Regulates some specific POPs: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, PCBs, DDT, hexachlorocyclohexane and lindane.
16.	Government Regulation No. 82 of 2001 concerning Water Quality Management and Pollution Control	Regulates water quality standard for POPs substances: aldrin, chlordane, dieldrin, endrin, heptachlor, toxaphene and DDT.
17.	Government Regulation No. 18 in conjunction with Government Regulation No 85 of 1999 concerning Hazardous Wastes Management	<ul style="list-style-type: none"> Regulates wastes that are classified as hazardous wastes for POPs of PCBs (Annex I Table 1); wastes from pesticides industry (Annex I Table 2); used container, spills, expired material, product that do not meet specification that are classified as hazardous wastes for POPs of aldrin, chlordane, DDT, dieldrin, endrin and hexachlorobenzene. Regulates threshold limit value of Toxicity Characteristic Leaching Procedure (TCLP) for POPs of aldrin, dieldrin, chlordane, endrin, heptachlor, hexachlorobenzene, lindane, PCBs and toxaphene.
18.	Minister of Environment Decree No. 23 of 2014 concerning Technical Evaluation Team on Persistent Organic Pollutants	<ul style="list-style-type: none"> Regulates technical evaluation team on POPs.
19.	Minister of Agriculture Decree No. 847 of 2011 concerning Commission on Pesticides	Stipulates roles and tasks of commission on pesticides, particularly its role in providing suggestion to Minister of Agriculture regarding pesticides management.
20.	Minister of Agriculture Decree No. 24 of 2011 concerning Requirements and Procedure for Pesticides Registration	Regulates POPs pesticides, including: aldrin, chlordane, dieldrin, endrin, heptachlor, mirex, toxaphene, DDT, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, chlordene, lindane, pentachlorobenzene and endosulfan.
21.	Minister of Manpower and Transmigration Decree No. 13 of 2011 concerning Threshold Limit Value for Occupational Physical and Chemical Factors	Regulates occupational chemical threshold limit value for POPs of: aldrin, DDT, dieldrin, endosulfan, endrin, hexachlorobenzene, chlordane and toxaphene.
22.	Minister of Trade Decree No. 44 of 2009 concerning Provision, Distribution and Inspection of Hazardous Substances	Does not specifically regulate POPs, but stipulates instead: (1) kind of hazardous substances (2) import provision, (3) distribution of hazardous substances, (4) permit process, (5) reporting of hazardous substances, (6) prohibition and (7) facilitation, inspection and sanction.

No.	Laws and regulations	Regulations related to POPs
23.	Minister of Agriculture Decree No. 42 of 2007 concerning Inspection of Pesticides	<ul style="list-style-type: none"> • Regulates in detail regarding inspection of pesticides that consists of inspection of production, distribution, storage and utilisation of pesticides in order to ensure its quality and effectiveness, that it does not have harmful impact on human and environment and comply with relevant laws and regulations. • Regulates roles and responsibilities of inspector of pesticides (government inspector, provincial inspector and city/district inspector).
24.	Minister of Health Decree No. 472 of 1996 concerning Safety of Health Hazard Material	Regulates the utilisation of POPs: endosulfan, hexachlorobenzene and heptachlor.
25.	Minister of Agriculture Decree No. 276 of 2008 concerning Commission on Pesticides	Provides details on the duties of the Commission on Pesticides, particularly on its role in advising the Minister of Agriculture on issues relating to pesticides management.
26.	Minister of Transportation Decree No. 69 of 1993 and No. 30 of 2002 concerning Carrying Out of Road Transportation	Does not specifically regulate transportation of POPs, instead stipulates in detail requirements of hazardous substances transportation (Article 11 to Article 16).
27.	Minister of Industry Decree No. 148 of 1985 and No. 24 of 2006 concerning Inspection of Production and Utilisation of Hazardous Substances for Industry	<ul style="list-style-type: none"> • Regulates pesticides POPs in general (including pesticides itself and its active ingredients), however does not stipulate the kind of pesticides and its active ingredients. • Regulates that industry is totally responsible for their management of hazardous substances from provision, storage, processing, packaging and transportation to distributor.
28.	Head of Bapedal Decree No. 3 of 1995 concerning Technical Requirements for Hazardous Wastes Treatment	<ul style="list-style-type: none"> • Regulates concentration in extraction test of wastes (TCLP) for POPs of aldrin, dieldrin, chlordane, endrin, heptachlor, hexachlorobenzene, lindane, PCBs and toxaphene. • Regulates threshold limit value for destruction and removal efficiency (DRE) for POPs of polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-p-dioxins (PCDDs). The threshold limit value for the three of POPs shall be no less than 99.9999 percent. • Regulates threshold limit value of liquid wastes from hazardous wastes treatment for POPs of polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-p-dioksin (PCDDs).
29.	Head of Bapedal Decree No. 4 of 1995 concerning Requirement Procedure for Landfilling of Treated Hazardous Wastes, Former Treatment Location of Hazardous Wastes and Former Landfill of Hazardous Wastes	<ul style="list-style-type: none"> • Regulates total concentration of untreated hazardous wastes and its landfill category (Table 2) for POPs of hexachlorobenzene. • Regulates concentration in extraction test of wastes (TCLP) – Table 3 for POPs of aldrin, dieldrin, chlordane, endrin, heptachlor, hexachlorobenzene, lindane, PCBs and toxaphene. • Regulates threshold limit value for liquid wastes from hazardous wastes treatment (Table 5) for POPs of polychlorinated biphenyls (PCBs), polychlorinated dibenzofurans (PCDFs) and polychlorinated dibenzo-p-dioxins (PCDDs).

In general, most POPs substances in Stockholm Convention have been governed in many regulations in Indonesia. There are at least four regulations that comprehensively govern the substances, which are Minister of Agriculture Decree No. 24 of 2011 concerning Requirements and Procedures for Pesticides Registration, Government Regulation No. 74 of 2001 concerning Hazardous Substances Management, Government Regulation No. 18 and No. 85 of 1999 concerning Hazardous Wastes Management, as well as Government Regulation No. 82 of 2001 concerning Water Quality Management and Pollution Control. Table 2.8 shows that some of Stockholm Convention's POPs are yet to be regulated. In the future the substances shall be governed thoroughly in Indonesian regulations.

Table 2.8. Summary matrix of POPs regulation in Indonesian laws and regulations

No.	POPs	GR No. 18 and No. 85 of 1999	GR No. 74 of 2001	GR No 82 of 2001	Minister of Agriculture Decree No. 24 of 2011
1.	Aldrin	✓ D202	✓	✓	✓
2.	Chlordane	✓ D202	✓	✓	✓
3.	Dieldrin	✓ D202	✓	✓	✓
4.	Endrin	✓ D202	✓	✓	✓
5.	Heptachlor	✓ D202	✓	✓	✓
6.	Hexachlorobenzene	✓ D202	✓	-	-
7.	Mirex	-	✓	-	✓
8.	Toxaphene	✓ D202	✓	✓	✓
9.	Polychlorinated biphenyls (PCBs)	✓	✓		-
10.	DDT	✓ D202	✓	✓	✓
11.	Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/Fs)	✓	-	-	-
12.	Alpha-hexachlorocyclohexane	✓ D202	✓	-	✓
13.	Beta-hexachlorocyclohexane	✓ D202	✓	-	✓
14.	Chlordecone	✓ D202	-	-	✓
15.	Hexabromobiphenyl	-	-	-	
16.	Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether)	-	-	-	-
17.	Lindane	✓ D202	✓	✓	✓
18.	Pentachlorobenzene	✓ D202	-	-	✓

No.	POPs	GR No. 18 and No. 85 of 1999	GR No. 74 of 2001	GR No 82 of 2001	Minister of Agriculture Decree No. 24 of 2011
19.	Perfluorooctane sulfonyl fluoride	-	-	-	-
20.	Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether)	-	-	-	
21.	Endosulfan	✓ D202	-	-	✓
22.	Hexabromocyclododecane	-	-	-	-

Note: ✓ = regulated in the regulation, - = not regulated in the regulation, details of each regulation is illustrated in Table 2.7.

2.2.4. Key approach and procedures for POPs chemical and pesticides management including enforcement and monitoring requirements

As mentioned earlier, all life cycle stages of POPs substance and pesticides are governed in various laws and regulations in Indonesia. These include from regulation of their existence, import, utilization, emission and fate within the environment, wastes containing of POPs, to remediation of contaminated sites. However, existing laws and regulations do not cover all POPs chemicals. They instead mainly govern some of the chemicals and pesticides under POPs. There are three POPs whose life cycle stages are not regulated namely PFOS and related substances, PBDEs (to include: tetrabromodiphenyl ethers and pentabromodiphenyl ethers (commercial pentaBDEs) and hexabromodiphenyl ethers and heptabromodiphenyl ethers (commercial octaBDEs) and lately hexabromocyclododecanes (HBCDs), which was recently added to the list of POPs during COP 6 in 2013.

Instruments for law enforcement on POPs are already available in Indonesia. Inspectors and investigators, police or civilian officials, have carried out enforcement activities, including those carried out for POPs chemicals and pesticides. On sanctions, Law No. 32 of 2009 concerning Environmental Protection and Management governs sanctions in detail on environmental pollution including pollution from POPs chemicals and pesticides. The law firmly rules that environmental pollution is a criminal action. Law No. 12 of 1992 concerning Plant Cultivation System governs sanction regarding pesticides, which includes: (a) utilisation of method and/or facility for plant protection that harms human health and threatens human safety or degrades the environment, (b) distribution of unregistered

pesticides or pesticides that do not conform to label and (c) failure to destroy pesticides prohibited for distribution or pesticides that do not meet quality standard, are damaged or unregistered. Both of these laws govern imprisonment and penalty sanctions.

Inspection and monitoring of chemical and POPs pesticides are also governed in various regulations, nevertheless, not all POPs are included in the regulations.

- Inspection of utilization of pesticides is regulated under Minister of Agriculture Decree No. 42 of 2007 concerning Inspection of Pesticides;
- Monitoring of POPs emission in wastes incinerator is regulated under Head of Bapedal Decree No. 3 of 1995 concerning Technical Requirements for Hazardous Wastes Treatment;
- Monitoring of POPs containing hazardous wastes for landfill is regulated under Head of Bapedal Decree No. 4 of 1995 concerning Requirements Procedure for Landfill of Treated Hazardous Wastes, Former Treatment Location of Hazardous Wastes and Former Landfill of Hazardous Wastes;
- Monitoring regarding POPs in water resources is regulated in Government Regulation No. 82 of 2001 concerning Water Quality Management and Pollution Control. The Central Facility for Environmental Pollution Control Laboratory within MoE regularly conducts this kind of monitoring;
- Monitoring of POPs in occupational air quality is regulated under The Minister of Manpower and Transmigration Decree No. 13 of 2011 concerning Threshold Limit Value for Occupational Physical and Chemical Factors.

Indonesia has a national reference environmental laboratory, which is called the Central Facility for Environmental Pollution Control (Pusarpedal). Pusarpedal monitors some POPs on a regular basis. The laboratory was accredited by the National Accreditation Committee (KAN) in 2001 and in 2005. The functions of the Pusarpedal are as follows:

- Environmental quality monitoring, coordination and development of environmental quality monitoring network, as well as management of environmental quality monitoring data;
- Review on environmental quality monitoring result, environmental quality standards and environmental damage criteria;

- Management of laboratory references, which are conducting review and development of method for environmental quality parameter testing, development and establishment of standard reference material, proficiency testing material and verification of testing result data discrepancies;
- Sampling and environmental parameter quality testing as well as calibration of laboratory equipment and environmental laboratory technical service;
- Development and evaluation of system, technical aspects, management and human resources of environmental laboratories and conducting proficiency test.

At the local level monitoring facilities are also available in environmental laboratories belonging to local government (provincial and district/city). Pusarpedal also provides coaching and facilitation to laboratories in improving their performance on monitoring and analysis. Table 2.9 denotes the number and location of environmental laboratories in provinces throughout Indonesia. In general, only some of these laboratories can analyse some POPs substances. Accredited laboratories can be further developed to become laboratories that are able to analyse POPs substances.

Table 2.9. Environmental laboratories in provinces throughout Indonesia¹

No.	Province	Accredited Laboratory	Registered Laboratory
1.	Aceh	-	-
2.	North Sumatera	1	-
3.	West Sumatera	2	-
4.	Riau	1	-
5.	Jambi	1	-
6.	South Sumatera	2	1
7.	Bengkulu	-	-
8.	Lampung	2	-
9.	Bangka Belitung Islands	1	-
10.	Riau Islands	-	1
11.	DKI Jakarta	1	7
12.	West Java	4	7
13.	Central Java	4	4
14.	D I Yogyakarta	2	2

¹ Ministry of Environment.

No.	Province	Accredited Laboratory	Registered Laboratory
15.	East Java	4	3
16.	Banten	1	2
17.	Bali	-	-
18.	West Nusa Tenggara	1	-
19.	East Nusa Tenggara	-	-
20.	West Kalimantan	2	-
21.	Central Kalimantan	-	-
22.	South Kalimantan	2	-
23.	East Kalimantan	3	2
24.	North Sulawesi	1	1
25.	Central Sulawesi	1	-
26.	South Sulawesi	2	-
27.	Southeast Sulawesi	1	-
28.	Gorontalo	-	-
29.	West Sulawesi	-	-
30.	Maluku	1	-
31.	North Maluku	-	-
32.	West Papua	-	-
33.	Papua	1	1

2.3. Effect of POPs on Human Health

People are mainly exposed to POPs through contaminated foods causing adverse health effects related to reproductive, developmental, behavioral, neurologic, endocrine and immune systems. In particular, exposure to high levels of certain POPs are associated with serious human health problems, including cancer, neurological damage, birth defects, sterility, immune system defects and even death. Laboratory studies have shown that low doses of certain POPs can adversely affect organ systems. Chronic exposure to low doses of certain POPs may affect the immune and reproductive systems. A number of populations are at particular risk of POPs exposure, including people whose diets include large amounts of fish, shellfish, or wild foods that are high in fat and locally obtained.

In Indonesia, investigation into the impacts of environmental exposures, which are mainly caused by chemical exposures are recorded as non-communicable diseases (NCDs)

surveillance. The 2010 WHO Report¹ for Indonesia stated that total NCDs deaths was 1.1 million of the total population (2008). It is equal to 63.6 % deaths of all causes (30.6% caused by cardio vascular diseases, 14.5% by heart ischemic and 12.9% by cancer).

In Indonesia, since 1988, the incidence of cancer tends to increase every year and may soon be expected to be formidable. It is currently estimated that there will be at least 170–190 new cancer cases annually per 100,000 people. Cancer deaths become the sixth rank among other causes of death, such as infectious diseases, cardiovascular diseases, traffic accidents, nutritional deficiency and congenital diseases. As there are no population-based registries in Indonesia, there is no specific data on the exact incidence and prevalence of cancer. However, data collected from hospitals in several regions shows that cancer incidence increased by 2-8% per year in the last decade. Data from the most pathological laboratories in Indonesia from 1988-2007 reveals that in the combined picture, cervical, breast, lymph node, skin and nasopharynx are the five major anatomical sites for cancer disease. Among females, the most common cancers are cervical, breast and ovarian cancer and among males skin, nasopharynx and lymph node cancer. The top ten leading cancers among female between 2005-2007 are breast cancer (with 18.6 per 100,000 incidences), cervical cancer (9.25 per 100,000), ovary cancer (4.27 per 100,000), colorectal cancer (3.15 per 100,000) and bronchus and lung cancer (2.40 per 100,000), thyroid cancer (2.21 per 100,000), corpus utery cancer (1.76 per 100,000), pharingeal cancer (1.72 per 100,000), leukaemia (1.61 per 100,000) and liver cancer (1.41 per 100,000). The top ten leading cancers among male are bronchus and lung cancer (incidence 5.81 per 100,000), colorectal cancer (4.13 per 100,000), liver cancer (4.01 per 100,000), pharyngeal cancer (3.65 per 100,000) and prostate cancer (2.82 per 100,000).

2.4. Assessment of POPs Issue in Indonesia

2.4.1. Assessment with respect to POPs pesticides (Annex A, Part I chemicals)

Among the POPs pesticides listed under Annex A, Part 1 of the Stockholm Convention, (aldrin, alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, chlordane, chlordanone, dieldrin, endrin, heptachlor, mirex, toxaphene, hexachlorobenzene and lindane), only dieldrin, chlordane, endosulfan and toxaphene were registered and permitted for use in

¹ WHO. 2010. World Health Statistics 2010. WHO statistical information system.

Indonesia (the 2008 NIP). Nevertheless, toxaphene was banned since 1980, chlordane and dieldrin since 1992. The prohibiton of these POPs pesticides, particularly the initial POPs pesticides was promulgated under Government Regulation No. 74 of 2001. Furthermore, based on Ministerial Decree No. 7 of 2007 in junction with that of No. 24 of 2011, any pesticide used in Indonesia should be registered by Ministry of Agriculture (MOA). In addition, the Commission on Pesticides plays an important role in formulating policy on the use of pesticides including its registration and application in Indonesia.

As described in the 2008 NIP, information related to the amount of use of POPs pesticides listed under Annex A in Indonesia is not available. Nonetheless, inventory result carried out in 2013 through documentation at the Ministry of Agriculture showed that organochlorine pesticides were still registered in Indonesia between 1992-2012. This document does not specifically reveal the types of registered organochlorine pesticides. Regarding the newly listed POPs pesticides, endosulfan was still registered in 2008, but it was no longer registered in the following years. Figure 2.1 illustrates the amount of organochlorine pesticides registered at MoA in the years 1992-2012.

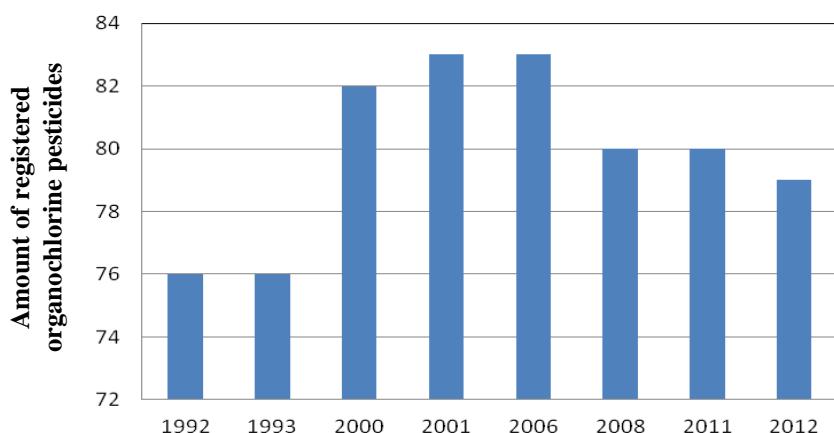


Figure 2.1. Amount of registered organochlorine pesticides 1992-2012

In general farmers only recognized certain organochlorine pesticides such as endrin, DDT and endosulfan. DDT was last used around 1980 and endrin in 1990. Whereas endosulfan was still used under the trade name Akodan albeit in small amount. Akodan (containing 20% endosulfan) is still sold and found in small kiosks. Therefore, stockpiles of endosulfan are sill available and sold at small retailers (kiosks). Further inventory is required to gather more information on the amount of existing stockpiles. On the other hand, lindane is

still used for second line head lice treatment in Indonesia. In 2012, lindane was registered by two companies at MoE and imported from India under the trade name of Gamaxene.

The Government of Indonesia has enacted the Government Regulation No. 74 of 2001 concerning Hazardous Substances Management. This regulation prohibits the export and import on specific chemicals material listed under Annex A of the Stockholm Convention. Indonesia is not a country producing POPs pesticides as listed in Annex A. Based on the inventory activity in 2003, the result revealed that there were no record on the importation of POPs pesticides as well as production activity. The result also indicated that there were no available stockpiles.

2.4.2. Assessment of PCBs (Annex A, Part II chemicals)

PCBs inventory has been conducted since 2003, which was reported in the 2008 NIP. It was estimated that 23,108 tons of transformer oil were contaminated with PCBs. However, it should be noted that it was recalculated to be 5,107 tons in 2012 caused by redundant calculation.

Updating inventory of PCBs was conducted in two phases, i.e. during the PCBs Project Preparation Phase (Phase I) together with MoE, UNIDO, Ministry of Energy and Mineral Resources (MoEMR) and other relevant sectors between March 2012 – February 2013 and PCBs inventory in 2013 (Phase II) involving the PLN focused in the island of Java. Additional questionnaires were sent to relevant industries. During the preparation phase (Phase I), PCBs inventory was conducted for one year. The methodology used was through sending questionnaires, reviews and responses, collecting samples from the site and conducting analysis using portable Dexsil L-2000DX equipment. From the 79 questionnaires sent by the MoEMR (86% power plant and electrical services, 14% oil and mining company), only 31% responded. Only two respondents mentioned that they used Ascarel (PCBs trade name). Most respondents use Nynas or Shell Diala, which are PCBs free. Site visits were conducted by MoE together with MoEMR in 22 locations covering the islands of Java (13 locations), Sumatra (three locations), Sulawesi (two locations), Bali, Nusa Tenggara, Batam and Papua (one location within each island). A total of 221 samples were collected and screened using the Dexsil L-2000DX equipment. All data reported were obtained from chlorine reading and calculated and converted to PCBs arochlor 1242 using Dexsil L-2000

DX. A total of 1,026 tonnes of oil were suspected of containing PCBs with more than 50 ppm.¹

In 2013, a total of 410 questionnaires were sent to companies. However, only 20 companies (4.9%) returned the questionnaires related with their transformers and capacitors. In this period 165 transformers and 214 capacitors were recorded. From the data collected, no respondent mentioned the use of PCBs commercial name.

Respondents also stated the use of Shell Diala B, Nynas Nyetro, Onadyn 5 and Esso as insulation transformer's oil, which are considered as an alternative of PCBs free insulation transformer's oil. In obtaining more representative data of PCBs inventory, further inventory was conducted by the Research and Development Centre of PLN (PLN Puslitbang) focusing on the island of Java. Different samples from Phase I Preparation PCBs Project inventory were collected. A total of 1,088 transformers from the power plant and electrical services (30 kV transformer and above) were collected. However, with respect to the completeness of data, only 818 data samples are used and screened in this study. The 818 samples were gathered from 14 transmission sector locations, namely Semarang, Bandung, Cirebon, Cilegon, Malang, Madiun, Probolinggo, Duri Kosambi, Karawang, Surabaya, Bogor, Pulogadung, Salatiga and Purwokerto. Similar with the Phase I Preparation PCBs Project Inventory, all samples were tested using Dexsil L-2000DX equipment.

Most of the oil samples were gathered from in use transformers (97.67%), only 2.33% were not in operation. In this inventory, samples were collected not only before year 1985 but also consist of newer year production to analyze the cross contamination of PCBs. The result shows that 39.24% of a total population of 818 transformers were contaminated with PCBs at the concentration of 50 ppm and above.

A total of 5,906 tonnes of oil were calculated from all samples suspected to be contaminated with PCBs of more than 50 ppm. Therefore, the total amount of contaminated oil with PCBs above 50 ppm from PCBs inventory since 2012 in Phase I and Phase II using Dexsil L-2000 DX equipment is about 6,932 tonnes.

¹ Purnomo and Achmadi. PPG PCB Project Report. 2013.

Due to data availability, the estimation of PCBs oil in the study is based on the transformers available in State Electricity Company within the power plant sector, transmission transformer and distribution transformer and transformers managed by industries. Assuming that 39.24% of the contamination occurs in the power plant's oil transformers, transmission and distribution transformers, it can be estimated that about 14,967 tonnes of oil is contaminated with PCBs. At present the amount of oil contaminated by PCBs within industry is 7,911 tonnes, the amount of which derived from electricity sales to industries in PLN's yearly report, assuming that the industrial sector has and manages its own electrical transformer. The PCBs oil in Indonesia in this study is estimated at 22,878 tonnes.

PCBs has been banned through GR No. 74 of 2001. Meanwhile PCBs wastes is regulated under GR No. 18 of 1999 in conjunction with GR No. 85 of 1999 concerning Hazardous Wastes Management. Further details on the handling of PCBs hazardous wastes is stipulated in Head of Bapedal Decree No. 3 of 1995 concerning the Technical Requirements for Hazardous Wastes Treatment and Head of Bapedal Decree No. 4 of 1995 concerning Requirement Procedure for Landfilling of Treated Hazardous Wastes, Former Treatment Location of Hazardous Wastes and Former Landfill of Hazardous Wastes. Detailed information related to PCBs trade name is shown in Table 2.10.

Table 2.10. Information related to PCBs trade name¹

Manufacturer	PCBs Fluid Trade Name
Aerovox	Hyvol
Allis-Chalmers	Chlorectol
American Corporation	Asbestol
Bayer (Germany)	Clophen
Caffaro (Italy)	DK, Fenclor, Inclor
Cornell Dubilier	Dykanol
Electrical Utilities Corporation	Eucarel
Eriez Magnets	Pyranol
ESCO Manufacturing Company	Askarel*
Ferranti-Packard Limited	Askarel*
General Electric	Pyranol

¹ USEPA. 2004. PCBs Inspection Manual.

Manufacturer	PCBs Fluid Trade Name
Hevi-Duty Electric	Askarel*
ITE Circuit Breaker	Non-Flammable Liquid
Jard Corporation	Clorphen
Kanegafuchi (Japan)	Kennechlor
Kuhlman Electric	Saf-T-Khul
McGraw Edison	Elemex
Mitsubishi (Japan)	Kennechlor, Santotherm
Monsanto (US and UK)	Aroclor
Monsanto (US)	Therminol, Pydraul, Santovac 1 and 2
Monsanto (UK and Japan)	Santotherm FR
Monsanto (UK and Europe)	Pyroclor
Niagara Transformer Corporation	Askarel*, EEC-18
P.R. Mallory & Company	Aroclor B
Power Zone Transformer	EEC-18
Prodelec (France)	Phenoclor, Pyralene
Research-Cottrell	Askarel*
Sangamo Electric	Diaclor
Sprague Electric Company	Chlorinol
Universal Manufacturing Corporation	Askarel*
Wagner Electric	No-Flamol
Westinghouse	Inerteen
Others	Nepolin, Apirolio, Kaneclor

* Generic name for non-flammable insulating liquids

The preliminary inventory did not address PCBs in open application. While the use of PCBs in open application has probably been small in developing countries, it is important to have a rough assessment of potential former open PCBs use in Indonesia. Therefore, this issue is currently discussed during the National Steering Committee (NSC) meeting and is incorporated in the current national action plan.

2.4.3. Assessment of POP-BDEs (Annex A, Part IV and Part V chemicals) and HBB (Annex A, Part I chemicals)

PBDEs are a group of industrial organobromines produced from 1975 to 2004 as additive flame retardants. Among commercial PBDEs (Penta-, Octa- and DecaBDEs formulations), commercial penta- and octaBDEs (c-PentaBDEs and c-OctaBDEs) contain

homologues of tetra-, penta-, hexa- and heptabromodiphenyl ethers, which are listed as POP-PBDEs under the Stockholm Convention. These commercial mixtures have been used in various applications including electrical and electronic equipments, transportation sector, furniture, textile and carpet and construction materials. Detailed information related to commercial formulation of penta- and octaBDEs including their synonyms, trade names and composition of their mixtures is shown in Table 2.11.

Table 2.11. Information related to commercial formulation of penta- and octaBDE^{1,2}

	Commercial Product	
	Pentabromodiphenyl ether (c-PentaBDE)	Octabromodiphenyl ether (c-OctaBDE)
Synonym	<ul style="list-style-type: none"> - Pentabromodiphenyl ether - Pentabromodiphenyl oxide - Pentabromobiphenyl oxide - Benzene, 1,1-oxybis, pentabromo derivative 	<ul style="list-style-type: none"> - Octabromodiphenyl ether - Octabromodiphenyl oxide - Octabromobiphenyl oxide - Benzene, octabromo derivative; - Phenyl ether, octabromo derivative
Trade Name	<ul style="list-style-type: none"> - Bromkal 70-5 DE - Bromkal 70 - Bromkal G1 - DE 71 - Pentabromprop - FR 1205/1215 - Tardex 50 - Tardex 50 L - Saytex 115 	<ul style="list-style-type: none"> - Bromkal 7908DE - DE 79 - FR 143 - FR 1208 - Tardex 80 - Adine 404 - Saytex 111
Composition	triBDEs (0.5%), tetraBDEs (33%), pentaBDEs (58%), hexaBDEs (8%), heptaBDEs (0.5%)	hexaBDEs (11%), heptaBDEs (43%), octaBDEs (35%), nonaBDEs (10%), decaBDEs (1%)
Usage	Additives flame retardant that were added to polyurethane foam found in seat, headrest, ceiling, acoustic systems, etc. and in automotive products (transport sector). It is also applied to other sectors such as furniture, mattresses, rebound materials, construction materials, rubber, drilling operations, textile (work clothes, curtains)	Additives flame retardant that were added to polymers, especially plastic ABS, HIPS, PBT, Polyamide-polymer contained in casing personal computers, TVs, CRT computer/TV monitors, LCD monitors, laptops, printers, mobile phones, photocopiers, etc., and in electronics and electrical equipments
Main Region Consumer	America	Asia, America

¹ UNEP. 2012. Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organik Pollutants. p. 100.

² Scott Masten. 2001. Toxicological Summary for Selected Polybrominated Diphenyl Ethers. National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina, USA. p. 136.

	Commercial Product	
	Pentabromodiphenyl ether (c-PentaBDE)	Octabromodiphenyl ether (c-OctaBDE)
Application Period	1975~2004	1975~2004

Based on current inventory of POP-PBDEs,¹ no information on production, use, export and import of c-Penta- and c-OctaBDE can be gathered. An estimation of POP-PBDEs has been conducted based on estimation of c-Penta- and c-OctaBDE in products of two main sectors, i.e. electrical and electronic equipments (EEE) and in the transportation sector.² Calculations were conducted using statistic data on the number of cathode ray tubes (CRT) TV and computers monitor for the period of 1975-2012, which was obtained from UNComtrade³ for the EEE sector and data on the number of vehicles, such as cars, buses and trucks in the transportation sector for the period of 1975-2004, which was obtained from GAIKINDO (Association of Indonesia Automotive Industries).⁴

The cumulative estimate of POP-PBDEs generated from imported CRTs and their origin from local production minus (deducted by) exported CRTs in 1975-2012 is 112,197 kg for heptaBDE and 28,702 kg for hexaBDE. Furthermore, the estimated total amount of polymer plastic in all CRTs is 270,794 tonnes, generated from imported CRTs, which were 211,066 tonnes plus 286,760 tonnes from national production of CRTs and minus (deducted by) 227,032 tonnes from exported CRTs.

The estimated amount of CRTs containing PBDEs in use based on Tier 1 calculation was 1,049,918 tonnes, out of which the polymer fraction is approximately 315,000 tonnes. This number is higher compared to the calculated volume and there might be a slight overestimation. The total amount of c-octaBDEs in CRTs based on the Stockholm Convention PBDE inventory guidance emission factors ranges between 274 tonnes – 800 tonnes with POPs. The average POP-PBDEs based on Tier 1 was calculated at 231 tonnes heptaBDE and 59 tonnes hexaBDE. A further assessment may be conducted in the framework of a national e-wastes inventory.

¹ Sudaryanto, A. and Ilyas, M. 2014. Preliminary Inventory Persistent Organic Pollutants – Polybrominated Diphenyl Ethers (POPs-PBDEs) in Indonesia. Basel Convention Regional Centre for South East Asia.

² UNEP. 2012. Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organik Pollutants. pp. 100.

³ Uncomtrade. 2013. United Nations Commodity Trade Statistics Database.

<http://comtrade.un.org/db/default.aspx>. Accessed in July 2013.

⁴GAIKINDO. 2013. Indonesian Association for Car Manufacturer Home Page. <http://www.gaikindo.co.id>.

Whereas based on data of domestic car sale during 1975-2004 and second-hand imported car, the amount for tetraBDE was 19,697 kg, 34,619 kg for pentaBDE, 4,775 kg for hexaBDE and 298.7 kg for heptaBDE. Estimation of POP-PBDEs based on current data of EEE/WEEE was in the range between the estimation based on penetration rate of CRTs using Asian region data¹ and the number of population of Indonesia in 2004² (ranging from 104,370 kg to 304,712 kg for heptaBDE and from 26,699 kg to 77,950 kg for hexaBDE). Furthermore, through literature search, it has been reported that PBDEs were widely detected in various environmental matrices (soil, sediment, air and dust), biota (fish and shellfish), foodstuffs and human in Indonesia, indicating ubiquitous environmental contamination and human exposure to the compounds in Indonesia. Regarding policy and regulations, there is no regulation in Indonesia that regulates POP-BDEs and HBB.

2.4.4. Assessment with respect to DDT (Annex B Part II chemicals)

DDT has been banned in Indonesia. It was never registered as a pesticide and this material is no longer used to eradicate malaria in Indonesia (the authority is under the Ministry of Health (MoH)). There is no intention by the government to submit an exemption in using DDT in the future.

Although the use of DDT has been banned for a long time, DDT residue is still present in the environment. DDT was used to control mosquitoes until 1993. DDT that contaminated agricultural land area entered rivers, including the river sediment, flowed into coastal areas, the sea and eventually entered the food chain. Pusarpedal, under the Ministry of Environment, is responsible for implementing a national monitoring program to determine the actual state of the environmental pollution, including those caused by POPs. Pusarpedal in cooperation with the United Nations University (UNU) monitored POPs residues in several locations, including river and sea waters and soil sediments. Independently, Pusarpedal also monitors POPs residues at locations that could be potentially contaminated by POPs, namely in agricultural lands.

In 2012, Pusarpedal monitored residual of some POPs compounds including other organochlorine compounds, i.e. HCB, heptachlor, heptachlorepoxyde, aldrin, endrin, dieldrin,

¹UNEP. 2012. Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants. pp. 100.

² BPS, Statistics Indonesia. 2013. <http://www.bps.go.id/>.

mirex, chlordane, DDT and its derivatives (DDE and DDD), hexachlorocyclohexane (lindane) and methoxychlor. Selected monitoring sites were in the areas of agriculture or horticulture in West Java (Cianjur and Bandung), Central Java (Kopeng and Bandungan), East Java (Batu) and North Sumatra (Brastagi). The purpose of this monitoring was to fulfil the obligation of the Convention, in particular Article 11 and to obtain a more representative data on POPs contamination in the environment. Compounds found in agricultural areas in general were DDT and its derivatives with concentrations in soil or sediment higher than that in water. Most of the river waters did not contain DDT and its derivatives, except the one in Batu (Figure 2.2). *p,p'*-DDT was detected in two locations in Batu, i.e. 0.0157 µg/L and 0.0260 µg/L. Meanwhile the derivatives, *o,p*-DDD, *p,p'*-DDD, *o,p*-DDE, *p,p'*-DDE and *o,p*-DDT were detected only in one of the districts, which was from 0.007 to 0.016 µg/L.

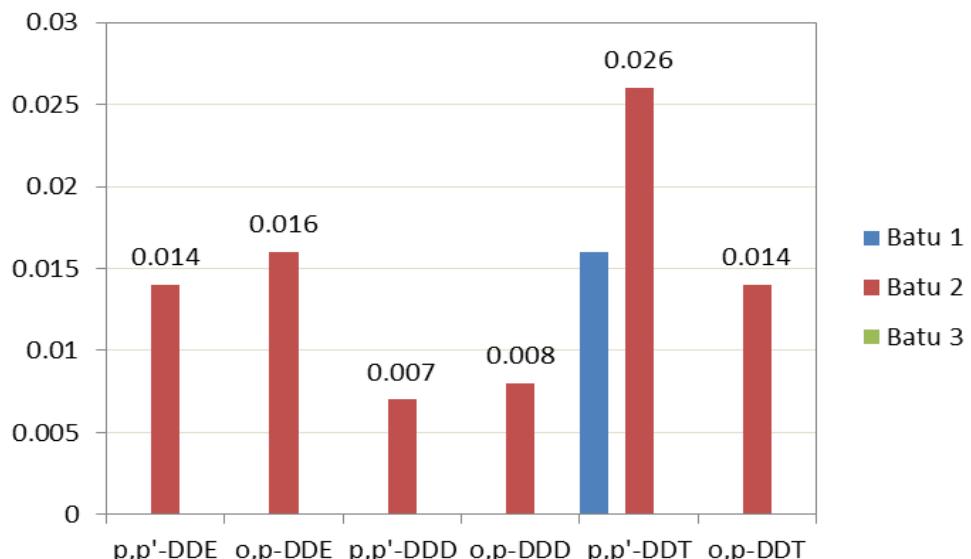


Figure 2.2. Concentration of DDT in river water in Batu , East Java¹

DDT and its derivatives were found in most of the river sediment monitoring points. In the river sediments located in Bandung, West Java, the residue of *p,p'*-DDT and *o,p*-DDT were found in two monitoring points ranging from 2.5 to 24.6 µg/kg. DDT derivatives were found in the range of 1.5 to 1.9 µg/kg. In stream sediments in Batu, Cianjur and Medan, the *p,p*-DDT was found in the range of 2.8-7.7 µg/kg, while the derivatives of DDT were found in the range of 0.7-4.0 µg/kg. Lindane was only detected in river sediments in Bandung, with

¹ Pusarpedal. 2012. Pemantauan Persistent Organic Pollutants (POPs) di Indonesia. Pusarpedal, Kementerian Lingkungan Hidup. Jakarta.

a concentration of 4.46-6.7 μ g/kg (Figure 2.3). The fact that *p,p*-DDT was detected in sediment with a higher concentration than the derivatives indicates the possibility of new entries from the use of DDT to the environment.

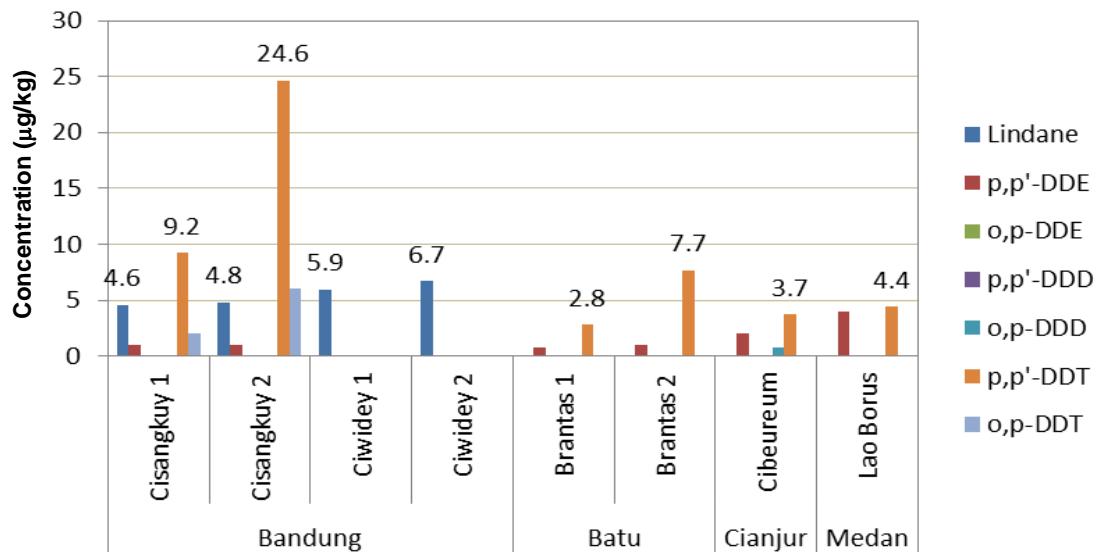


Figure 2.3. Concentration of OCs in sediment of four survey sites in Indonesia¹

In the agricultural lands, the only POPs residues found was DDT and its derivatives, except that in paddy soil in Bandung where there was lindane concentration of 21 μ g/kg. The highest concentration of DDT was found in Cianjur horticultural area and the next highest was in Batu agricultural lands. The highest concentration of DDT was found in the form of parent compound (*p,p*-DDT) with a magnitude of 144 μ g/kg. In Batu apple orchards, the highest concentration of *p,p*-DDT was 54 μ g/kg, whereas for other agricultural land located in Bandung, Semarang and Medan the detectable concentrations of DDT and its derivatives was only less than 6 μ g/kg (Figure 2.4).

The detected POPs with concentrations in both stream sediments and in farmland higher than that in the river water is in accordance with the nature of hydrophobicity and lipophilicity of the POPs. Thus, these compounds are water insoluble and readily accumulate in sediment or soil. Continuous monitoring is necessary to obtain a representative and accurate data on POPs contamination in the environment. Pusarpedal monitoring survey in 2012 showed that POPs residues were still detected in water, sediment and soil. These results

¹ Pusarpedal. 2012. Pemantauan Persistent Organic Pollutants (POPs) di Indonesia. Pusarpedal, Kementerian Lingkungan Hidup. Jakarta.

also indicate the need to further investigate the active components of insecticides or fungicides that farmers still use. Although POPs are no longer used, the presence of DDT and others in the environment proves the constant threat of the use of POPs in the past.

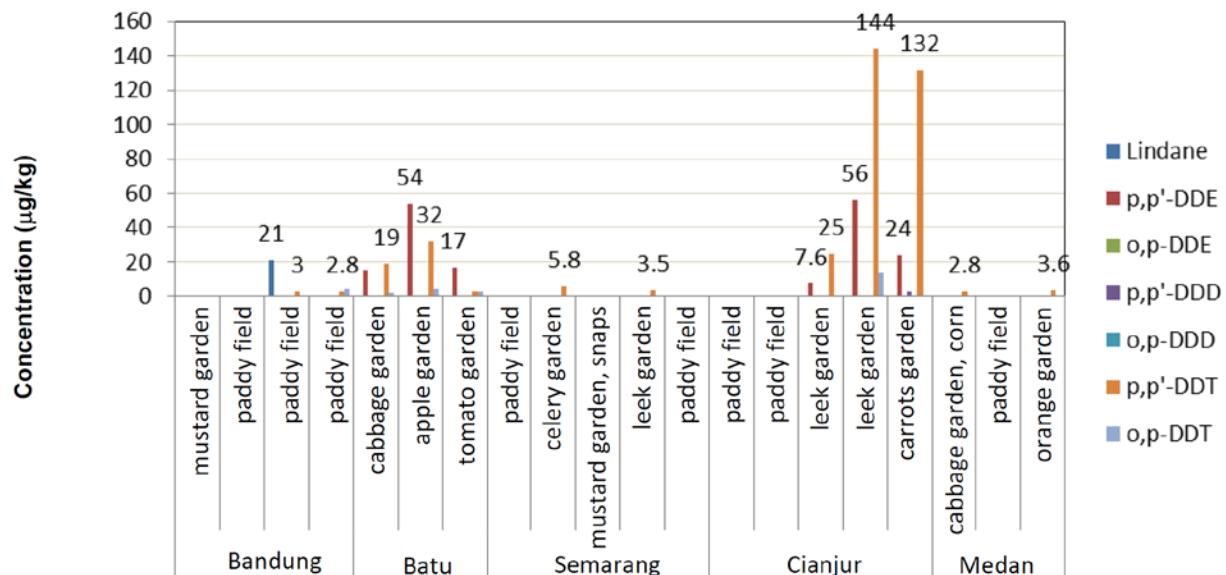


Figure 2.4. Concentration of OCs in soil of five areas in Indonesia¹

Bendiocarb (carbamate) is being used for DDT replacement in addition to the application of integrated strategies based on social and ecological approaches.

2.4.5. Assessment of PFOS, its salts and PFOSF (Annex B, Part III chemicals)

PFOS is a fully fluorinated anion, usually used as a salt in some applications or incorporated into larger polymers. PFOS is produced synthetically from PFOSF (perfluorooctane sulfonyl fluoride) and can be derived from its salt when dissolved. Terms of PFOS related substances are used for all substances containing one or more groups of PFOS ($C_8F_{17}SO_2$), which can be degraded into PFOS in the environment. PFOS, its salts and perfluorooctane sulfonyl fluoride (PFOSF) are included in Annex B of the Stockholm Convention in 2009. Table 2.12 shows general information related to PFOS and industries using PFOS and material related to PFOS.

¹ Pusarpedal. 2012. Pemantauan Persistent Organic Pollutants (POPs) di Indonesia. Pusarpedal, Kementerian Lingkungan Hidup. Jakarta.

Table 2.12. Examples of industrial uses of PFOS and PFOS-related substances¹

Category	Chemical name	Trade name	Use of PFOS & its related chemicals
Manufacture of articles and products using PFOS as a chemical			
Metal plating industry	tetraethylammonium perfluorooctane sulfonate (CAS No. 56773-42-3)	Fluorotenside-248, SurTec 960, FC-248 and FT-248m	Surfactants/wetting agents/mist suppressants in hard and decorative chrome plating, which can reduce the emission of chromium and improve the working environment in this sector.
Mining industry	potassium perfluorooctane sulfonate (CAS No. 2795-39-3)	FC-80	Surfactants in the mining industry to enhance the amount of recovery in copper and gold mines.
Consumer articles containing PFOS, its salts, PFOSF and its related substances			
Textiles and upholstery	acrylate, methacrylate, adipate and urethane polymers of N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)		Used to provide soil, oil and water resistance for textiles, apparel, home furnishing and upholstery.
Synthetic carpets		Examples of products used before 2003 for surface treatment of synthetic carpets include: <ul style="list-style-type: none"> • Scotchgard (3M) • Baygard (Bayer) • Zonyl (Dupont) 	To provide stain protection, especially for synthetic carpets based on synthetic fibres being impregnated.
Paper and packaging	1. Mono-, di- or triphosphate esters of N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE) 2. N-Methyl perfluorooctane sulfonamidoethanol acrylate polymers	Main suppliers of fluorochemicals in the paper industry, with their brand names (UNEP 2010): <ul style="list-style-type: none"> • 3M Scotchban® • Bayer Baysize S® • Ciba (BASF) Lodyne® • Clariant Cartafluor® • DuPont Zonyl® 	To impart grease, oil and water resistance to paper, paperboard and packaging substrates, or a glossy finish.
Industrial and household surfactants	potassium N-ethyl-N-[(heptadecafluorooctyl) sulfonyl] glycinate (CAS No. 2991-51-7)		Surfactants to lower surface tension and improve wetting and rinse-off in a variety of industrial and household cleaning products.

¹ UNEP. 2014. Draft Guidance for the the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants (31 March 2014).

Category	Chemical name	Trade name	Use of PFOS & its related chemicals
Toner and printing ink	N-ethyl-N-[3-(trimethoxysilyl)propyl] perfluorooctane sulfonamide (CAS No. 61660-12-6)		Additive in toner and printing inks.
Firefighting foams		Significant amount of firefighting foams containing PFOS, from Tyco FS&BP, Ciba, Chemguard and 3M	Used for extinguishing liquid fuel fires and are normally used to suppress fires in flammable liquids like oil, petrol, other non-water-soluble hydrocarbons and flammable water soluble liquids like alcohols, acetone etc.
Insecticides	N-Ethyl perfluorooctane sulfonamide (EtFOSA; CAS No. 4151-50-2)	Sulfuramide	Surfactant and an active substance in insecticide products.

The first inventory of PFOS in Indonesia was drawn up by conducting a workshop, in which the industry and other sectors that are considered to be using PFOS and their related substances were invited. This was followed by distributing questionnaires, along with a brief explanation of the use of PFOS in the targeted sectors. The goal was so that respondents were able understand the use of PFOS. However, only a few questionnaires were returned and it was revealed that the potential users are not familiar with PFOS and their related substances. Therefore, information and outreach programs on PFOS continue. The next step conducted was approaching industry associations. Several industry associations stated that their members no longer use PFOS. However, there is lack of information regarding the former use of PFOS, the amount of PFOS formerly used and whether there are residual or stockpiles and stored wastes in landfills of PFOS. Chemical suppliers also responded that they no longer imported PFOS due to the global policy on the restricted use of PFOS. Eventually, this approach also failed in trying to obtain accurate and valid data on current and previous import of PFOS to Indonesia. However, scientific reports revealed that PFOS are present in sediments in the Bay of Jakarta, in skipjack tuna from Indonesia's offshores and in breast milk in Purwakarta.

Retrieving data of PFOS that were imported as chemicals by relevant government agencies did not come up with satisfactory results. This is due to the lack of regulations governing the management of PFOS in Indonesia.

A further PFOS inventory approach taken was to acquire information through a statistical approach by using export and import data of several products or articles that are considered to contain PFOS.¹ Selection of data was conducted by Harmonized System (HS) Code. The priority sectors were specialized paper industry, firefighting foam, textiles and synthetic carpets. Based on this statistical approach,² data of export products during the year of 1999-2012, fire-fighting foam sector contributed the highest amount (1,208,159 kg), followed by textiles (874,622 kg), specialized paper (665,440 kg) and synthetic carpets (555,233 kg). According to import data during the year of 1999-2012, textile sector contributed the highest amount (2,022,057 kg), followed by specialized paper (1,085,742 kg), fire-fighting foam (1,237,933 kg) and synthetic carpets (4,648 kg). However, it should be noted that calculation based on these statistics data of export/import products was not adequately specific and therefore the calculation of potential amount of PFOS above may be overestimated. As additional information, world total production of PFOS was around 96,000 tonnes during 1970-2002.³ Meanwhile current production of PFOS and related substances from China is at the rate of 100-200 tonnes/year.^{4,5} With this approach, which is conducted by processing the data in accordance with the guidance of the Secretariat of the Stockholm Convention, the amount of PFOS obtained was very high, which is beyond the current global PFOS production. This statistical approach did not therefore lead to meaningful results either since HS codes are not adequately specific. Instead it brought highly unrealistic results, which are above the global production volumes. The experience of this first inventory of gathering information on PFOS in articles and products revealed the gaps in controlling these substances in the current regulatory framework on chemicals in articles and products. Similar experiences have also been made in an industrial country.⁶ Therefore, another approach needs to be taken in inventory activities within the NIP implementation.

¹ BPS. <http://www.bps.go.id>.

² Dahiyat and Iswaldi. 2014. Preliminary Inventory PFOS in Indonesia. Basel Convention Regional Centre for Southeast Asia.

³OECD (Organization for Economic Co-operation and Development). 2002. Cooperation on Existing Chemicals. Hazard Assessment of Perfluorooctane Sulfonate (PFOS) and Its Salts. ENV/JM/RD(2002) 17/FINAL, Paris.

⁴Lim TC, Wang B, Huang J, Deng S, Yu G. 2011. Emission Inventory for PFOS in China: Review of Past Methodologies and Suggestions. *TheScientificWorldJournal* 11:1963-1980.

⁵Zhang L, Liu J, Hu J, Liu C, Guo W, Wang Q, Wang H. 2012. The inventory of sources, environmental releases and risk assessment for perfluorooctane sulfonate in China, Environ Pollut 165:193-198.

⁶ A similar experience have been made in the PFOS inventory of Turkey (Korucu MK, Gedik K, Weber R, Karademir A, Karakus PBK (2014) Inventory development of perfluorooctane sulfonic acid (PFOS) in Turkey: challenges to control chemicals in articles and products. Environ Sci Pollut Res Int. DOI 10.1007/s11356-014-3924-2).

Laws and regulations in Indonesia at present do not cover provisions of PFOS, PFOS salts and PFOSF. However, as already mentioned, some of the policies and regulations of POPs substances and wastes have been stipulated in a government regulation on the management of hazardous substances.

2.4.6. Assessment of releases of unintentionally produced chemicals (Annex C chemicals)

Chemicals unintentionally produced, such as dioxins and furans (UPOPs), are produced from incomplete combustion of organic chlorine substance. Inventory of dioxins and furans release using UNEP standard toolkit has been carried out from various potential release sources such as open burning, chemical and consumable products, wastes incineration, metal and non-metal production, heat energy power plants, mineral products and transport. The inventory in 2013 estimated that release of dioxins and furans in Indonesia was 9,881 g TEQ. The ranking of sectors contributing to dioxins and furans release from the highest to the lowest is open burning process (5,547.2 g TEQ), chemical and consumable products (2,388.5 g TEQ), wastes incineration (812.1 g TEQ), ferrous and non-ferrous metal products (749.8 to 1,260 g TEQ), power and heat generators (204.8 g TEQ), disposal (111.0 g TEQ), mineral products (38.7 g TEQ) and transportation (22.6 g TEQ).¹ The release of unintentionally produced PCBs was estimated at 4.32 kg TEQ¹ with major release from heavy oil combustion (4.31 kg TEQ) due to the relatively high emission factor in the toolkit. The release of unintentionally HCB was estimated at 1.91 tonnes yearly¹ with major release from production of chlorinated aromatic chemicals in particular pigments (1.76 tonnes).

The initial data can be used to carry out continued inventory of dioxins and furans release, as well as of other UPOPs listed in Annex C of the Convention (HCB, PCBs and PeCB), to the environment from all potential release sources.

At present there is only a small amount of dioxins and furans released into the environment in Indonesia. In its efforts to monitor dioxins and furans into the atmosphere, Pusarpedal has carried out monitoring and analysis of the environment. Nevertheless the institution is unable to calculate dioxins and furans measurement from environmental

¹ Purnomo, A. and Shoiful, A. 2014. Preliminary Inventory Persistent Organic Pollutants – Initial POPs in Indonesia. Basel Convention Regional Centre for South East Asia.

samples. Hence, capacity building to analyse dioxins and furans, namely that related to laboratory facilities and human resources, should be prioritized. On the other hand, to guarantee the quality of data produced and laboratory validity and assessment of standard measurement, analytical method should be carried out. Due to the low capability at national level to analyse dioxins, only a small amount of dioxins measureable data is available from gas emission. These data are only available from large industries that are financially equipped to conduct emission measurement on dioxins programs due to the high cost of laboratory analysis and sampling.

On the subject of policy and regulation to prevent unintentional chemical release, Indonesia has adopted Law No. 18 of 2008 on Solid Wastes Management which governs the obligation to manage all types of wastes including household wastes, industrial household wastes and specific wastes and prohibits burning wastes not according to technical requirements (which could cause POPs release). Standard for maximum level of dioxins has also been issued (2,3,7,8-TCDD) for processed food products by the National Agency of Drug and Food Control (BPOM) through Head of BPOM Decree No. HK.00.06.1.52.4011 concerning Determination of the Maximum Limit of Microbial and Chemical Contaminants in Food. The maximum standards for dioxins are as follows:

- Processed meat 3 pg WHO-PCDDs/FTEQ/g fat;
- Processed liver an 6.1 pg WHO-PCDDs/FTEQ/g fat;
- Processed fish 3 (pg WHO-PCDDs/FTEQ/g wet weight);
- Processed milk, including butter fat 3 pg WHO-PCDDs/FTEQ/g fat;
- Processed egg 0.91 pg WHO-PCDDs/FTEQ/g fat;
- Oil and fat 1.82 pg WHO-PCDDs/FTEQ/g fat;
- Serealia 0.46 pg WHO-PCDDs/FTEQ/g fat.

For other UPOPs chemicals, hexachlorobenzene (HCB) as ink distiller has been regulated through BPOM Decree No. HK.03.1.23.07.11.6664 of 2011 concerning Supervision of Food Packaging. Other than the above mentioned, no other regulation or research has been carried out regarding PCBs as UPOPs and dioxins in industries and wastes incineration.

The degree of community understanding and awareness on the potential danger due to dioxins and other POPs chemicals remains low despite workshops that have been carried out.

Several NGOs have programs on POPs for the public, but enhancement is still needed in the area.

2.4.7. Information on the state of knowledge on stockpiles, contaminated sites and wastes, identification, likely numbers, relevant regulations, guidance, remediation measures and data on releases from sites

Ministry of Environment has issued a regulation on contaminated sites remediation procedures, namely the Minister of Environment Decree No. 33 of 2009 concerning Procedures for Remediation of Contaminated Sites Due to Hazardous Wastes. Meanwhile, in terms of decentralization, regulations on its procedure have also been issued, namely through the Minister of Environment Decree No. 30 of 2009 concerning Procedures for Licensing and Supervision of Hazardous Wastes Management and Supervision of Contaminated Sites Remediation Due to Hazardous Wastes by Local Government.

In general, regulations specify four aspects of recovery for contaminated sites, namely:

1. Planning: includes (a) the implementation of the recovery plan for contaminated land and (b) plan for soil treatment contaminated by hazardous wastes;
2. Implementation: includes (a) survey for sites contaminated by hazardous wastes in accordance with the procedures, (b) determination of the location of the sampling point for contaminated sites by hazardous wastes in accordance with the procedures and (c) restoration activities for contaminated sites by hazardous wastes;
3. Evaluation;
4. Monitoring.

2.4.7.1. Pesticides

There is no production and exportation of any POPs pesticides, both for the initial and the newly listed ones. An inventory conducted in 2003 revealed that there was no importation of initial POPs pesticides following the banning according to Government Regulation No. 74 of 2001. Since there was importation of newly listed POPs pesticides, namely endosulfan and lindane and, stockpiles of these pesticides are still found in the field.

Regulations for use of these newly listed POPs pesticides are available. The use of endosulfan as pesticide is banned in agricultural areas. Lindane is regulated for limited use to eradicate lice and scabies.

Pesticides companies in Indonesia are only involved in formulating and distributing the commodities. Volumes of imported active compounds are limited for use for short periods of time due to expensive cost of storage. Hence, companies tend to prepare stock for only one planting season, hence, large stockpiles are likely to be difficult to find. The remaining stockpiles of POPs pesticides can be found in small kiosks in the form of remaining stock or unsold goods. Absolute amount and volume of these residues are not known and is difficult to estimate.

Contaminated sites by DDT in Malang and Bogor have been identified and documented in the previous 2008 NIP. At present, no remediation activities have been carried out on those sites. In addition, the area at present has changed into a populated residential area. Furthermore, a certain location in Pasir Gombong (West Java) is suspected to be contaminated with HCB.¹ Members of the company (Dongwoo) responsible for this contamination have been convicted and put in prison.²

Environmental Minister Regulation No. 33 of 2009 concerning the Procedures for Remediation of Contaminated Sites by Hazardous Wastes stipulates that responsibility for clean up lies with the responsible company, however, the company had gone bankrupt. The current regulation is under revision and will accommodate measures to deal with contaminated abandoned sites. Under the 2015-2019 Medium Range Development Plan, MoE is required to carry out coordinated efforts on remediation of contaminated sites in abandoned critical areas (degraded/contaminated) through the following measures, i.e. coordinated inventory and assessment as well as coordinated activities on remediation of abandoned mine fields, forest/land coverage, coastal and marine, as well as critical water mass. Hence, monitoring and assessment and eventually clean up measures will have to be carried out at these contaminated fields.

¹ <http://www.radar-bekasi.com/?p=691>. Accessed in November 2013.

² www.menlh.go.id.

2.4.7.2. PCBs and PCDDs/Fs

Most of the quantitative testing conducted during the PCBs inventory focused on the in use transformers. However, two private companies (located in Bogor and Purwakarta, Java Island) confirmed that they have out of use transformers containing pure Askarel and Chlopen. Those out of use transformers were kept in a closed warehouse in their industrial area. Since the country lacks adequate capacity to dispose PCBs, the owners of those transformers seek for further guidance from the government.

Pusarpedal has conducted monitoring of PCBs since 2007, where soil samples from Semarang containing PCBs was found to have a concentration ranging from 1.0 to 526 mg/kg, while those from other areas (Malang, Jakarta, Bogor and Bandung) only contain PCBs of less than 1.1 mg/kg. In the meantime, study of PCBs in river and coastal sediments was conducted in Surabaya in 2010, where for the 33 samples studied, the concentration of PCBs ranged from 0-420 µg/kg dry weight. The data also showed that the average concentration of PCBs in the river sediment is higher than that in the coastal sediment.

There is no information regarding monitoring of dioxins and furans (PCDDs/Fs) in the contaminated sites and the open area near the source of contamination. Regulation of PCDDs/Fs are listed in Government Regulation No. 85 of 1999 amended by Government Regulation No. 18 of 1999 concerning Hazardous Wastes Management where PCDDs/Fs are listed on the list of chronic contaminant wastes. The results revealed that the inventory of by-products wastes is either incinerator residues or ash (Group 1 according to the UNEP toolkit) and that other groups have been managed, collected, taken to be processed and disposed by third parties that are licensed. However, monitoring of potential contamination by PCDDs/Fs contained in the ash and residue has not been carried out.

2.4.7.3. POP-PBDEs

Since there is no available information on production, export, import and use of technical mixtures of pentabromodiphenyl ether (c-PentaBDE) and octabromodiphenyl ether (c-OctaBDE) in Indonesia, information on their stockpiles is not available. However, due to the presence of POP-PBDEs in a wide range of commercial and household products, the main stocks of these compounds are in articles/products containing c-PentaBDE (tetra- and

pentaBDE) and c-OctaBDE (hexa- and hepta-BDE), both are in use and in end-of life. Although current information of POP-PBDEs in EEE and end-of life has been estimated, information on the amount of their stockpiles has not been gathered. The estimate amount of POP-PBDEs in end-of life of vehicles during inventory 2013¹ was 15,185 kg for tetra-BDE, 26,689 kg for penta-BDE 3,681 kg for hexaBDE and 230 kg for heptaBDE.

Furthermore, current inventory also indicates that there is no information on contaminated sites and wastes of POP-PBDEs in Indonesia.¹ However, the sector of end of life treatment of e-wastes such as recycling area, in particular recycling areas and landfills with deposited wastes and ashes of CRT TV/computers could be seen as potential contaminated sites of POP-PBDEs. Laboratory analysis of casing CRT TVs and acrylonitrile butadiene styrene (ABS) polymer collected from formal and informal e-wastes recycling sites found them to contain PBDEs (114 mg/kg in ABS polymer, 320 mg/kg - 330 mg/kg in CRT TVs for heptaBDE). Table 2.13 shows the concentration of PBDEs in various products/articles collected from e-wastes recycling and automotive scraping areas in Depok, Bogor and Bekasi.¹

Table 2.13. Concentration of PBDEs (mg/kg) in polyurethane foam of automotive seat and various articles of electrical and electronic equipments

No	Sample Type	PBBs	PBDE Homologues							Total PBDEs
			Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca	
1	PUR Foam Automotive Seat-1	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2	PUR Foam Automotive Seat-2	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
3	Casing CRT Computer-1	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4	Casing CRT Computer-2	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
5	Casing CRT TV-1	nd	<5.0	<5.0	<5.0	330	31	27	433	821
6	Casing CRT TV-2	nd	<5.0	<5.0	<5.0	320	28	25	403	776
7	Polymer ABS-1	nd	<5.0	<5.0	<5.0	114	5	252	83578*	83949*
8	Polymer ABS-2	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

¹ Sudaryanto, A. and Ilyas, M. 2014. Preliminary Inventory Persistent Organic Pollutants-Polybrominated Diphenyl Ethers (POP-PBDEs) in Indonesia. BCRC-SEA.

No	Sample Type	PBBs	PBDE Homologues							Total PBDEs
			Tetra	Penta	Hexa	Hepta	Octa	Nona	Deca	
9	Polymer ABS-3	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
10	Shredder PCBs Residue	nd	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

Note:

-PBBs = polybrominated biphenyls, *failed items, mean the peak is too large to quantify the concentration.

-nd = not detected

Furthermore, available information from published scientific journals can also be used to identify the potential contaminated site for POP-PBDEs.^{1,2,3} Potential contaminated sites also occur in areas close to plastic factories and municipal dumpsites. Monitoring study of POPs in atmospheric air using passive air sampler in and around Jakarta¹ showed that POP-PBDEs were found higher in samples collected from areas close to plastic factories (Dadap, Jakarta) and a dumpsite (Bantar Gebang, Bekasi). Furthermore, soil samples collected from dumpsites at Bantar Gebang (Bekasi) and Benowo (Surabaya) were found to contain POP-PBDEs higher than that of the reference sites.^{2,3}

Regarding regulations and guidance with respect to releases from contaminated sites, including an assessment of opportunities for disposal of obsolete stocks, there is no specific guidance addressed on management policy of POP-PBDEs available so far. Furthermore, there is also no threshold set up in Indonesia to compare POP-PBDEs levels in the environment, biota and human.

¹ Sudaryanto, A., Riyadi, A.S., Setiawan, I.E., Ilyas, M., Isobe, T., Takahashi, S. and Tanabe, S. 2010c. Concentrations of PBDEs, HBCDs and Two Novels of BFRs in Atmosphere Derived by Passive Air Sampler from Various Locations in and Around Jakarta, Indonesia. Proceeding of the Dioxin Symposium. San Antonio, USA.

² Ilyas, M., Agus Sudaryanto, Iwan Eka Setiawan, Adi Slamet Riyadi, Tomohiko Isobe, Shohei Ogawa, Shin Takahashi, Shinsuke Tanabe. 2011a. Characterization of polychlorinated biphenyls and brominated flame retardants in surface soils from Surabaya, Indonesia. Chemosphere, 83, 783–791.

³ Eguchi, A., Isobe, T., Ramu, K., Tue, HM., Sudaryanto, A., Devanathan, G., Viet, PH., Tana, RS., Takahashi, S., Subramanian, A., Tanabe, S. 2012. Soil contamination by brominated flame retardants in open wastes dumping sites in Asian developing countries. Chemosphere. 11/2012; DOI:10.1016/j.chemosphere. 2012.10.027.

2.4.7.4. PFOS

Government Regulation on hazardous substances does not specifically regulate PFOS. Indonesia is not a country producing PFOS and its related chemicals, therefore their presence in Indonesia is mainly due to imports.

With regard to stockpiles and wastes, such as in synthetic carpets, fire-fighting foams, aviation hydraulic fluids and other PFOS containing stocks and wastes, no reliable information was obtained.

PFOS contaminated sites to be considered are firefighting training areas with aqueous film-forming foam (AFFF) and similar foam use (historically most of them were PFOS containing foams), such as in airports, refineries, oil storages, military sites and in oil drilling areas. The other sites are disposal areas of wastes and sludges of industries that have used and still use PFOS and its related substances. No further information was obtained.

2.4.8. Summary of future production, use and releases of POPs – requirements for exemptions

According to Government Regulation No.74 of 2001, lindane is allowed for limited use. Only certain pharmaceutical industries import the substance for lice and scabies. According to BPOM, banning on lindane use is being proposed. Therefore, the Government will not propose exemption for lindane, neither for DDT and endosulfan. Due to the lack of information on PFOS as chemicals and chemicals in products and articles, the Government through the relevant institutions will conduct assessment for several industries to decide if exemption is needed.

2.4.9. Existing programmes for monitoring releases and environmental and human health impacts, including findings

Monitoring releases of POPs and studies on environmental and human health impacts are important as the basis for formulating and development of management policy, including NIP. Pusarpedal under MoE is the institution designated to carry out the national monitoring program to determine the actual state of environmental pollution including those caused by

POPs. However, certain national research agencies/universities also conduct monitoring study of POPs, such as the Indonesian Institute of Sciences (LIPI), Gadjah Mada University (UGM) and Bandung Institute of Technology (ITB). In most cases, existing data of POPs in the environment and human in Indonesia is also generated by studies conducted by foreign institutions through research collaboration between scientists from developed countries and Indonesian researchers.^{1,2}

2.4.9.1. Monitoring of POPs among wildlife and human biomarkers in Indonesia

2.4.9.1.1. POPs Pesticides

As mentioned earlier in Subchapter 2.4.4 the 2012 environmental monitoring by Ministry of Environment (Pusarpedal)³ indicated that organochlorine pesticides were detected in river water, sediment and soil from various locations. Furthermore, POPs residue in foodstuffs in Indonesia has also been investigated.⁴ A total of 23 organochlorine pesticides (OCPs) residues were detected in five groups of foodstuffs, i.e. vegetables (carrot, potato, cucumber, corn and onion), rice, pulses (green bean and soybean), nuts (peanut) and fish (milkfish) collected from traditional markets in three big cities of Indonesia, namely Jakarta, Bogor and Yogyakarta. OCPs were only detected in fatty foodstuffs, such as soybean, peanut and milkfish. The concentration of HCB, Σ Drins, Σ DDTs, Σ Heptachlors and Σ HCHs (hexachlorocyclohexane) was far below the maximum residue limits (MRLs) established by Food and Agriculture Organization (FAO)/World Health Organization (WHO).

2.4.9.1.2. PCBs and PCDDs/Fs

At the moment there is no available regular monitoring program of PCBs releases in the environment and the impact on the society in the country. In 2014, Pusarpedal proposed

¹ Sudaryanto, A., Takahashi, S. and Tanabe, S. 2007. Persistent Toxic Substances (PTS) in the Environment of Indonesia. In: Persistent Organik Pollutants in Asia – Sources, Distributions, Transport and Fate, Li, A., Jiang, G., Giesy, J.P., Tanabe, S. and Lam, P.K.S (Eds). Elsevier, Amsterdam, the Netherlands, 587-627.

² Takahashi, S., Ramu, K., Sudaryanto, A., Isobe, T., Subramanian, A., Takasuga, T., Tanabe, S. 2008. Academic and Research Programs for Capacity Development in Asia: Building an Environmental Chemistry Network and its Outcomes on Persistent Organic Pollutants and Related Compounds. Organohalogen Compounds 70, p. 970-973. (Proceeding of the 28th International Symposium on Halogenated Persistent Organic Pollutants-DIOXIN 2008, Birmingham, UK, August 17-22, 2008).

³ Pusarpedal. 2012. Pemantauan Persistent Organic Pollutants (POPs) di Indonesia. Pusarpedal, Kementerian Lingkungan Hidup. Jakarta.

⁴ Shoiful et al. 2013. Concentrations of organochlorine pesticides (OCPs) residues in foodstuffs collected from traditional markets in Indonesia. Chemosphere (90) 1742-1750.

to carry out nationwide monitoring of PCBs in soil and water collected from Semarang, Malang, Purwokerto, Bekasi and Gresik.

As for dioxins and furans, there is no national laboratory in the country that has the capacity to analyse dioxins/furans. Thus, a program for monitoring releases of dioxins/furans has not been performed.

Previous measurements and monitoring had used overseas laboratory services and Pusarpedal is developing a laboratory capable to analyse PCDDs/Fs.

2.4.9.1.3. POP-PBDEs

No monitoring study by any national institutional in Indonesia has been conducted to analyse POP-PBDEs. However, large data set of POP-PBDEs is available in the literatures due to research collaborations between researchers from developed countries and scientists in Indonesia.^{1,2}

Results of the collaborations note that POP-PBDEs are widely present in Indonesia's environment, biota and human. For instance, POP-PBDEs have been reported to be present in atmospheric air³, dust⁴, soil⁵, sediment, biota, foodstuff and human⁶ from Indonesia.

¹Sudaryanto, A., Takahashi, S. and Tanabe, S. 2007. Persistent Toxic Substances (PTS) in the Environment of Indonesia. In: Persistent Organik Pollutants in Asia – Sources, Distributions, Transport and Fate, Li, A., Jiang, G., Giesy, J.P., Tanabe, S. and Lam, P.K.S (Eds). Elsevier, Amsterdam, the Netherlands, 587-627.

²Takahashi, S., Ramu, K., Sudaryanto, A., Isobe, T., Subramanian, A., Takasuga, T., Tanabe, S. 2008. Academic and Research Programs for Capacity Development in Asia: Building an Environmental Chemistry Network and its Outcomes on Persistent Organic Pollutants and Related Compounds. Organohalogen Compounds 70, p. 970-973. (Proceeding of the 28th International Symposium on Halogenated Persistent Organic Pollutants-DIOXIN 2008, Birmingham, UK, August 17-22, 2008).

³ Sudaryanto, A., Riyadi, A.S., Setiawan, I.E., Ilyas, M., Isobe, T., Takahashi, S. and Tanabe, S. 2010c. Concentrations of PBDEs, HBCDs and Two Novels of BFRs in Atmosphere Derived by Passive Air Sampler from Various Locations in and Around Jakarta, Indonesia. Proceeding of the Dioxin Symposium. San Antonio, USA.

⁴ Sudaryanto, A., Isobe, T., Suzuki, G., Setiawan, I.E., Ilyas, M., Riyadi, A.S., Takahashi, S., Tanabe, S. 2009. Characterization of Brominated Flame Retardants in House Dust and their Role as Non-Dietary Source for Human in Indonesia. In: Interdisciplinary Studies on Environmental Chemistry — Environmental Research in Asia, Eds., Y. Obayashi, T. Isobe, A. Subramanian, S. Suzuki and S. Tanabe. TERRAPUB, Tokyo, Japan, pp. 133–141.

⁵ Ilyas, M., Agus Sudaryanto, Iwan Eka Setiawan, Adi Slamet Riyadi, Tomohiko Isobe, Shohei Ogawa, Shin Takahashi, Shinsuke Tanabe. 2011a. Characterization of polychlorinated biphenyls and brominated flame retardants in surface soils from Surabaya, Indonesia. Chemosphere, 83, 783–791.

⁶ Sudaryanto, A., Setiawan, I.E., Riyadi, A.S., Ilyas, M., Anantasena, Y., Djamaruddin, R., Isobe, T., Takahashi, S., Tanabe, S. 2010b. Utilization of es-BANK of Ehime University for Monitoring Environmental Pollutants in Indonesia: A Case Study for Brominated Flame Retardants in Biota, Human and Environmental Samples. Interdisciplinary Studies on Environmental Chemistry, Vol. 4. Environmental Specimen Bank: Exploring Possibility of Setting-up ESBs in Developing Countries (Eds., T. Isobe, K. Nomiyama, A. Subramanian and S. Tanabe). TERRAPUB, Tokyo. pp. 205-213.

2.4.9.1.4. PFOS

None of the national agencies in Indonesia have any program for environmental monitoring of PFOS. Program to monitor impact of PFOS to human health does not exist either. Reasons for this could be due lack of regulations on it, low capacity of laboratory infrastructure and human resources and the high cost of laboratory sampling and analysis. However, the presence of PFOS in human and biota from Indonesia have been noted by monitoring studies of foreign researchers.

2.4.9.2. Association between POPs in environmental media and human health impacts and diseases

Although several studies have shown the presence of POPs in various environmental media in Indonesia, their link to human health impacts has not been studied. Limited studies have indicated low daily intake of POPs including PCBs, DDTs and POP-PBDEs as compared to reference dose values.^{1,2} Human exposure to POPs has been known to be associated with health effects like cancers and tumors, neurobehavioral impairment including learning disorders and changes in temperament, immune system changes, reproductive deficits and sex-linked disorders. In Indonesia, according to Darmais Cancer Hospital (2012), since 1988, the incidence of cancer tends to increase every year and is soon expected to be formidable. It is currently estimated that there will be at least 170–190 new cancer cases annually per 100,000 people. Cancer deaths become the sixth rank among other causes of deaths, such as infectious diseases, cardiovascular diseases, traffic accidents, nutritional deficiency and congenital diseases. As there are no population-based registries in Indonesia, the exact incidence and prevalence of cancer are not known. However, data collected from hospitals in several regions shows that cancer incidence had increased by 2-8% per year in the last decade. Further study is needed to conduct the link between POPs contamination and their impact on human.

¹ Sudaryanto, A., Takahashi, S. and Tanabe, S. 2007. Persistent Toxic Substances (PTS) in the Environment of Indonesia. In: Persistent Organik Pollutants in Asia – Sources, Distributions, Transport and Fate, Li, A., Jiang, G., Giesy, J.P., Tanabe, S. and Lam, P.K.S (Eds). Elsevier, Amsterdam, the Netherlands, 587-627.

² Sudaryanto, A., Riyadi, A.S., Setiawan, I.E., Ilyas, M., Isobe, T., Takahashi, S. and Tanabe, S. 2010c. Concentrations of PBDEs, HBCDs and Two Novels of BFRs in Atmosphere Derived by Passive Air Sampler from Various Locations in and Around Jakarta, Indonesia. Proceeding of the Dioxin Symposium. San Antonio, USA.

2.4.10. Current level of information, awareness and education among target groups; existing systems to communicate such information to the various groups; mechanism for information exchange with other Parties to the Convention

2.4.10.1. Pesticides

Farmers no longer use the banned initial POPs pesticides. Their level of understanding about these hazardous chemicals is gradually increasing. On the other hand, certain POPs pesticides are no longer available on the market. In the case of endosulfan, the country's agricultural extension workers have informed them about its ban. The agricultural extension workers have significant positive role in this regard.

The community in general, however, are not aware of the hazardous property of lindane. Lindane is an active component in a widely known treatment for scabies and for second line head lice treatment. The medication packaging does not provide information on the hazardous properties of lindane. The important target groups to be considered regarding lindane are women and children.

2.4.10.2. PCBs and PCDDs/Fs

Currently, the level of awareness on PCBs and PCDDs/Fs is still relatively low. During the PCBs Project preparation and PCBs inventory starting since February 2012, several awareness workshops on PCBs have been carried out in addition to dissemination of information related PCBs to the transformers' owners during sample collections and analysis. Most of the employees in the target locations lack PCBs management knowledge. Generally, international private companies have better awareness compared to local public companies. One cement company reported dioxins/furans measurement results in its sustainability report.

Furthermore, MoE and UNIDO have also conducted dissemination of information on PCDDs/Fs through seminars and workshops. Not only to the community and industry, workshops on green boiler to reduce releases of PCDDs/Fs from boiler were also provided for lecturers to be passed on to the students, especially in the faculties of mechanical engineering and chemical engineering. Information dissemination activities and trainings on PCBs and PCDDs/Fs are shown in Tables 2.14 and 2.15.

Table 2.14. Information dissemination and training activities on PCBs

No	Activity	Time
1.	PCBs Workshop Meeting in Jakarta, Indonesia, 85 participants.	28 February 2012
2.	Sampling and analysis of PCBs at Puslitbang PLN, Duren Tiga Jakarta, 23 participants.	21 February 2013
3.	PCBs treatment facility study trip to Manila, Philippines, five delegation members from Indonesia.	26-28 February 2013
4.	PCBs kick off meeting at Le Meridien, Jakarta, Indonesia.	14 November 2013
5.	Sampling and analysis training for PCBs at PLN, Padang, around 30 participants.	29 April 2014

Table 2.15. Information dissemination and training activities on PCDDs/Fs

No.	Activity	Time
1.	Awareness raising in Jakarta.	2 November 2010
2.	Inception workshop, Hotel Ambhara Jakarta, Indonesia, total 105 participants	21-22 December 2011
3.	Training for Pusarpedal and MoE personnel on “Dioxins Sampling and Analysis”, Beijing, China. Training was attended by participants from six national countries including three delegates from Indonesia.	28 - 31 May 2012
4.	Training for Universitas Sultan Ageng Tirtayasa and MoE personnel on “Green Boiler Curriculum” in Bangkok, Thailand. Training was attended by six participating countries including three delegates from Indonesia.	2-3 April 2012
5.	Training personnel from Suralaya and Ministry of Manpower and Transmigration (MoMPT) on “Boiler Operator” in Singapore. Training was attended by six participating countries including three delegates from Indonesia.	11-13 April 2012
6.	Training of one personnel from Pusarpedal on “Dioxins and Furans Sampling and Analysis” in Wadsworth Centre, New York, US for one month.	June – July 2012
7	Green Boiler Workshop in Royal Krakatau Hotel, Cilegon, Indonesia, attended by 51 participants and Signing of Cooperation with Sultan Ageng Tirtayasa University.	3 October 2012
8	Signing of Cooperation with Gadjah Mada University and participation in sponsoring the national seminar on “Advanced Technological Development and Innovation in Energy Engineering,” Yogyakarta, Indonesia.	22 November 2012
9	Training on Operations of Combustion Facilities and BAT/BEP Facilities Orientation in Rome, Italy. Training was attended by six participating nations countries including three delegate members from Indonesia.	26–29 November 2012
10	Training Workshop “Green Boiler Technology Course” at Puri Denpasar Hotel, Jakarta, Indonesia. Training was attended by 30 Indonesian lecturers, two participants from MoMPT, one participant from Assistant Deputy for Standardisation and Technology, MoE and one participant from the office of the Assistant Deputy of Hazardous Substances, MoE.	28-29 October 2013

2.4.10.3. POP-PBDEs

As POP-PBDEs have just recently been included in the new list of POPs under the Stockholm Convention, the issues and public information on these compounds in Indonesia were likely not similar to those of other classical POPs. The information on POP-PBDEs under Stockholm Convention is still only known mainly at government level, particularly in MoE. As a consequence, the current level of information, awareness and education among target groups, existing systems to communicate such information to the various groups and mechanism for information exchange with other Parties to the Convention regarding the POP-PBDEs have not been established by the government.

2.4.10.4. PFOS

Awareness raising activities have been carried out through workshops during the inventory phase of the project. As stated previously, in collaboration with the Centre for Green Industry, Ministry of Industry (MoI), has initiated an awareness campaign about the use of PFOS and its related substances for several textile industries.

2.4.11. 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

Indonesia has participated regularly and actively in the Conference of the Parties (COP) to the Stockholm Convention. Status of measures to fulfill the obligations of the Stockholm Convention has been reported to the COP. Indonesia has appointed MoE as the designated national focal point on exchange of information on POPs. Indonesia has carried out activities on exchange of information regarding measures of reduction or elimination of the production, use and release of POPs in regional and international events (conference, workshop, seminar, etc). Regarding the 3rd reporting exercise of which the deadline was 31 August 2014, Indonesia submitted its report on 6 August 2014.

2.4.12. Relevant activities of non-governmental stakeholders

2.4.12.1. Pesticides

Monitoring of release of POPs pesticides has not been carried out in a planned and regular mode. Controls of these pesticides are still very limited. Pesticides controls are developed at the central, provincial and district levels. Controllers must report violations of the use of banned pesticides to the police and ultimately bring the cases to court. Supervisory activities always refer to publications of the Commission on Pesticides ("green book"). Less effective supervision is demonstrated by the discovery of cans of endosulfan during a field survey in 2013.

Programs to monitor the environment have been carried out by Pusarpedal albeit not on a regular basis and limited to specific locations. This is probably due to the high cost of sampling and laboratory analysis. As reported in the previous NIP, sporadic activities have been conducted through collaboration with foreign research institutes or universities. Programs to monitor the impact of POPs pesticides on human health have not been planned so far.

NGOs have contributed in supporting the Government with respect to reduction and elimination of POPs pesticides through awareness raising activities. The NGOs involved are Asosiasi Bioagroinput Indonesia (Bioagroinput Association of Indonesia), Croplife (BASF), Himpunan Masyarakat Pestisida Nasional (National Pesticides Community Association), Gita Pertiwi and YLKI (Indonesian Consumer Institution Foundation).

2.4.12.2. PCBs and PCDDs/Fs

In February 2012 UNIDO initiated project "*Introduction of an environmentally sound management and disposal system for PCBs wastes and PCBs contaminated equipment in Indonesia.*" The initial activities were mainly aimed at awareness raising, PCBs inventory and developing commitment involving governmental stakeholders and the private sectors, particularly the industries. However, at this stage, NGOs did not actively take part. It is envisaged that NGOs will be assigned to continue the awareness raising activities during the full size PCBs project in 2014-2019.

In the meantime, several NGOs have run programs on the issue of dioxins/furans. They educate and provide advocacy to the public to increase awareness about dioxins/furans. However, their programs do not involve dioxins/furans measurements or cleaning up of contaminated sites. Their programs are limited and only reach out to a small number of those in need.

2.4.12.3. POP-PBDEs

Similarly to many developing countries, there has often been very limited and incomplete public awareness and understanding about the severe health and environmental effects caused by POPs including POP-PBDEs and other toxic chemical pollutants. In this context, NGOs and other non-governmental stakeholders could help in bridging this problem. However, there is no such organization engaged in activities that provide concrete and immediate contributions to the country's effort in the implementation of the Stockholm Convention. For instance, through the International POPs Elimination Network (IPEN), which is a global network of non-governmental organizations working together for the elimination of persistent organic pollutants, some NGOs are participating in the International POPs Elimination Project (IPEP). IPEN has defined the IPEP NGO POPs Project into 17 categories in which some activities are conducted by NGOs working in Indonesia, including the project of:

- Awareness campaign on the danger of POPs and other pesticides to human health and the environment through action research activity by a rural community, the Farmer's Initiatives for Ecological Livelihoods and Democracy (FIELD);
- Policy brief on zero wastes: a proposal for a POPs-free alternative to managing municipal discards in Indonesia, Malaysia and the Philippines, by Balifokus (Indonesia), Consumers' Association of Penang (Malaysia), Ecological Wastes Coalition (Philippines) and Global Alliance for Incinerator Alternatives (Philippines);
- Monitoring of banned pesticides in Indonesia, by Gita Pertiwi.

However, there is no information available regarding NGOs related to POP-PBDEs issues.

2.4.12.4. PFOS

There is no information on NGO involvement in PFOS issues as well as in university because it is still a new issue in Indonesia.

2.4.13. Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development – linkage to international programmes and projects

2.4.13.1. Pesticides

In relation to the incidents in the use of pesticides, the Commission on Pesticides responds to reports submitted, investigates the potential hazards and when necessary, declares and prohibits such material. This policy is conducted in coordination with MoE and the Directorate General of Customs and Excise (DGCE).

Information on banned pesticides as well as pesticides permits are widely known by the pesticides companies. Active chemicals prohibited would be impossible to be registered and hence would not be formulated and traded in the country.

Commission on Pesticides is a government agency responsible for issuing permit to use pesticides. Industries must apply for permission to import the pesticides. Active chemicals prohibited would be impossible to be registered and hence would not be formulated and traded in the country legally. However, illegal import and trade might take place.

Since the enactment of Law No. 12 of 1992 concerning Plant Cultivation System, the School of Integrated Pest Management was established throughout the country. The main goal of the program is to decrease the use of pesticides. In the last decade, organic farming had been developed by implementing non-pesticides cultivation system. To eradicate malaria, DDT replacement includes using compounds of organophosphates, application of *Bacillus thuringiensis* and environmental management by monitoring the water puddles. Environmental management in this case is carried out by the local Health Service in monitoring the outbreak of malaria and dengue fever.

2.4.13.2. PCBs and PCDDs/Fs

POPs assessment, measurement and analysis

Pusarpedal was established as a centre for excellence for environmental laboratory. It is equipped with several GCs to analyze PCBs in the soil and water matrix. The centre has also been equipped with a GC-TOFMS to monitor dioxins/furans in environmental samples since 2012. However, this laboratory has not been accredited to carry out dioxins/furans analysis. In addition, several other laboratories such as Sucofindo, LEMIGAS and PLN Puslitbang are also able to analyze PCBs.

Alternatives, research and development

Several papers have been published in the academia related to PCBs and dioxins and furans in Indonesia, however, their covers are limited to research activities on the existence of POPs. The Agency for Assessment and Application of Technology (BPPT) initiated work on contaminated sites using TPH (total petroleum hydrocarbon) analysis. They have developed a technology to remediate hydrocarbon-contaminated sites contaminated by PCBs. Other technology using microbial consortia (bioremediation) has also been developed in the BPPT. Areas of their research are in Subang, Sukabumi and Solo in collaboration with the MoA. Currently, MoE is cooperating with BPPT in assessing appropriate technologies for the destruction of PCBs in Indonesia. Nevertheless, PCBs free commercial insulation transformer's oil such as Shell Diala B, Nynas Nyetro, Onadyn 5 and Esso are available in the market and are currently utilized by PLN and other industries as reported during the inventory of PCBs.

International projects

A regional project with UNIDO on best available technique/best environmental practises (BAT/BEP) in fossil fuel-fired utilities and industrial boilers in order to reduce the release of dioxins/furans is currently ongoing. The project collaborates with PT. Indonesia Power and UBP Suralaya in Cilegon for BAT/BEP implementation. Capacity buildings for laboratory personnel of Pusarpedal as well as for boiler operators were conducted in this project, including the development of Green Boiler Technology course and its dissemination at universities. Preparation project on PCBs was conducted from March 2012 to February 2013

with UNIDO. As of this moment, the full size project is being implemented. In the meantime, a pipeline project of dioxins/furans in wastes incineration and in metallurgical sector is under development.

2.4.13.3. POP-PBDEs

During the inventory of POP-PBDEs, the technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development – linkage to international programmes and projects were evaluated through communication with relevant stakeholders, particularly to government policy makers, research institutes/agencies, universities and non-government sectors. Some institutes and universities have equipments such as GC/MS and are capable to analyze certain traditional POPs, such as PCBs and organochlorine pesticides. However, there is no capacity to analyze POP-PBDEs. The technical infrastructures for these matters have not been established yet, as needed by the research and development on POP-PBDEs. Research related to POP-PBDEs in Indonesia was mainly carried out through research collaboration with foreign developed countries where samples were analyzed (often by a researcher from Indonesia).

The availability of alternatives of penta- and octaBDEs

The alternatives of brominated flame retardants, called emerging or novel brominated flame retardants (NBFRs), have been introduced to the market. Those NBFRs include decabromodiphenyl ethane or 1,2-bis (pentabromodiphenyl) ethane (DBDPE), 1,2-bis (2,4,6 – tribromophenoxy) ethane (BTBPE), 2-ethylhexyl-2,3,4,5-tetrabromo benzoate (TBB or EHTBB), bis(2-ethylhexyl)-3,4,5,6-tetrabromo phthalate (TBPH or BEHTBP), tetrabromobisphenol A-bis (2,3-dibromopropylether) (TBBPA-DBPE) and hexachlorocyclopentadienyldibromo cyclooctane (HCDCBO). TBPPA was produced 150,000 tons/year worldwide in 2006.¹ The total production of 21 NBFRs was 180,000 tonnes/year, approximately.² In the current inventory, information on import, export,

¹JRC. 2006. Summary risk assessment report on TBBP-A. Ispra: European Commission Joint Research Centre; 2006.

²Covaci, A., Harrad, S., Abdallah, M.A.-E., Ali, N., Law, R.J., Herzke, D., de Wit, C. A. 2011. Novel brominated flame retardants: A review of their analysis, environmental fate and behavior. Environment International 37 (2011) 532–556.

production and usage of NBFRs in Indonesia have not been gathered yet. It is expected that future inventory works should also collect the information on NBFRs use in Indonesia.

2.4.13.4. PFOS

There is no laboratory in Indonesia to analyse PFOS and its related substances, but there is a plan to verify the presence of PFOS and related substances in samples in line with the ratification of Stockholm Convention. PFOS alternatives are available for some applications, however this is not always the case for developing countries like Indonesia, where the alternatives still need to be considered and introduced. The POPs Reviewing Committee has compiled information on PFOS alternative, however, it is necessary to conduct further inventory to assess which industries still need exemptions and which industries can use PFOS alternatives that work about the same way or much better than PFOS in terms of price, quality, etc.

2.4.14. Identification of impacted populations or environments, estimated scale and magnitude of threats to public health and environmental quality and social implications for workers and local communities

A number of quantitative measurements of POPs concentrations in human breast milk, biota and environment have been carried out through various monitoring studies. The target of POPs study includes organochlorine pesticides, PCBs, POP-PBDEs and PFOS. The study results indicated that their risk to human health is still low. In order to have more representative national perspective, further comprehensive assessment of their impact on human health and environment is necessary in the near future.

2.4.15. Details of any relevant system for the assessment and listing of new chemicals

In accordance with Government Regulation No. 74 of 2001, hazardous substances consist of three categories: allowed to use, prohibited to use and limited to use. Hazardous substances management under the scope of this regulation does not cover radioactive materials, explosives, mining products, including oil and natural gases as well as the respective derivatives, food and beverages as well as food additives, household health and

cosmetics, pharmaceutical ingredients, narcotics, psychotropic and their precursors as well other addictive substance, chemical weapons and biological weapons (Article 3).

Government Regulation No. 74 of 2001, Article 6 states that each hazardous substances shall be registered (registration and designated number for hazardous substances is under the jurisdiction of the Republic of Indonesia) by producers or importers. Obligation to register hazardous substances is required only once for hazardous substances that is produced or imported for the first time. Registration as stipulated in Article 3 is applied to the authorized institution according to the prevailing legislation, that is, the institution that has the authority to issue permit and perform control based on its field. Meanwhile, other materials that are not specified in Article 3 should be registered by responsible institution, that is, the institution responsible for controlling the impacts on the environment, which is MoE.

The institution authorized to issue a registration number on hazardous substances that is not included in the Government Regulation No. 74 of 2001 shall send a copy to MoE. On the other hand, MoE that issues the registration number for hazardous substances stated in Government Regulation No. 74 of 2001 shall send a copy to the authorized institution. Registration procedure is specified in a decree issued by the respective institution head.

According to the regulation, MoE informs the Commission on Hazardous Substances on the registration and asks for advice and or consideration for the new hazardous substances. Based on advice and or consideration made by the Committee, MoE (1) asks for adjustment to the annex of Government Regulation No. 74 of 2001 and (2) gives approval to the Ministry of Trade (MoT) as a consideration to issue or decline permit for importation.

Especially for pesticides, Commission on Pesticides was established by the Minister of Agriculture Decree No. 847 of 2011. The Commission has a Technical Team for Pesticides Evaluation. The team is responsible for (a) preparing evaluation material of technical data and/or information with regard to pesticides registration and (b) carrying out technical evaluation regarding application of pesticides registration and/or registered pesticides or pesticides that have permit from the Minister of Agriculture. The Head of Technical Team is responsible and report to the Head of Commission on Pesticides (Director General of

Agricultural Infrastructure, Ministry of Agriculture), who is responsible and report to the Minister of Agriculture.

In order to support analysis of the quality of pesticides in Indonesia, proper laboratory infrastructure is already available. The list of laboratories that are capable of conducting pesticides quality test includes:

- Laboratory of Quality of Plantation Product Testing, Ministry of Agriculture (*Laboratorium Balai Pengujian Mutu Produk Tanaman, Kementerian Pertanian*);
- Laboratory of Central Application for Isotope and Radiation, National Nuclear Agency (*Laboratorium Pusat Aplikasi Isotop dan Radiasi, Badan Tenaga Nuklir Nasional*);
- Laboratory of Central Agency for Chemical Industry, Ministry of Industry (*Laboratorium Balai Besar Industri Kimia, Kementerian Perindustrian*);
- Laboratory of Centre for Product Quality Testing, Ministry of Industry (*Laboratorium Pusat Pengujian Mutu Barang, Kementerian Perindustrian*);
- Laboratory of Central Agency for Agriculture Product, Ministry of Agriculture (*Laboratorium Balai Besar Hasil Pertanian, Kementerian Pertanian*);
- Laboratory of Central Agency for Research and Development of Agriculture Post Harvest, Ministry of Agriculture (*Laboratorium Balai Besar Penelitian dan Pengembangan Pasca Panen Pertanian, Kementerian Pertanian*);
- Laboratory of Central Agency for Research and Development of Agricultural Land Resources, Ministry of Agriculture (*Laboratorium Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian, Kementerian Pertanian*);
- Laboratory of Centre for Research of Plantation Biotechnology, Ministry of Agriculture (*Laboratorium Balai Penelitian Bioteknologi Perkebunan Indonesia, Kementerian Pertanian*);
- Laboratory of Centre for Testing of Food and Drug, National Agency for Food and Drug (*Laboratorium Pusat Pemeriksaan Obat dan Makanan Nasional, Badan Pengawasan Obat dan Makanan*);
- Laboratory of Agriculture Faculty of IPB (*Laboratorium Fakultas Pertanian, IPB*);
- Laboratory of Veterinary Faculty of IPB (*Laboratorium Fakultas Kedokteran Hewan, IPB*);

- Laboratory of Faculty of Mathematics and Natural Science of IPB (*Laboratorium Fakultas MIPA, IPB*);
- Laboratory of Integrated Research and Testing of UGM (*Laboratorium Penelitian dan Pengujian Terpadu, UGM*);
- Laboratory of Faculty of Technobiology of UNIKA (*Laboratorium Fakultas Teknobiologi, UNIKA*);
- Laboratory of Pesticides UPTD-BPTPH Maros, South Sulawesi (*Laboratorium Pestisida UPTD-BPTPH, Maros, Sulawesi Selatan*);
- Laboratory of Pesticides UPTD-BPTPH Padang, West Sumatra (*Laboratorium Pestisida UPTD-BPTPH, Padang, Sumatera Barat*);
- Laboratory of Pesticides UPTD-BPTPH Surabaya, East Java (*Laboratorium Pestisida UPTD-BPTPH, Surabaya, Jawa Timur*);
- Laboratory of Pesticides UPTD-BPTPH Medan, North Sumatra (*Laboratorium Pestisida UPTD-BPTPH, Medan, Sumatera Utara*);
- Laboratory of Agrochemical UPTD-BPTPH Lembang, West Java (*Laboratorium Kimia Agro UPTD-BPTPH, Lembang, Jawa Barat*);
- Laboratory of Centre for Quality Testing and Certification of Agriculture and Forest Product DKI Jakarta (*Laboratorium Balai Pengujian Mutu Dan Sertifikasi Hasil Pertanian Dan Hasil Hutan, DKI Jakarta*);
- Centre for Research on Herbs and Drugs Plantation, Agriculture Research and Development Agency, Ministry of Agriculture (*Balai Penelitian Tanaman Rempah dan Obat, Badan Penelitian dan Pengembangan Pertanian, Kementerian Pertanian*);
- Research and Development Centre for Oil and Gas Technology (LEMIGAS);
- Centre for Polymer Research, BPPT, Serpong (*Pusat Penelitian Polimer, BPPT, Serpong*).

Regulation concerning registration of new chemicals does not fully consider the chemical properties listed in Annex D of the Stockholm Convention, namely chemical identity, persistency, bioaccumulation, potential to be transported in the distance environment and the adverse impact (toxicity or ecotoxicity data).

2.4.16. Details of any relevant system for the assessment and regulation of chemicals already in the market

Regarding the details of any relevant system for the assessment and regulation of chemicals already in the market, Government Regulation No. 74 of 2001 regulates the following matters:

- Every individual exporting hazardous substances under limited use shall notify the authority of the export destination country, the authority of the transited country and MoE. Exportation can only be done after approval from the authority of the export destination country, the authority of the transited country and MoE. Approval from MoE is a foundation to issue or to decline export permit from the Ministry of Trade (MoT);
- Every individual importing hazardous substances that falls into limited use category and or importing for the first time shall follow the notification procedure. Notification shall be sent to the authority of the exporting country to MoE. MoE shall respond to the notification in no later than 30 working days after the notification has been received;
- Every individual producing hazardous substances shall provide material safety data sheet (MSDS);
- Every individual responsible in transportation, storing and distributing of hazardous substances shall include MSDS;
- Hazardous substances shall be transported by using proper means and carried out according to regulation issued by the Ministry of Transportation (MoTransp);
- Each hazardous substances produced, transported, distributed and stored shall be packed according to its category, with the procedure in packing, adhered symbol and label and attached MSDS, according to the regulation issued by the head of responsible institution;
- Every hazardous substances storage shall be equipped with appropriate symbol and label in terms of building site and construction. The storage must be equipped with emergency response system and procedure for hazardous substances handling;
- Hazardous substances that is expired and or does not meet the specification and or used packaging shall be managed according to regulation for hazardous wastes;

- Every individual performing hazardous substances management shall comply with occupational safety and health standards, in line with guidelines issued by the Ministry of Manpower and Transmigration and shall periodically undertake health checkup. The individual shall also carry out mitigation on accident and/or emergency situation caused by hazardous substances. Other obligation is to send periodic written report at least every six months to the MoE and the authorized institution with a copy sent to the governor/local government;
- In case of accident caused by hazardous substances, every individual carrying out hazardous substances management shall isolate the site of accident, perform mitigation according to the procedure, report the accident or the emergency situation to the local government, give information, support and evacuate the surrounding community. The management of hazardous substances shall give compensation caused by the accident and/or emergency situation and or remediate the damaged and polluted condition of the environment caused by hazardous substances;
- Control of hazardous substances management is under the MoE and the authorized institution. In a particular case, the authorization can be delegated to the local government (provincial/district/city);
- A person on duty to control hazardous substances management shall have identification card issued by MoE and the authorized institution. The person is permitted to enter hazardous substances operational site to take samples, pictures and or to make graphs;
- The Governor/Regent/Mayor/Minister of Environment and authorities of the respective institution may raise community awareness on adverse potential effect of hazardous substances management on the environment, human health and other organisms, through dissemination of information regarding hazardous substances;
- The community has the right to obtain information on efforts to control impacts on the environment caused by hazardous substances management. The information shall be provided by the responsible person in the activity of hazardous substances management. The information may be delivered through printed or electronic media and/or information board;
- Violation against GR No. 74 of 2001 shall be charged with administrative sanction, financial compensation and or punishment in accordance with the degree of violation.

III. THE 2008 NIP ACHIEVEMENT

The action plans in the 2008 NIP have generally covered all the aspects required to fulfill the obligations under the Stockholm Convention. The action plans are categorized into 17 groups as described in the following sections. The summary of the 2008 NIP achievement is illustrated in Table 3.1.

Table 3.1. Review of the 2008 NIP

Action Plans	Performance Indicator	Stakeholder*	Recent Status/Achievement	Year of Achievement
3.1 Institutional and regulatory strengthening measures				
1. Establishment of Commission on Hazardous Substances.	Commission on Hazardous Substances is established.	MoE	a. Commission on Pesticides established since 1970.	Before the 2008 NIP
			b. Commission on Hazardous Substances is not established yet. The GoI is planning to establish working groups related to POPs under Presidential Decree on Chemical Management. Commission on Pesticides will be one of the working groups under the Presidential Decree.	-
2. Increase coordination and dissemination.	Stakeholder networks is established.	MoE, related institutions	Stakeholder networks established by the National Steering Committee (NSC).	2008 and 2014
3. Ratification.	Stockholm Convention is ratified.	MoE	Stockholm Convention is ratified through Law No.19 of 2009 concerning the Ratification of the Stockholm Convention On Persistent Organic Pollutants.	2009

*The institution listed first will act as coordinator

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
4. Law and regulatory review and evaluation.	Law and regulations concerning POPs are established.	MoE, MoA, BPOM, MoI, MoT, MoHA, related institutions	<p>a. BPOM established regulation Ka BPOM No. 28 of 2013 concerning Monitoring Importation of Drug Materials, Traditional Drug Materials, Health Supplement Materials and Food Materials into Indonesian Territory.</p>	2013
			<p>b. BPOM established regulation Ka BPOM No HK.00.06.1.52.4011 concerning Determination of the Maximum Limit of Microbial and Chemical Contaminants in Food.</p>	2009
			<p>c. Regulation Ka BPOM No HK.03.1.23.08.11. 07517 of 2011 concerning Technical Requirements of Cosmetic Ingredients established.</p>	2011
			<p>d. Regulation Ka BPOM HK 03 1 23 07 11 6664 of 2011 concerning Supervision of Food Packaging established.</p>	2011
5. Capacity building: procurement on laboratory equipment and system, accreditation, preparing analysis method (SNI POPs), training, dissemination of	Capacity building is initiated.	Pusarpedal, accredited local laboratories, BSN, BPOM, related institutions	<p>a. Pusarpedal as national laboratory for POPs.</p> <p>b. Capacity building for Pusarpedal was initiated.</p> <p>c. Pusarpedal procured gas chromatography high resolution (GC-HR) time-of-flight</p>	Available 2009 2012

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
regulations and strengthening intersectoral cooperation.			mass spectrometry (ToFMS) to analyse PCDDs/Fs. Additional facilities are being constructed to support PCDDs/Fs analysis.	
			d. Standard analysis method POPs from environment (SNI POPs) is not developed yet.	-
			e. Analysis method for dioxins in food (from BPOM) is being developed.	-
3.2. Measures to reduce and eliminate releases from intentional production and use				
1. Controlling distribution of illegal POPs pesticides.	Technical guidelines on supervision and prevention of POPs trafficking is developed.	MoA, DGCE, MoT, MoI, MoH, MoE	a. Commission on Pesticides, which has the authority to grant permits for distribution of pesticides, was established. See 3.1. point 1.	2008
			b. Technical guidelines on supervision and prevention of POPs trafficking is not available.	-
2. Inventory on HCB used as pesticide and in industry.	Inventory data on HCB in industry is available.	MoI, MoA, DGCE, MoE	Inventory data on HCB in industry is not available.	-
3. Inventory on PCBs and equipment containing PCBs.	Inventory data on PCBs is available.	MoEMR, MoI, MoTransp, MoEC, MoD, universities, MoE	a. PCBs inventory for transformer in some industries such as shoes, tire, mining, electricity companies conducted during PPG PCBs MoE-UNIDO involving MoEMR and PLN. Analysis was conducted using Dexsil L2000DX.	2012 - 2013
			b. After PPG PCBs, MoE and MoEMR still conducted PCBs inventory. On the other hand, PLN	2013 - 2014

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
			<p>also conducted inventory focusing on their transformers covering Java and Bali islands. As of now, PT. PLN is collecting and analysing samples from Sumatra Island.</p> <p>Temporary data was compiled during current NIP update and review.</p> <p>Estimation of PCBs was also generated based on existing data.</p>	
4. Regulation for transformer, capacitor and other articles containing PCBs.	Regulation for transformer, capacitor and other articles containing PCBs is disseminated.	MoEMR, MoE, DGCE, MoI, MoT, MoTransp, MoEC, MoD	a. Regulation on banning the use of PCBs was established (GR No. 74 of 2001).	2001
			b. Specific regulation for transformer, capacitor and other articles containing PCBs has not been established.	-
			c. Legislation and policies on PCBs management, including incentive mechanism will be adopted and endorsed under MoE-UNIDO PCBs project. The project started in 2014.	-
5. Look for alternative/substitute for materials and products free of POPs and alternative processes and practices not producing POPs.	Alternative/substitute for materials and products free of POPs is developed.	MoI, MoA, MoEMR, MoE, research institution, MoEC/universities, BPPT	a. Insulation oil free of PCBs are available in the market, however, no study analysis has been developed.	Before 2008
			b. A list of plants that can substitute broad spectrum fungicides and insecticides (lindane) has been developed by BPPT by using multi-criteria analysis.	2013

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
			c. An active compound used as head lice repellent, a substitute for lindane is being extracted and fractioned from the flesh of a <i>keluwak</i> (<i>Pangium edule</i>) by BPPT.	2013
			d. Guidance book on various alternatives to chemical pesticides and fertilizers (author: Ir. Untung Suwahyono) has been published.	2010
6. Look for destruction technology for POPs according to ESM.	Destruction technologies for POPs according to ESM are developed.	MoI, MoEC/universities, research institution, BPPT	ESM of PCBs through proper collection, packaging, registration, labelling, transportation, storage and disposal of 3,000 tons PCBs will be conducted under MoE-UNIDO PCBs project. The project started in 2014. In the meantime, MoE initiated to review and assess PCBs destruction technology with BPPT and related stakeholders.	-
7. Increase access to and transfer of technology, products and alternative management practices according to ESM.	Access to and transfer of technology, products and alternative management practices according to ESM increase.	MoI, MEC/universities, research institution, BPPT	a. BPPT surveyed organic farming in Bali and Bali Rungu. An organic farmer has implemented non-chemical pesticides use.	2011
			b. MoE published a book on corporate social responsibility model.	2011
			c. MoI published guidance book on green industry.	2010

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
8. Management for reducing and ultimately eliminating POPs.	POPs use is reduced.	MoE, MoI, MoA	a. POPs have been banned for use by the SC ratification. There is no POPs pesticides registered at the Commission on Pesticides to be used in the country. See also 3.2. point 1 and point 7.	2009
			b. Development of ESM for PCBs by MoE. See 3.2. point 6.	-
9. Monitoring of POPs in various media.	Database on monitoring of POPs in various media is available.	MoE	a. Pusarpedal conducted monitoring of POPs pesticides in river, sediment and soil in farming areas.	Since 2002
			b. For PCBs, see 3.2 point 3.	2012 - 2014
			c. Monitoring of DDT in 3 regencies (Malang, Kabanjahe, Karawang) by MoE and in Batam, Banten, Lampung, Riau by BPPT.	2008-2010
			d. Monitoring of PCBs and PBDEs in various media in Batam, Jakarta, Surabaya by BPPT.	2008-2010

3.3. Activity: Production, import and export, use, stockpiles and wastes of Annex A, Part I chemicals

1. Preventing and controlling illegal trade through enforcement of the existing law, education and dissemination of information to public and control on pesticides.	There is no production, export and import of chemicals according to Annex A, Part I.	DGCE, MoT, MoA, MoI, MoH, MoE, MoCI	There is no production, export and import of chemicals according to Annex A, Part I. See also 3.2. point 1.	2008
2. Inventory and strategy to remediate contaminated	Contaminated sites are inventoried and remediated.	MoH, MoA, MoFor, MoE, MoEC/universities, research	a. BPPT applied the soil bioremediation (using microbial consortia) contaminated by	2005

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
sites.		Institutions, BPPT.	hydrocarbon and/or OCs and/or phosphate at Subang, Sukabumi and Solo in collaboration with Ministry of Agriculture. b. No remediation activities were carried out on contaminated sites by DDT in Malang and Bogor that was identified in the 2008 NIP.Those areas at present have changed into a populated residential area.	-
3. Expansion of IPM and IVM program implementation: program dissemination through campaign, demonstration on controlling, publication and farmer empowerment through field school.	IPM and IVM programs are implemented.	MoA, MoH, MoF	IPM and IVM program have been implemented.	Since 2007-now
4. Training of trainers for IPM program to other provinces.	Training of trainers for IPM program is conducted.	MoA	-	-
5. IPM program on smallholder plantation.	IPM program on smallholder plantation is implemented.	MoA	IPM program on smallholder plantation has been implemented.	2009
6. IVM program by reducing the use of chemicals and increasing environmental management and biocontrol.	IVM program on reducing the use of chemicals and increasing environmental management is conducted.	MoH, MoA	Minister of Health Decree No 374/Menkes/Per/III/2010 related the IVM program implementation has been established.	2010
7. Monitoring residues of POPs pesticides.	Monitoring of POPs pesticides residue is conducted.	MoE, MoA, MoFor, MoH	Monitoring of POPs pesticides residue in the environment has been performed by Pusarpedal.	Every year, since 2004

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
8. Capacity building for monitoring and law enforcement, e.g. use of products for vector control and for eradicating crop pests.	Capacity for monitoring increases and laws are enforced.	MoE, MoHA, MoA, MoH	Capacity for monitoring has increased, but laws have not been enforced.	-
3.4. Activity: Production, import and export, use, identification, labelling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, Part II chemicals)				
1. Strengthening infrastructure capacity and ability (e.g. accredited laboratory) and human resources to be able to implement Convention obligation.	Accredited laboratory and human resources are available.	Pusarpedal, accredited local laboratory, BSN, BPOM, related institutions	Accredited laboratory Pusarpedal for POPs monitoring. See 3.1. point 5.	Available
2. Improvement of regulations concerning elimination of PCBs.	Regulations regarding elimination of PCBs are established.	MoEMR, MoE, MoA, BPOM, MoI, MoT, MoHA	See 3.2. point 4.	-
3. Inventory on PCBs equipment containing PCBs.	Inventory on PCBs equipment containing PCBs is performed.	MoEMR, MoI, MoTransp, MoD, MoEC/universities, MoE	See 3.2. point 3.	2012 - 2014
4. Management on PCBs, equipment containing PCBs and PCBs wastes according to ESM.	PCBs, equipment containing PCBs and PCBs wastes are properly managed according to ESM.	MoEMR, MoE, MoI	a. See 3.2. point 4.	-
			b. See 3.2. point 6.	-
5. Destruction of PCBs & PCBs wastes according to ESM and BAT/BEP (research and implementation) and enhancement of destruction facility number in-country.	PCBs & PCBs wastes are destroyed according to ESM and BAT/BEP.	MoEMR, MoI, MoEC/universities, research institutions, BPPT, MoE	PCBs facility treatment is not available, see 3.2. point 6.	-

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
6. Provision of training/ awareness for users and vulnerable group to PCBs.	Training/awareness for users regarding PCBs is conducted.	MoCI, MoEMR, MoE, MoI	a. Two trainings and two awareness raising workshops for users and vulnerable group to PCBs has been conducted during and after PPG stage of MoE-UNIDO PCBs project.	2012 - 2014
			b. Public awareness raising and advocacy campaign will be conducted under MoE – UNIDO PCBs project commencing in 2014.	-
3.5. Activity: Production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the Country				
1. Controlling illegal distribution and trade.	There is no DDT production, import and export.	DGCE, BPOM, MoA, MoT, MoI, MoH, MoE	There is no DDT production, import and export. Supervision of distribution and illegal trade of DDT have been conducted by DGCE, MoA and MoH. Regulation on the importation and its use is also effectively applied. See 3.2. point 1.	2008
2. Extension of inventory on ex-DDT warehouse.	Data on inventory and contaminated sites is available.	MoH, MoA, MoE	Data on inventory and contaminated sites are not updated. See also 3.3. point 2.	-
3. Identification and measurement/ examination on DDT residue level.	Concentration of DDT residue is measured.	MoH, BPOM, MoA, MoE	Concentration of DDT residue was measured in certain areas by Pusarpedal. See also 3.2. point 9.	Monitored every year since 2004
4. Remediation on polluted sites.	DDT contaminated sites are remediated.	MoH, MoA, MoFor, MoE, related institutions	See 3.3. point 2.	-
3.6. Activity: Register for specific exemptions and the continuing need for exemptions (Article 4)				
Indonesia does not have any intention to register exemption since the malaria mosquitoes have been resistant to DDT.				

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3.7. Action Plan: Measures to reduce releases from unintentional production (Article 5)				
1. Preparing UPOPs regulations, including regulatory limit for air emission.	Regulation and environmental limit value for UPOPs are set.	MoI, MoE, MoHA	a. Regulation and environmental limit value for UPOPs have not been established.	-
			b. Regulation on UPOPs (PCDDs/PCDFs TEQ) residue in food has been established by Head of BPOM. See also 3.1. point 4.	2009
2. Quantitative measurement of PCDDs/Fs releases in industrial and populated areas to be used as baseline for efforts in reducing releases.	Data on releases of PCDDs/Fs in industrial areas and settlements are monitored.	MoE, MoEC/universities, BPPT	a. MoEMR has visited and conducted pre-assessment for PCDDs/Fs release in power plants i.e.: <ul style="list-style-type: none"> • PLTU Suralaya in 2011; • PLTU Labuhan in 2012; • PLTU Ombilin in 2012; • PLTU Cirebon in 2013. Sampling and analysis of PCDDs/Fs for PLTU Ombilin will be conducted in 2014.	2011-2013
			b. Monitoring of PCDDs/Fs releases at Suralaya Power Plant conducted under MoE-UNIDO Boiler project. See 3.2. point 9.	2011-2012
			c. Regular monitoring on releases of PCDDs/Fs in industrial areas and settlements has not been performed due to lack of laboratory capacity at national level.	-
3. Program for annual report on PCDDs/Fs	Releases of UPOPs by public and private sector are reported.	MoE, MoI, MoHA	A cement industry, PT. Holcim Indonesia, conduted measurement	2012

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
release by public and private sectors potential to release UPOPs.			of dioxins/furans release (Sustainability Report 2012).	
4. Expansion of Blue Sky Program in industrial and populated areas.	Blue Sky Program is implemented in industrial and settlement area.	MoI, MoHA, MoEMR, MoE	Blue Sky Program in dense populated area (cities) by MoE in year: <ul style="list-style-type: none"> • 26 cities were evaluated in 2011. • 44 cities were evaluated in 2012. • 14 metropolitan areas, 14 big cities and 16 medium cities were evaluated in 2013. 	2011 - 2013
5. Implementation of BAT/BEP in various sectors, including preparation of BEP guidelines and provision of training on BEP.	BAT/BEP is implemented in industries.	MoI, MoHA, MoH, MoE	a. BAT/BEP has been implemented in Suralaya Power Plant in Cilegon. This activity is under MoE-UNIDO Boiler project.	2011 onward
			b. BAT/BEP has been implemented in PT. Goodyear Indonesia in Bogor. This activity is under MoE-UNIDO Boiler project.	2011 onward
6. Increasing public awareness and using alternative technology/ processing to inhibit open burning (domestic wastes, shifting cultivation, wood burning in households).	Activities on open burning is reduced (using better technology for wastes management, firewood converted to other alternative fuels).	MoCI, local government, MoEMR, MoI, MoE, MoA, MoFor, relevant institutions	Government established conversion from kerosene to LPG program to reduce UPOPs emissions.	2007
7. Using alternative materials, products and process or the modified ones.	Alternative materials to reduce releases of UPOPs are used.	MoI, MoA, MoEMR, research institutions, MoEC /universities, BPPT, MoE	See 3.7. point 5.	2010 onward

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
8. Research related to power generating and transportation.	Research in power generating and transportation to reduce releases of POPs is carried out.	Research institutions, MoEC/universities, BPPT, MoE	a. No specific research in power generating and transportation to reduce releases of POPs or UPOPs was conducted in the country. However, many researches on electric generating by wind power, solar power, wave power, hydropower and nuclear power which are alternatives (renewable energy) to fossil fuel and to reduce UPOPs release have been conducted in the country.	2008 - 2014
			b. For research on transportation, electric car developed by individuals and institutions (LIPI, BPPT, PLN, universities).	2010 - 2014
			c. Lithium battery factory in Indonesia to supply the electric car was established.	2013
9. Education, training and awareness raising.	Education materials for community are available and disseminated.	MoCI, MoEC/universities, MoI, MoE, MoEMR, BPOM, MoA, NGO	Under MoE – UNIDO Boiler Project, several activities on this action plan related UPOPs have been conducted such as: a. Trainings for: <ul style="list-style-type: none">• Boiler operators on boiler operation;• Laboratory staff on dioxins sampling analysis from environment for one month;	2010 - 2014

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
			<ul style="list-style-type: none"> • Laboratory & government staff on dioxins sampling analysis from power plant emission; • Laboratory & government on boiler combustion operation and BAT/BEP facilities in fossil fuel power plant; • Trainers (lecturers) from university on Green Boiler Technology course. <p>b. Workshops on:</p> <ul style="list-style-type: none"> • BEP implementation in power plants & dioxins sampling in Pusarpedal, Suralaya and Semarang power plants; • BAT/BEP implementation for improving boiler efficiency and reducing dioxins emission in Jakarta for academia, lab, industrial and power plants boilers; • Green Boiler in Cilegon in cooperation with Sultan Ageng Tirtayasa University. <p>c. Cooperation among MoE, UNIDO with universities (i.e. UGM and Sultan Ageng Tirtayasa) on Green Boiler Technology Course dissemination.</p>	
10. Developing strategy for pollution prevention that	Development strategy on pollution prevention is established.	MoE, MoEC/universities, research institutions,	BAT/BEP implementations in power sector. See 3.7.	2011

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
will give recommended alternatives as equipment/facility to minimize pollutants.		BPPT	point 5.	
11. Determination on mass concentration of PCDDs/Fs, HCB and PCBs	Mass concentration of PCDDs/Fs, HCB, PCBs is identified.	MoE, MoI	a. Mass concentration of PCDDs/Fs from Suralaya coal-fired power plant were identified See 3.7. point 2.	2011-2012
			b. Mass concentration of PCDDs/Fs from other sector and other UPOPs (HCB, PCBs) released from related sectors has not been assessed and identified.	-

3.8. Activity on measures to reduce releases from stockpiles and wastes

1. Infrastructure strengthening (strengthening lab performance for POP analysis, preparing SNI and human resource development, including researchers, field workers, analysts, technicians and government officials).	Number of accredited laboratory and skilled human resources increases.	Pusarpedal, accredited local laboratory, BSN, BPOM, MoEC/universities, BPPT, research institutions, related institutions	Pusarpedal assigned as national reference laboratory for most POPs. See also 3.1. point 5	Available
2. Evaluating impact of POPs releases on environment on human health.	Human health impact evaluation results are attained.	MoH	No comprehensive research to evaluate on impacts of POPs on human health in Indonesia.	-
3. Remediating polluted sites.	Contaminated sites are remediated.	MoH, MoA, MoFor, related institution, MoE	See 3.3. point 2.	-

3.9. Activity: Identification of stockpiles, articles in use and wastes

1. Identification and management of POPs stockpiles	POPs stockpiles and wastes are identified.	MoA, MoE, MoI, MoH	a. PCBs stockpiles and in use are identified. See 3.2. point 3.	2012 - 2014
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Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
and wastes according to ESM.			b. Minimum information on other POPs stockpiles and wastes.	-
2. Survey on existing and use of HCB.	HCB inventory data is available.	MoI, MoE, MoA, MoEC/universities	Preliminary inventory on HCB as intentional product and unintentional product (Tier 1) have been performed.	2014
3. Inventory on PCBs and equipment containing PCBs.	PCBs inventory data is available.	MoEMR, MoI, MoT, MoEC/universities, MoD, MoE	See 3.2. point 3.	2012 - 2014

3.10. Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use

1. Preparing guidelines on management of POPs stockpiles/residue, destruction of articles containing POPs and destruction of POPs wastes according to ESM.	Guidelines on management of POPs stockpiles/residue, destruction of articles containing POPs, destruction of POPs wastes according to ESM is available.	MoE, MoI, MoEMR, MoA, MoFor, BPOM	Minister of Environment Decree No. 30 of 2009 regulating the permit and supervision of hazardous wastes management (including POPs) and Minister of Environment Decree No. 33 of 2009 related to guideline to recover area contaminated with hazardous wastes are available. However, the ESM implementation of POPs wastes and stockpiles is not effective yet due to the limited inventory data. For PCBs, see 3.2. point 4 and point 6.	2009
2. Establishment of a body for controlling registration, maintenance and collecting POPs pesticides in agricultural areas that may exist (safe storage and disposal).	Institution/body for safe storage and disposal is established.	MoA, MoI, BPOM, MoE	Commission on Pesticides is available. See 3.2. point 1.	Before the 2008 NIP

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3. Research on PCBs destruction according to BAT/BEP.	PCBs destruction techniques according to BAT/BEP are available.	MoEMR, MoI, MoEC/universities, BPPT, research institutions	MoE and BPPT are assessing the PCBs destruction technology according to BAT/BEP implementing PCBs project which is currently on going. See 3.2. point 6.	2014
4. Handling, collecting, transporting, storing and disposing of POPs wastes according to ESM.	Regulation on handling, collecting, transporting, storing and disposing of POPs wastes according to ESM is available.	MoEMR, MoE, MoI, MoA	a. Licensing of hazardous wastes management is stipulated by the Government Regulation No. 18 and 85 of 1999 and other regulation following on the above mentioned regulation.	1999
			b. Law No. 22 of 2009 governing the transportation of hazardous wastes and further details by Minister of Transportation Decree No. 69 of 1993.	2009
5. Destruction of POPs wastes in accordance with ESM.	POPs wastes are destroyed in accordance with ESM.	MoE, related Institutions	For PCBs, see 3.2 point 6.	-
6. Establishment of PCBs destruction facility in accordance with BAT/BEP.	PCBs destruction facility in accordance with BAT/BEP is available.	MoEMR, MoI, MoE	PCBs destruction facility in accordance with BAT/BEP is not available yet. The facility is expected to be established under MoE-UNIDO PCBs project. See 3.2. point 6.	-

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3.11. Activity: Identification of contaminated sites (Annex A, B, C) and remediation in an environmentally sound manner				
1. Development of appropriate strategy for identification and remediation of contaminated sites by POPs.	Appropriate strategy for identification and remediation of polluted sites by POPs is developed.	MoH, MoE, MoA, MoFor	Strategy for identification and remediation of contaminated sites by POPs have not been developed. Monitoring on POPs from several locations and preliminary inventory data POPs are available. This can be used to identify and search potential contaminated sites. See also 3.3. point 2.	-
2. Survey on contaminated sites.	DDT & PCBs-contaminated lands are surveyed and identified.	MoH, MoE, MoA, MoFor	<p>a. Survey on contaminated sites identified in the 2008 NIP in Malang and Bogor has not been conducted.</p> <p>b. One location in Pasir Gombong was suspected to be contaminated by POPs, however, further survey or investigation have not been carried out.</p>	<p>-</p> <p>-</p>
3. Remediation of contaminated sites.	Contaminated sites are remediated.	MoH, MoE, MoA, MoFor, related Institutions	Remediation of contaminated sites has not been performed. See 3.3. point 2.	-
3.12 Activity: Facilitating or undertaking information exchange and stakeholder involvement				
1. Establishment of Commission on Hazardous Substances to ensure sustainability in compliance with the Convention.	Commission on Hazardous Substances is established.	MoE	Commission on Hazardous Substances has not been established. See also 3.1. point 1.	-
2. Coordination of the implementation of alternative techniques and use of alternative pesticides.	Alternative techniques and use of alternative pesticides are implemented.	MoA, MoI, MoEMR	Alternative techniques and use of alternative pesticides were implemented. Guidance book was published, see 3.2. point 5.	2010

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3. Coordination of the implementation of various techniques in using PCBs and in various sectors to reduce release of UPOPs.	Alternative techniques to reduce releases of UPOPs are available.	MoI, MoEMR	a. BAT/BEP in source category of fossil fuel –fired utility and industrial boiler have been implemented to reduce release of UPOPs. See 3.7. point 5.	2010 - 2014
			b. PCBs destruction technology was discussed in 3.2. point 6. Proper PCBs destruction will reduce release of UPOPs.	2014
4. Coordination of regulatory limit for POPs release.	Regulatory limit for POPs release is set.	MoE	a. Regulatory limit for POPs emission release has not been set.	-
			b. Regulatory limit for TCDD residue in foods has been established by BPOM. See 3.1. point 4.	2009
5. Increase of stakeholder participation in reducing and eliminating POPs, e.g. participation of general public, farmers, industries, various sectors in central and local government levels, NGO, multilateral organizations, national and international research institutions and consumers' protection agencies.	Stakeholder participation increases.	MoCI, MoA, MoI, MoHA, MoT, research Institutions, NGO, MoEC/universities, BPPT.	Under cooperation between MoE and UNIDO, a number of trainings and workshops have been conducted regarding the reduction and elimination of POPs particularly PCBs and UPOPs (PCDDs). See 3.4. point 6. and 3.7 point 9. The absence of Commission on Hazardous Substances also affects public participation.	2010 - 2014
6. Increase of ability in information exchange regarding POPs	Information exchange, both national and international levels, increases.	MoE, related institutions.	Information system on POPs (SIPOPs) has been developed by BPPT. Although SIPOPs is not yet	2012

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
at national and international levels.			published to public yet, it is expected to increase public awareness, participation and education.	
7. Increase of ability in management and evaluation program regarding reducing and eliminating POPs.	Ability in management and evaluation program regarding reducing and eliminating POPs increases.	MoE, MoA, MoFor, MoI, MoEMR, related institutions.	Dissemination on management and evaluation regarding reducing and eliminating POPs has increased, but not all target groups have been covered yet.	2014
8. Review of all regulation concerning POPs.	All regulations concerning POPs are reviewed.	MoE, MoA, BPOM, MoI, MoT, MoHA, related institutions.	All regulations concerning POPs have been reviewed in the NIP report.	2014
3.13. Activity on public awareness, information and education				
1. Collecting and disseminating information from abroad and in-country regarding POPs to stakeholders and general public.	Leaflet and website regarding POPs are developed.	MoE, MoCI, related institutions.	Dissemination of information and training related to POPs have been conducted through national and regional conferences in Indonesia, such as The Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions in February 2010 in Bali and RENPAP (Regional Network on Pesticide for Asia and the Pacific). RENPAP was established in early 1980s and the national focal point in Indonesia is MoI. The last time of hosting the meeting was in 2014 in Bogor.	2009-2014
2. Determining and nurturing target of information.	Information targets are established.	MoCI, MoE, MoEMR, MoEC, MoI, BPOM	Nurturing of four target groups: industry, government, higher education, NGO.	2009-2014

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3. Preparation of relevant information for each target group.	Relevant information for each target group is available.	MoEMR, MoE, MoEC, MoI, BPOM, MoCI	Several documents of regulation, technical regulation and guidelines related to POPs are available in MoE and other relevant ministries.	Since 2009
4. Integration of awareness of POPs in education and teaching.	POPs awareness is integrated in education curriculum.	MoEC, MoCI, MoE	Cooperation between MoE and universities (UGM and Sultan Ageng Tirtayasa) was established on Green Boiler Curriculum for POPs awareness.	2012
5. Coordination of public education to increase awareness and concern in reducing and eliminating POPs.	Coordination of public education improves.	MoCI, MoE, MoA, MoI, BPOM	Technical team on hazardous wastes including POPs was established and coordination and commitment still need to be strengthened.	2010 - 2014
6. Provision of training for stakeholders regarding hazard potential of POPs and safe handling, especially in industrial zones.	Training for stakeholders regarding hazard potential of POPs and safe handling is performed.	MoI, MoE, MoEMR, MoA, BPOM	Trainings are provided for boiler operators in state electricity generator company, PT. Indonesia Power and laboratory staff of Pusarpedal related to dioxins/furans.	2012
7. Provision of incentives for individual/working units that are successful in reducing/eliminating POPs.	Incentive programs for individual/ working units that are successful in reducing/eliminating POPs are established.	MoE, MoI	Incentive program for individual/working units to reduce/eliminate POPs have not been established.	-
8. Carrying out exchanges in educational materials at national and international levels.	Exchange program on educational materials at national and international levels are established.	MoE, MoEC	Educational material on Green Boiler Technology Course has been disseminated.	2013
9. Increase in public participation in addressing POPs and developing adequate response	Public participation increases.	MoCI, MoE	NGO and industrial sectors were invited in the preparation of NIP on POPs.	2013 - 2014

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
(including opportunity to give inputs at national level regarding the implementation of the Convention).				
3.14. Effectiveness evaluation (Article 16)				
1. Development of information system to collect monitoring data on chemicals listed in Annex A, B and C and their transport in the regional and global environment and prepare reports	Monitoring data is collected and recorded.	MoE, related institutions	a. Information system on POPs (SIPOPs) has been initiated by BPPT.	2012
			b. Information centre on poisoning (SIKER) is available at BPOM.	2012
2. Monitoring based on the Global Network for the Monitoring of Chemicals in the Environment in order to obtain equivalent data through harmonized methods regarding the existence of POPs and its transport in the regional & global environment.	POPs data through harmonized methodologies is available.	MoE, BPOM, related institutions	Monitoring of POPs by Pusarpedal has been conducted with support of (UNU)-Japan in the frame of Global POPs Regional Monitoring.	1999-2013 -
3. Monitoring of POPs and review of any possibility of additional newly listed POPs.	12 POPs are monitored.	MoE, MoA, BPOM, MoEC/ universities, BPPT	See 3.2. point 9.	Since 2004
4. Evaluation of transport of POPs in regional environment related to Malaysia, Singapore, Brunei Darussalam and the Philippines.	Evaluation report on POPs transportation in regional environment is available.	MoE, related institution	Evaluation on initial POPs in air has been conducted in Koto Tabang, West Sumatra by Pusarpedal.	-

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
3.15. Reporting				
1. Collection of monitoring data on chemicals listed in Annex A, B and C and their transport in the environment.	Monitoring data is collected and recorded.	MoE, related institution, MoEC/ Universities, BPPT	Data on monitoring of organochlorine pesticides and PCBs is available at Pusarpedal, BPPT, LIPI and universities.	Since 2001
2. Reporting to the COP by MoE regarding implementation of the Convention from the policy and technical aspects (based on results of Commission on Hazardous Substances's work).	Convention implementation report is submitted to the COP.	MoE, related institution	Convention implementation report is submitted to the COP by MoE annually.	2013
3.16. Research, development and monitoring				
1. Planning of research, development and monitoring: development of selection criteria and mechanisms.	Plan of research, development and monitoring is developed.	MoE, MoEC, BPPT	BPPT, LIPI and universities have conducted researches related to POPs.	Since 2005
2. Monitoring the existence, use and effort to reduce/eliminate POPs in various sectors in Indonesia.	The existence, use and efforts to reduce/eliminate POPs in various sectors in Indonesia are identified and monitored.	MoE, related institution	See 3.2. point 9.	Since 2004
3. Implementing research through cooperation with researchers and institutions from overseas and in-country: selection, field work, seminar, reporting.	Research collaborations with other institutions, both overseas and local, are developed.	MoEC/ universities, research institution, LIPI, BPPT, MoE	BPPT has developed research collaborations regarding POPs with MoA, ITB, organic farmers and Ehime University (Japan).	2007-2011
4. Monitoring of POPs in various media.	POPs concentrations in various media are regularly monitored.	MoE	See 3.2. point 9.	Since 2004
5. Monitoring of UPOPs in various media.	UPOPs concentrations in various media are regularly monitored.	MoE	Dioxins measurement in Suralaya Power Plant has been	2011

Action Plans	Performance Indicator	Stakeholder	Recent Status/Achievement	Year of Achievement
			conducted. However, monitoring UPOPs in various media has not been performed, due to lack of laboratory in Indonesia capable to perform dioxins analysis.	
3.17. Technical and financial assistance				
1. Technical assistance, e.g. in selecting/ implementing BAT/BEP in various sectors, remediating contaminated sites, management of POPs according to ESM and strengthening infrastructure.	Technical assistance, e.g. in selecting/implementing BAT/BEP in various sectors, remediating contaminated sites, management of POPs according to ESM and strengthening infrastructure, are gained.	MoE, MoI, MoEMR, MoA, MoFor, MoH, BPOM, Pusarpedal, accredited local laboratory	a. Technical assistances from UNIDO for: <ul style="list-style-type: none">• Review & update of NIP on POPs;• Inventory and ESM of PCBs disposal;• BAT/BEP in fossil fuel-fired utility and industrial boiler.	2013-2014 PPG : 2012-2013 2010-2014
			b. Technical assistances from UNDP for Inventory and ESM of PBDEs.	2013-2014
2. Financial assistance to implement action plans that need substantial funding, e.g. procurement of laboratory facility, implementation of BAT/BEP in various sectors, management of POPs according to ESM, remediation of contaminated sites and establishment of POPs destruction facilities.	Financial assistance to implement action plans that need substantial funding, e.g. procurement of laboratory facility, implementation of BAT/BEP in various sectors, management of POPs according to ESM, remediation of contaminated sites and establishment of POPs destruction facilities, are gained.	MoE, MoI, MoEMR, MoA, MoFor, MoH, BPOM, Pusarpedal, accredited local laboratory	Financial assistance from the GEF for: <ul style="list-style-type: none">• Review & update of NIP on POPs;• Inventory and ESM of PCBs disposal• BAT/BEP in fossil fuel-fired utility and industrial boiler;• Inventory and ESM of PBDEs.	2013-2014 PPG : 2012-2013 FSP: Starting 2014 2010-2014 2013-2014

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

4.1. Policy Statement

The 1945 Constitution of the Republic of Indonesia, namely the UUD 1945, states that a healthy environment is a constitutional right as well as a human right for every Indonesian citizen. The parliament and the government of the Republic of Indonesia have done measures in fulfilling the right by the ratification of the Stockholm Convention through Law No. 19 of 2009 concerning the Ratification of the Stockholm Convention on Persistent Organic Pollutants. In addition, Law No. 32 of 2009 concerning Environmental Protection and Management in parallel, strengthens the fulfillment of the rights as stated by law.

Indonesia had previously issued formal government regulations concerning hazardous wastes management in 1994 and concerning hazardous substances management in 2001. Government regulation concerning hazardous wastes management was revised and amended in 1999. In order to more effectively manage hazardous wastes and hazardous substances and to cope with recent challenges and trends, the Government of Indonesia through the Ministry of Environment is in the final stage of revising Government Regulation concerning Hazardous Wastes Management and Government Regulation concerning Hazardous Substances Management. One specific aspect addressed in the revision is accommodating the Stockholm Convention's chemicals into the revised regulations. The revision also considers a more comprehensive life cycle management of hazardous substances and wastes. Furthermore, the Ministry of Industry is also engaged in the preparation of guidelines for certain POPs chemicals management as well as in conducting studies on POPs alternatives. A more preventive approach related to chemical management has also been adopted by the Ministry of Environment through the development of 10Y SCP Indonesia (10 Year of Sustainable Consumption and Production plan), which involves collaboration between many government ministries and agencies. Alternative chemicals used in replacing certain POPs in Indonesia, such as pesticides are considered as one of the measures of SCP. Other POPs alternatives are also being assessed for their use in Indonesia, especially for the newly listed POPs.

Under the preliminary draft of the 2015-2019 Medium-Term National Development Plan¹ the strategy to control environmental pollution and degradation as related to hazardous wastes and substances are stated as follows:

- The management of hazardous wastes and substances through the development of standards and regulations on hazardous wastes and substances and the strengthening of control in hazardous wastes and substances;
- Enhancement of the management of wastes, including hazardous (specific) wastes through development of 3R (reduce, reuse, recycle); and
- Coordinated recovery of critical abandoned land (degraded/contaminated) through inventory and assessment measures and the coordinated recovery of abandoned mining areas, forest/land coverage degradation, coastal and marine as well as critical water mass.

4.1.1. NIP goal

The goal of this plan is to ensure the protection of human health and the environment by strengthening relevant policies, regulations, institutions and awareness raising as well as to ensure effective implementation of POPs management in Indonesia, including but not limited to accurate identification, proper control and reduction and/or elimination, environmentally sound dispose of any unwanted and obsolete stocks and the regular monitoring of POPs and their impacts on human health and the environment.

4.1.2. NIP objectives

- a. Strengthen institutional and capacity building as well as improve coordination between relevant institutions and stakeholders regarding POPs;
- b. Establish a comprehensive and integrated measurement, monitoring and knowledge management system and infrastructure;
- c. Strengthen policy, regulation and guidelines for initial POPs, develop policy, regulation and guidelines for newly listed POPs, harmonize relevant policies, regulation and guidelines regarding POPs;

¹ Ministry of National Development Planning (BAPPENAS), Rancangan Awal Pembangunan Jangka Menengah Nasional 2015-2019. available on : http://www.bappenas.go.id/files/7714/1557/5291/RT_RPJMN.PDF. Accessed in January 2015.

- d. Enhance awareness raising of POPs issues to all relevant stakeholders as well as POPs users and the general public, including improving stakeholders' participation on POPs management;
- e. Effective management of POPs through their life cycle (production, import, export, utilization, transportation and disposal), providing POPs alternatives and environmentally sound management (ESM) as well as best available techniques/best environmental practices (BAT/BEP) of POPs.

4.2. Implementation Strategy

4.2.1. Institutional initiative

Related departments, local governments and industries will incorporate respective tasks into their own work plans and organize their implementation in accordance with the requirements of the NIP. At present the focal and contact point of the Stockholm Convention resides in MoE. The updated NIP Indonesia will be submitted to the Stockholm Convention through MoE. The national focal point will also facilitate exchange of information relevant to the reduction or elimination of the production, use and release of POPs and will seek alternatives to POPs, including information relating to their risks, as well as to their economic and social costs.

At present Indonesia does not have any agency that is fully responsible for the guidance and coordination for the implementation of the Stockholm Convention. The NSC Ministerial Decree at present provides guidance and recommendations only for the NIP process, including assessment and recommendation of sectoral involvement and public awareness.

In the future the NSC can be developed further through a Presidential Decree to become a committee that will have the mandate to:

- a. Regularly supervise;
- b. Summarize and evaluate progress in Convention implementation;
- c. Organize and conduct performance evaluations;
- d. Adjust and update the NIP on a timely basis.

The designated ministry that will head the committee under the Presidential Decree will be in charge of organizing member departments to implement the NIP and other departments concerned with the responsibility for their respective actions in achieving the goals of the Stockholm Convention. This designated ministry will strengthen the capacity for the implementation of related departments and local governments in achieving the goals of the Stockholm Convention, establish a decision-making support system for Convention implementation and build and improve technical support mechanisms. This ministry will also encourage and support the establishment of relevant coordination bodies in regions with severe POPs contamination, or with better-off conditions in carrying out the implementation activities of the Convention. This ministry will also build and improve the system of policies and regulations, integrate the control and reduction of POPs into relevant policies and legal system and strengthen law enforcement and the building of the enforcement forces. It will adhere to the principle of pollution prevention and strengthen policy guidance and regulatory controls on the reduction and control of POPs releases as well as actively adopting economic instruments appropriate for the market economy system to promote the reduction and control of POPs releases.

4.2.2. The path to achievable and workable action plans

In reference to the result of inventory activity, institutional and regulatory reviews, as well as review and update of the 2008 NIP, the action plan to implement the Stockholm Convention should be managed through the continuation of in-depth inventory of all initial and newly listed POPs and the strategy to the completion of phase out of the POPs chemicals should be set out differently by taking into account the current conditions.

4.2.3. Sinergy of activities with other relevant programs (co-benefits)

Effective implementation of NIP on POPs in Indonesia is neither an exclusive nor an independent program. Some of the activities/programs in ministries/agencies, institutions and relevant stakeholders could support the implementation of NIP POPs, such as:

- a. Proper (Environmental Performance Rating Program Company), Ministry of Environment;
- b. 10Y SCP (Sustainable Consumption and Production), Ministry of Environment;
- c. Green Industry Award, Ministry of Industry;

- d. Standard Green Industry, Ministry of Industry;
- e. Sustainable Agriculture, Ministry of Agriculture;
- f. ISPO (Indonesian Sustainable Palm Oil), Ministry of Agriculture;
- g. Healthy Indonesia, Ministry of Health;
- h. Millennium Development/Sustainable Development Goals, Bappenas;
- i. Environmental Education, Ministry of Education and Culture;
- j. Ecolabel, National Standardization Agency of Indonesia and others.

In order to archive an effective management of POPs in Indonesia, it is necessary to map the benefits of the activities/programs mentioned above and integrate them with the management of POPs.

4.3. Activities, Strategies and Action Plans

4.3.1. Activity : Regulatory strengthening measures

In general, an action plan and regulatory strengthening measures with regard to NIP on POPs in Indonesia are carried out through two main approaches based on the types of POPs listed in the Stockholm Convention and on the life cycle of POPs. The first approach (based on the type of compound) is to ensure that all POPs listed in the Stockholm Convention can be organized and managed well in Indonesia, whereas for the second approach (based on life cycle) is to ensure that all relevant POPs can be managed at different stages of their life cycle such as import, export, production, use, stockpiles and wastes.

Regulatory strengthening measures on POPs require intensive cooperation and communication between the various stakeholders, especially those from various governmental agencies. As mentioned earlier, certain POPs listed in the Stockholm Convention has been organized in Indonesia through various regulations issued by different governmental agencies in accordance with each of their duties and functions. Arrangements made by those agencies need to be aligned for their effectiveness and not to overlap in their settings.

While developing this NIP, the Ministry of Environment was also processing the final revision of Government Regulation No. 74 of 2001 and Government Regulation No. 18 of 1999 and No. 85 Year of 1999. The draft of the regulations is available and has been

informed to the relevant agencies and the general public. However, it seems that the draft is based more on the real needs on the ground and has not fully considered the obligation of all POPs in the Stockholm Convention, including their life cycle. For example, some of the newly listed POPs have not been covered by those regulations, such as perfluorooctane sulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether), hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octabromodiphenyl ether), or hexabromocyclododecane. This reflects that the Law No. 19 of 2009 concerning the Ratification of the Stockholm Convention has not been fully considered in the preparation of the regulation draft.

Action plans

1. Assessment of evaluation and harmonization of all regulations related to the management of hazardous substances and hazardous wastes in Indonesia, which are linked to POPs listed in the Stockholm Convention. The review should ensure that for all POPs in the Stockholm Convention i.e. their management and regulation throughout their life cycle are obligatory covered. The scope of the legislation is comprehensively studied and conducted across various sectors (ministries and non-ministerial government agencies).

Detailed action plans

- a. Implementation of study;
- b. Evaluation and harmonization workshop on regulation related to POPs.

Performance indicator

Report and recommendations for further harmonization action of legislation related to the management of hazardous substances and hazardous wastes in Indonesia.

2. Study to ensure that all obligations of the Convention are covered in the Draft of Government Regulation (RPP) concerning the Management of Hazardous Substances and Hazardous Wastes. For example, in the RPP on the Management of Hazardous Substances, lindane is designated for limited use (specific exemption for human health pharmaceuticals), while in the Convention, the production of this material has been banned. In addition, the RPP does not include arrangements of some POPs, such as perfluorooctane sulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial pentabromodiphenyl ether), hexabromodiphenyl ether and

heptabromodiphenyl ether (commercial octabromodiphenyl ether), or hexabromocyclododecane.

Detailed action plans

- a. Implementation of study (checklist and analysis towards obligation of the Stockholm Convention under national regulation);
- b. Recommendation workshop on regulation and management of POPs into RPP;
- c. Final recommendation on regulation and management of POPs into RPP.

Performance indicator

All POPs and the relevant obligations of Stockholm Convention are incorporated in RPP concerning the Management of Hazardous Substances and Hazardous Wastes.

3. Assessment of GR No. 7 of 1973 and its regulation derivatives to ensure that all POPs pesticides under the Convention are included, including the details of their management procedures. The regulation is 41-year-old and should be updated taking into account current issues related to the management of pesticides, especially POPs pesticides.

Detailed action plans

- a. Implementation of study;
- b. Workshop for formulation and recommendation to changes in GR No. 7 of 1973;
- c. Final recommendation.

Performance indicator

The position and relevance of GR No. 7 of 1973 and/or recommendation to change GR No. 7 of 1973 are in place.

4. Assessment of system model for an increase in the effectiveness of the enforcement regulations related to setting up and management of POPs in the Stockholm Convention.

Detailed action plans

- a. Implementation of study;

- b. Workshop on system model to increase the effectiveness of enforcement regulations related to POPs management (to be carried out four times; three times in each part of the regions in Indonesia and one time in the capital city);
- c. Recommendation to enhance effectiveness in compliances with regulations including with guidance document;
- d. Development of capacity to implement model (training, workshop, seminar, publish guidance, etc).

Performance indicator

System model to increase the effectiveness of enforcement regulations related to POPs management is available.

- 5. Development of incentive mechanisms for disposal of PCBs equipment and wastes in an environmentally sound manner.

Detailed action plans

- a. Economic and market-based incentives proposed for disposal of PCBs containing equipment and wastes;
- b. Market analysis based on the cost of testing and disposal options and PCBs inventory;
- c. Proposal of a testing and disposal incentive scheme, including consultation with stakeholders;
- d. Financial and sustainability assessment of the incentive scheme;
- e. Adoption of the final incentive program.

Performance indicator

Incentive mechanisms for disposal of PCBs equipment and wastes in an environmentally sound manner is agreed upon and implemented.

- 6. Study of roadmap formulation for implementation of guidelines and technical guidance on the management of POPs in various ministries and relevant non-ministerial government agencies. The roadmap will describe the various types of arrangements, including technical and implementation guidelines for management of POPs, which are currently unavailable. Some examples of necessary arrangements/guidelines include:

(1) Guidelines for the management of PCBs in transformers, capacitors and electrical equipment, (2) Review and development of policies and regulatory frameworks of PCB management, (3) Propose and adoption of economic and market-based incentives for wastes disposal of PCB and PCB-containing equipment. (4) Setting of PFOS in the industry, (5) Regulation of products containing PBDEs and PBDEs in the industrial and recycling sectors, (6) POPs stockpiles arrangements, (7) Setting of HCB and others.

Detailed action plans

- a. Implementation of study;
- b. Formulation for implementation of guidelines and technical guidance on the management of POPs;
- c. Recommendation on road map;
- d. Development and adoption of PCBs official guidelines;
- e. Development of operational guidelines and maintenance of electrical equipments containing PCBs;
- f. Development of Indonesian National Standard (SNI) for PCBs-free insulation oil for electrical equipment.

Performance indicator

1. Road map and list of operational guidelines and technical instructions for POPs management in Indonesia, implementation guidelines, and technical guidelines on POPs management are developed;
 2. PCB management, policy and regulatory framework are developed;
 3. PCBs official guidelines is communicated and disseminated to the stakeholder.
7. Assessment of POPs formulation standards for environmental and human health protection. The quality standards need to be set at least on three things, namely: (1) POPs quality standard for environmental protection, (2) POPs quality standards for the protection of labor and (3) Quality standards for the protection of public health.

Detailed action plans

- a. Implementation of study;
- b. Workshop on POPs formulation standards for environmental protection;
- c. Workshop on POPs formulation standards for occupational workers;

- d. Workshop on POPs formulation standards for human health protection.

Performance indicator

Report on POPs quality standard formulation for environmental protection, labour protection and the protection of public health is conducted.

4.3.2. Activity : Institutional strengthening and capacity building measures

The establishment of the Commission on Hazardous Substances is one of the directives of Government Regulation No. 74 of 2001. The 2008 NIP proposed an action plan on the establishment of this institution and the process is still on-going. As one of the instruments in the management of hazardous substances, including POPs, it is expected to strengthen the hazardous substances institution in Indonesia. Therefore, it is imperative to establish the Committee.

The management of POPs in Indonesia requires involvement of various ministries and other non-ministerial government institutions of equal levels. At present the Ministry of Environment is the focal point for the implementation of the NIP on POPs in Indonesia. The number of institutions involved will require an adequate level of coordination. Based on observations of the implementation of the 2008 NIP, coordination and communication between ministries and non-ministerial government agencies will be one of the main aspects to be improved. Since the management of POPs in Indonesia will involve various ministries and non-ministerial government institutions, coordination will have to be executed by an office higher than a ministerial and a non-ministerial government organization. An assessment on the managing institution becomes a dire necessity to coordinate the realization of the NIP on POPs.

A model institution would be one established through a Presidential Regulation. This institution can be headed by the President supported by a vice head or several vice heads at ministerial level and managed by a secretariat or daily manager. Following through various regulations, the institution could be formalized in formulating a national action plan which functions as a guidance for ministries and government institutions in carrying out planning, executing and monitoring and conducting evaluation of their action plans as well as providing guidance for local government in developing their own action plans. On the other hand, these

regulations could serve also as reference for private sector, the public and other relevant stakeholders in the management of POPs.

In essence the implementation of the Stockholm Convention in Indonesia will involve laws and regulations related to the management of hazardous substances as well as regulations related to the management of hazardous wastes. Both regulations already existing in Indonesia will also be related to the implementation of the Basel Convention and the Stockholm Convention. Currently there are three conventions of which the management are related, i.e the Basel Convention, the Stockholm Convention and the Rotterdam Convention. Integrating the management of these three conventions in one institution will: (1) simplify the management process, (2) effectively manage it, (3) enhance the effectiveness in compliance to relevant regulations, (4) ensure effective use of resources and funds, (5) expedite coordination and (6) integrate reporting.

Action plans

1. The formulation of Commission on Hazardous Substances as referred to Article 21, GR. No. 74 of 2001. The Commission is assigned with the task to provide advice and/or suggestion to the government.

Detailed action plans

- a. Development of concept for institutional and members;
- b. Development of system and operational procedure for Commission on Hazardous Substances;
- c. Workshop for institutional, system and operational procedure for Commission on Hazardous Substances;
- d. Approvalment and inauguration of Commission on Hazardous Substances.

Performance indicator

Commission on Hazardous Substances is approved and inaugurated by the President of the Republic of Indonesia.

2. Assessment on the formulation of an institution to manage hazardous substances and hazardous wastes related to the three conventions (Basel, Stockholm and Rotterdam). This institution will:

- Formulate and implement management strategy for the implementation of the conventions (Basel, Stockholm and Rotterdam) and other conventions related with hazardous substances and wastes in Indonesia;
- Coordinate the management of hazardous substance and wastes in Indonesia, especially in effectively formulating the NIP of the three conventions: Basel, Stockholm and Rotterdam;
- Formulate and improve knowledge management on hazardous substances and wastes related to the three conventions. In this context the knowledge management will include information gathering, storage, processing, disseminating and exchange;
- Design and implement capacity building related to hazardous substances and wastes of the three conventions on human resources at central and provincial governments, districts/cities, POPs users, the general public, as well as other relevant stakeholders;
- Conduct an annual conference on the management and realization of the NIP for the Basel, Stockholm and Rotterdam Conventions in Indonesia;
- Publish a cross-sectoral and cross-stakeholder annual report on the management of the three conventions (Basel, Stockholm and Rotterdam) and the realization of its NIP.

The institution can consist of various working groups, i.e:

- Basel Convention working group;
- Stockholm Convention working group;
- Rotterdam Convention working group;
- Working group on financing;
- Working group on capacity building;
- Working group on knowledge management.

Detailed action plans

- a. Comparative assessment of institutional management of hazardous substances and wastes;
- b. Development of concept for institutional management of hazardous substances and wastes;

- c. Workshop with various stakeholders;
- d. Development of institutional structure and system management of hazardous substances and wastes;
- e. Workshop with various stakeholders related to institutional management of hazardous substances substances and wastes;
- f. Recommendation of institutional management of hazardous substances and wastes.

Performance indicator

Assessment report and recommendation on institution for the integrated management of hazardous substances and wastes is available.

- 3. Establishment of laboratory analysis of all POPs in every part of region in Indonesia (West, Central, East). This laboratory will at least have the capacity to analyze and monitor POPs in various environmental media, biota, in food and foodstuffs, material/product (article) and their impact on humans.

Detailed action plans

- a. Planning for laboratory physical design for POPs;
- b. Laboratory system design (ISO 17025, analytical method, work safety, calibration, accreditation, etc.);
- c. Human resource preparation for laboratories (managers, analysis, field personnel, administrative personnel, etc.);
- d. Laboratory development, equipment, supporting facilities, etc.

Performance indicator

Establishment and operation of three POPs laboratories in each region of Indonesia.

- 4. Annual workshop on formulation of a detailed plan for implementation of annual NIP on POPs in Indonesia, which is coordinated by the focal point and followed by all relevant stakeholders, including the implementation of evaluation workshops.

Detailed action plans

- a. Preparation of workshop activities;
- b. Workshop commencement;
- c. Signing of agreement document for yearly NIP implementation from stakeholders;
- d. Distribution of agreement documents to related stakeholders;
- e. Mid-year evaluation of detailed NIP on POPs activities in Indonesia.

Performance indicator

Annual plan of NIP on POPs is agreed and supported by all relevant stakeholders.

5. The establishment of knowledge management centre (the centre of knowledge management) for NIP POPs in Indonesia, including knowledge acquisition, knowledge storage, knowledge processing, knowledge dissemination and exchange of knowledge.

Detailed action plans

- a. Preparation of knowledge management system;
- b. Preparation of internet website;
- c. Preparation of human resources;
- d. Preparation of system and operating procedure;
- e. Preparation of institution (role, mandate, responsibilities and resources).

Performance indicator

Knowledge Management Centre for NIP on POPs in Indonesia is established, officially inaugurated and operated.

6. Development of the human resources capacity related to POPs for government (centre, provincial, district/city), POPs users, communities and other relevant stakeholders.

Detailed action plans

- a. Preparation plan for capacity development for five years;
- b. Preparation of annual plan for capacity development;
- c. POPs training to stakeholder participants at national level;
- d. POPs training to stakeholder participants at district/city/province level annually;

- e. Capacity development for government institutions in the central and selected provinces for PCBs management:
 - Establish a technical working group for PCBs management;
 - Assessment of capacity building needs;
 - Conduct training and workshops at central and provincial levels on PCBs management;
 - Enhance laboratory capacity for PCBs measurement.

Performance indicator

The availability of a medium-term capacity development plan (five years) and annual and 1,000 people of POPs stakeholders trained at the central and district/city/province. Assessment/identification of capacity development needs for government institutions is conducted. Several identified training activities to fulfil capacity development needs are successfully carried out.

- 7. Conducting annual national conference on management, achievement and evaluation of the implementation of the NIP on POPs in Indonesia involving relevant stakeholders.

Detailed action plans

- a. Preparation of annual conference;
- b. Annual conference activities;
- c. Write-up and editing of annual conference proceedings;
- d. Printing of proceedings;
- e. Uploading of the proceedings to internet website of relevant stakeholders;
- f. Disseminating proceedings to relevant stakeholders.

Performance indicator

The implementation and publication of the proceedings of the national conference on the management of NIP on POPs in Indonesia are conducted.

- 8. Publishing a cross-sectoral and multi-stakeholder annual report on NIP on POPs achievement in Indonesia.

Detailed action plans

- a. Report write-up;
- b. Report editing;
- c. Publication of report;
- d. Uploading of report to internet website of related stakeholders;
- e. Printing report and dissemination to relevant stakeholders.

Performance indicator

Publication of reports of cross-sectoral and stakeholder knowledge on NIP on POPs management in Indonesia.

4.3.3. Activity: Measures to reduce or eliminate releases from intentional production and use**4.3.3.1. Prohibition and/or elimination of production and use of chemicals listed in Annex A and restriction of production and use of chemicals listed in Annex B****4.3.3.1.1. Pesticides (initial and newly listed)**

The use of nine POPs pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene and hexachlorobenzene) have been banned through GR No. 74 of 2001, which is in accordance with the Stockholm Convention. Endosulfan has been banned for use as a pesticide in agriculture and lindane is no longer permitted to be imported and used. Policies on pesticides are decided by the MoA, MoE and MoH.

Action plans

Ensure that all POPs pesticides have been set in regulations, strengthen compliance and monitor the law enforcement relating to pesticides (See Subchapter 4.3.1. point 3 and 4).

Detailed action plans

Identify and develop non-POPs pesticides and promote sustainable agricultural practices, such as organic farming and use of alternatives to pesticides.

Performance indicator

Life cycle of POPs pesticides are regulated.

4.3.3.1.2. PCBs

The use of PCBs as synthetic organic chemicals, which is also known as chlorinated hydrocarbon, is prohibited by GR No. 74 of 2001. However, there is no technical guidance on the management of equipment containing PCBs (transformers, capacitors and other electrical equipment) and no guidelines for the management of PCBs, PCB technical codes of practice and incentive mechanism for the destruction of PCBs.

Action plans

Prepare regulatory framework for the management of PCBs, such as labeling and technical guideline (see Subchapter 4.3.1. point 4).

Detailed action plans

See Subchapter 4.3.1. point 4.

Performance indicator:

1. Availability of concept of standard operation procedure for equipment containing PCBs, including capacitor and transformer;
2. Availability of PCBs destruction policy concept on the electricity equipment and its incentive mechanism;
3. Availability of Ministerial Decree concept on the management of PCBs and PCBs-contaminated electricity equipment.

4.3.3.1.3. POP-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

These POPs are found in certain commercial formulation of polybrominated diphenyl ethers (PBDEs) as additive flame retardant, such as commercial pentaBDE and octaBDE (c-PentaBDE and c-OctaBDE). To the best current information, these commercial formulations have never been produced/exported in/from Indonesia, but they may have been imported in minor amount compared to c-DecaBDE. Environmental monitoring studies indicated that tetra-, penta-, hexa- and hepta- homologous PBDEs were found at minor proportion

compared to decaBDEs to the total PBDEs in sediments,¹ soil² and dust³ of various locations in Indonesia and no regulatory measures exist regarding PBDEs in Indonesia. Therefore, further regulatory measures need to be taken with regard to restricting/prohibiting the manufacture, import or use, sale, stockpiles and wastes of the commercial mixtures containing these substances (pentaBDE and octaBDE) to prevent the re-introduction of these POPs into Indonesia.

Action plans

Strengthening the existing regulations to ensure the regulation and management of POP-PBDEs in all life cycles including the prohibition and elimination of their production and use in accordance with the obligation of the Stockholm Convention (See Subchapter 4.3.1. point 2).

Detailed action plans

See Subchapter 4.3.1. point 2.

Performance indicator

POP-PBDEs are included in government regulation on hazardous substances and wastes to be banned/prohibited and eliminated from their production and use.

4.3.3.1.4. PFOS

Industries manufacturing PFOS and its related substances are not available in Indonesia. However, PFOS and PFOS-related substances are found in sediment skipjack tuna liver in Jakarta Bay and in breast milk in Purwakarta, Indonesia. This may be due to previous

¹ Sudaryanto, A., Setiawan, I.E., Riyadi, A.S., Ilyas, M., Anantasena, Y., Djamaruddin, R., Isobe, T., Takahashi, S., Tanabe, S. 2010b. Utilization of es-BANK of Ehime University for Monitoring Environmental Pollutants in Indonesia: A Case Study for Brominated Flame Retardants in Biota, Human and Environmental Samples. Interdisciplinary Studies on Environmental Chemistry, Vol. 4. Environmental Specimen Bank: Exploring Possibility of Setting-up ESBs in Developing Countries (Eds., T. Isobe, K. Nomiya, A. Subramanian and S. Tanabe). TERRAPUB, Tokyo. pp. 205-213.

² Ilyas, M., Agus Sudaryanto, Iwan Eka Setiawan, Adi Slamet Riyadi, Tomohiko Isobe, Shohei Ogawa, Shin Takahashi, Shinsuke Tanabe. 2011a. Characterization of polychlorinated biphenyls and brominated flame retardants in surface soils from Surabaya, Indonesia. Chemosphere, 83, 783–791.

³ Sudaryanto, A., Isobe, T., Suzuki, G., Setiawan, I.E., Ilyas, M., Riyadi, A.S., Takahashi, S., Tanabe, S. 2009. Characterization of Brominated Flame Retardants in House Dust and their Role as Non-Dietary Source for Human in Indonesia. In: Interdisciplinary Studies on Environmental Chemistry — Environmental Research in Asia, Eds., Y. Obayashi, T. Isobe, A. Subramanian, S. Suzuki and S. Tanabe. TERRAPUB, Tokyo, Japan, pp. 133–141.

import and use of these chemicals and/or products containing PFOS. In addition, there is no regulation on PFOS management in Indonesia until now.

Action plans

Strengthening the existing regulations to ensure the regulation and management of PFOS in its life cycle including the prohibition and elimination of production and use in accordance with the obligation of the Stockholm Convention (See Subchapter 4.3.1. point 2).

Detailed action plans

See Subchapter 4.3.1. point 2.

Performance indicator

Management of PFOS and its related compounds is included in government regulation on hazardous substances and wastes.

4.3.3.2. Prohibition and/or restrictions of the import and export of the chemicals listed in Annex A and Annex B

4.3.3.2.1. Import of the chemicals listed in Annex A and Annex B

4.3.3.2.1.1. Pesticides (initial and newly listed)

No pesticides industry in Indonesia produces active compounds; all pesticides are imported. Based on explanation by the Commission on Pesticides, some companies imported intermediate materials, however, there is no POPs pesticides. Lindane is still imported and regulated as limited use to eradicate lice and scabies.

Action plans

Ensure that the life cycle of POPs pesticides is regulated and managed in accordance with the Stockholm Convention obligations, including banning the import of lindane (see Subchapter 4.3.1. point 3).

Detailed action plans

See Subchapter 4.3.1. point 3.

Performance indicator

1. Technical guideline for controlling and import prevention is available;
2. Monitoring data is conducted nationally;
3. Monitoring data is available using international standard.

4.3.3.2.1.2. PCBs

There is no importation of PCBs to Indonesia so no specific action plan is required in this chapter. Nevertheless, to ensure that imported transformer products used in Indonesia are PCBs-free, an electrical equipment standard is required.

Action plans

Build a roadmap for implementation guidelines and technical instructions on PCBs management through the development of SNI on PCBs-free electrical equipment (see Subchapter 4.3.1. point 6).

Detailed action plans

See Subchapter 4.3.1. point 6.

Performance indicator

Availability of Indonesian National Standard (SNI) of PCBs-free insulation oil for electrical equipment.

4.3.3.2.1.3. POPs-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

There is no information related to the importation of POPs-PBDEs. With regard to the prohibition and elimination of POPs-PBDEs from import activity, if any, efforts will be made through regulation on import ban of tetraBDE, pentaBDE, hexaBDE and heptaBDE as well as commercial formulations of PBDEs, including polymers and resins containing the substances with certain exceptions (e.g. their use for laboratory purposes and other incidental presence that aligns with the exception of the Stockholm Convention).

Action plans

Strengthening the existing regulations to ensure that the regulation and management of PBDEs in all life cycles, including the prohibition and elimination of their imports, are in accordance with the obligations of the Stockholm Convention (See Subchapter 4.3.1. point 2).

Detailed action plans

See Subchapter 4.3.1. point 2.

Performance indicator

POP-PBDEs are included in government regulation on hazardous substances and wastes to be banned/prohibited and eliminated from import.

4.3.3.2.1.4. PFOS

Detection of PFOS and its related chemicals in human, biota and the environment indicates the use of these chemicals in Indonesia. This is probably due to import of PFOS and/or products containing PFOS. PFOS have never been manufactured in Indonesia. There is no regulation on PFOS management in Indonesia until now. Therefore, it is necessary to conduct assessment of the presence of PFOS and its impacts for regulatory purposes.

Action plans

Assessment of the level of PFOS and its impact before developing relevant regulation.

Detailed action plans

- a. Establish and train a team of inventory;
- b. Build comprehensive records of chemical/wastes, imports and exports with easy access and appropriate update;
- c. Conduct inventory for all sectors predicted to be using PFOS and its related substances.

Performance indicator

Data on the level of PFOS and its related substances in all related sectors is available.

4.3.3.2.2. Export of the chemicals listed in Annex A and B

4.3.3.2.2.1. Pesticides (initial and newly listed)

POPs pesticides were never manufactured in Indonesia since 1992; therefore, there is no export data available. Stockpiles of lindane and endosulfan should be destroyed in the country.

Action plans

Ensure that all the life cycle of POPs pesticides is regulated and managed in accordance with the Stockholm Convention obligations (see Subchapter 4.3.1. point 3).

Detailed action plans

See Subchapter 4.3.1. point 3.

Performance indicator

Life cycle of POP pesticides are regulated and managed.

4.3.3.2.2.2. PCBs

There is no PCBs production in Indonesia, therefore there is no export to overseas. Action plan regarding PCBs is not required in this subchapter.

4.3.3.2.2.3. POP-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

PBDEs were never produced and exported and no information regarding their stockpiles is available in Indonesia. The action plan refers to Subchapter 4.3.1, namely the strengthening of regulations that also ensures export ban.

Action plans

Strengthening existing regulations to ensure the regulation and management of POPs-PBDEs in all life cycle including the prohibition and elimination of export in accordance to the Stockholm Convention (See Subchapter 4.3.1. point 2).

Detailed action plans

See Subchapter 4.3.1. point 2.

Performance indicator

POP-PBDEs are included in government regulation on hazardous substances and wastes to be banned/prohibited and eliminated from export.

4.3.3.2.2.4. PFOS

As PFOS have never been produced in Indonesia, there are no exports of PFOS and its related substances from Indonesia. There is no action plan on this subchapter.

4.3.4. Activity: Register of specific exemptions and the continuing need for exemptions

Regarding registration of specific exemptions and the continuing need for exemptions, the Government of Indonesia will not apply for re-exemptions to use POPs and will take regulatory measures to totally ban the use of these chemicals. As for exemption to PFOS, due to the lack of information on PFOS as chemicals and chemicals in products and articles, the Government through the relevant institutions will conduct assessment for several industries to decide whether or not exemption is needed.

4.3.5. Activity: Measures to reduce releases from unintentional production

UPOPs management is focused on the releases of dioxins/furans (PCDDs/PCDFs), PCBs, HCB and PeCB from various sectors. Reduction of unintentional HCB and unintentional PCB releases is expected to take place for most sources together with reduction of PCDDs/PCDFs release. However, for the heavy oil fired engines a particularly high PCB release (4,313 g TEQ) is reported and needs to be further assessed.

Action plans

1. Strengthening laboratory capacities for UPOPs measurement (PCDDs/PCDF, PCBs, HCB, PeCB) (See Subchapter 4.3.2).

Detailed action plans

See Subchapter 4.3.2.

Performance indicator

National laboratory for sampling and analyzing UPOPs (PCDDs/Fs, PCBs, HCB, PeCB) is established.

2. Conduct inventory and assessment on UPOPs (PCDDs/PCDFs, PCBs, HCB, PeCB).

Detailed action plans

- a. Establish and train the inventory team;
- b. Conduct inventory of open burning processes;
- c. Conduct inventory of production of chemical and consumer goods including pigment industry;
- d. Conduct inventory of wastes incineration;
- e. Conduct inventory of ferrous & non-ferrous metal production including ZnO production;
- f. Conduct inventory of power generation sector;
- g. Conduct inventory of heavy oil fired engines (dioxins-like PCBs);
- h. Validate the results with GC/MS measurement;
- i. Conduct assessment on dioxins maximum threshold limit in the environment, emission and food product.

Performance indicator

Availability of inventory database and assessment of UPOPs.

3. Introduction of BAT and BEP in wastes incineration sector.

Detailed action plans

- a. Preparation of guidance and guidelines on BAT/BEP in wastes incineration sector according to Stockholm Convention;
- b. Dissemination of action on Pollution Prevention/Cleaner Production (PP/CP) for wastes incineration category;

- c. Establishment of regional UPOPs baseline inventory for wastes incineration category;
- d. Development of regional coordination for development of human resources;
- e. Building capacities for sampling and analysis of UPOPs;
- f. Project management;
- g. Project preparation stage.

Performance indicator

- 1. Availability of guidance and guidelines on BAT/BEP in wastes incineration;
 - 2. BAT and BEP demonstration is applied for wastes incineration.
4. Introduction of BAT and BEP in metallurgical industry sector.

Detailed action plans

- a. Coordinating with industrial areas for development and implementation of BAT/BEP;
- b. Introducing pollution prevention/cleaner production strategy before introducing BAT/BEP implementation to reduce POPs emissions;
- c. Introducing BAT/BEP action in selected metallurgical industries;
- d. Demonstrating pilot cases of pre-treatment technology scrap feed including non-combustion technology;
- e. Improving capacities for monitoring PCDDs/Fs in metallurgical sector;
- f. Project management;
- g. Project preparation stage.

Performance indicator

- 1. Availability of guidance and guidelines on BAT/BEP in metallurgical industries;
- 2. BAT and BEP demonstration is applied for metallurgical industrial sector.

4.3.6. Activity: Identification of stockpiles, articles in use and wastes

4.3.6.1. Pesticides (initial and newly listed)

Stockpiles in bulk and concentration are not found because there is no POPs pesticides industry. The existing pesticides companies are only involved in formulating and

distributing commodities for short periods of time. The cost for warehousing is expensive, so the companies only plan stockpiles just sufficient for one planting season. Large stockpiles would be difficult to find. At the time, stockpiles are found in small kiosks in the form of the remaining stock or unsold goods. The absolute amount and volume of these residues are difficult to estimate.

Action plan

1. Conduct inventory of stockpiles in retailers.

Detailed action plans

- a. Develop management system for pesticides containers nationally (pesticides container program);
- b. Update POPs pesticides inventory through stockpiles survey (including in pesticides retailers).

Performance indicator

1. Database of monitoring results on POPs pesticides and their residues disseminated in various media;
 2. Guideline for POPs stockpiles management is available;
 3. Guideline for safe storage and disposal is available.
-
2. Continuously monitor the existence of POPs pesticides, export/import and in environment.

Detailed action plans

Expanding the implementation of IVM and IPM programs.

Performance indicator

IPM and IVM have been implemented using ESM.

3. Strengthen laboratories (human resources, equipment, accreditation and standard analysis procedures) in every region of Indonesia and soon determine the threshold concentrations in soil, water and foodstuffs (see Subchapter 4.3.2. point 3).

Detailed action plans

See Subchapter 4.3.2. point 3.

Performance indicator

See Subchapter 4.3.2. point 3.

4.3.6.2. PCBs

In principle strategy to identify stockpiles, articles in use and wastes of PCBs is still based on the inventory that has been done and will be continued to collect comprehensive POPs data. Using this strategy, stockpiles, articles in use and wastes of PCBs can be identified. Other strategy is to increase public awareness on POPs issue and improve access for information exchange. Active participation of stakeholders could help the inventory team to do self-reporting when the public is aware of the necessity of proper POPs management.

Action plans

Develop programs and conduct a national inventory and monitoring for PCBs.

Detailed action plans

- a. Establishment and training of inventory team;
- b. Updating of equipment inventory suspected of containing PCBs in selected provinces (Java Island) including PLN's transformers;
- c. Sampling of equipment suspected of containing PCBs in several selected provinces;
- d. Conduct inventory of PCBs on PLN's transformers in Sumatra and Batam;
- e. Conduct inventory of PCBs on PLN's transformers in East Indonesia;
- f. Conduct validation of inventory results from dexsil analysis with gas chromatography analysis;
- g. Conduct inventory of PCBs in transformer and capacitor in industries (including agroindustry). Inventory is focused in Java Island;
- h. Conduct study and inventory of cable sheath containing PCBs;
- i. Conduct study and initial inventory of PCBs in cure-caulk;
- j. Conduct an initial investigation and possibly a preliminary inventory of PCBs in open applications;

- k. Combining of inventory results and development of PCBs management plan based on data prioritization.

Performance indicator

Availability of comprehensive inventory database on PCBs from various sectors to identify PCBs stockpiles, PCBs in use and PCBs wastes. Several staff members are trained to carry out further inventory. Inventory of PCBs will be carried out at least to cover all provinces in Java Island based on site survey, questionnaire and sampling. Availability of a PCBs management plan agreed by relevant stakeholders.

4.3.6.3. POP-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

TetraBDE, pentaBDE, hexaBDE and heptaBDE have never been manufactured in Indonesia and there is no information on import of tetra-, penta-, hexaBDE and heptaBDE. Accordingly, there are no stockpiles of these substances. However, since they have been applied as additive flame retardants in various applications including in transportation sectors and in electronic and electrical equipment, they might still occur in vehicles and electric and electronic equipment in use in Indonesia. Preliminary report has estimated amount of tetra-, penta-, hexaBDE and heptaBDE in CRT TV/computers and automotive generating from 1975 to the current years depending on the articles (until 2012 for CRTs and 2004 for automotive). Thus, wastes containing POPs flame retardants will therefore be generated for many years to come from such applications. The action plans related to identifying and managing stockpiles and wastes of POP-PBDEs will develop appropriate strategies for identification by conducting further comprehensive inventory of these substance as well as products/articles containing POP-PBDEs and its wastes and developing environmentally sound management of products/articles containing POP-PBDEs for further managing of these substances.

Action plans

1. Developing further in-depth comprehensive inventory for POP-PBDEs substances and products/articles containing the substances (transportation sectors, electronic and electrical equipment and other polymer applications), including development of material flow analysis and substance flow analysis of PBDE-containing materials and their relevance for recycling. The larger framework is to develop an e-wastes inventory to manage e-wastes and an inventory to manage the end-of life vehicles.

Detailed action plans

- a. Develop plan for implementation inventory;
- b. Identify and coordinate key stakeholders;
- c. Inventory of the availability and flow distribution for EEE/WEEE (import new and used EEE, EEE in used or stored consumer, EEE entering the wastes) and development of their material flow analysis and substance flow analysis of PBDE-containing materials and their relevance for recycling;
- d. Data management;
- e. Reporting.

Performance indicator

Comprehensive inventory on POP-PBDEs from various sectors is performed.

2. Developing and improving infrastructure and human resource capacity to analyze and assess POP-PBDEs (see Subchapter 4.3.2. point 3).

Detailed action plans

See Subchapter 4.3.2. point 3.

Performance indicator

Human resources and laboratory infrastructures to analyze and to assess POP-PBDEs are available.

4.3.6.4. PFOS

The majority of industries in Indonesia are not familiar with PFOS and PFOS related substances. Therefore, absolute quantity of these chemicals in the form of remaining stock is difficult to estimate including storage condition and location. Regarding articles in use and wastes, several sectors were assumed to contain PFOS and its related substances.

Action plans

Continuing further comprehensive inventory of PFOS.

Detailed action plans

- a. Build a strategy for the identification of stockpiles, articles that have been used and PFOS wastes;
- b. Conduct an inventory of stockpiles of PFOS;
- c. Conduct an inventory of articles containing PFOS;
- d. Conduct an inventory of contaminated sites containing PFOS.

Performance indicator

Data of articles and stockpiles of PFOS and contaminated areas containing PFOS is available.

4.3.7. Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use

4.3.7.1. Pesticides

Pesticides residue was still found in small kiosks in the form of remaining stock or unsold goods. Absolute amount and volume of these residues are difficult to estimate.

Action plans:

Manage stockpiles appropriately and eliminate pesticides wastes.

Detailed action plans

- a. Develop POPs pesticides elimination system;
- b. Eliminate obsolete and stockpiles of POPs pesticides that have been identified, using environmental friendly techniques (not by burying, but by collecting and eliminating endosulfan and lindane).

Performance indicator:

1. Guideline for management of POPs stockpiles is available;
2. Guideline for safe storage and disposal is available;
3. Elimination of obsolete stockpiles of POPs pesticides.

4.3.7.2. PCBs

Implementation of environmentally sound management of PCBs wastes and equipment containing PCBs.

Detailed action plans

- a. Selection of operating entity:
 - Assessment of institutional capacity of candidate entities for PCBs handling and disposal;
 - Selection of the operating entity for PCBs handling and disposal;
 - Drafting of a business plan for the operating entity;
 - Upgrading technical and analytical capacity of the PCBs operating entity;
- b. Application of an ESM pilot system for PCBs at the identified PCBs location:
 - Drafting of technical code of practices for the PCBs system;
 - Implementation of ESM system (labelling, recording, transportation);
- c. Operation of disposal facility:
 - Drafting of feasibility study for technical options of PCBs disposal taking into consideration PCBs management plan;
 - Selection of technical options and permit for PCBs disposal;
 - Environmental monitoring;
 - Disposal of 3,000 tonnes of PCBs wastes and PCB contaminated equipment.
End goal is the disposal of all PCBs in Indonesia. The availability of disposal facility is estimated in Year 3 and disposal of 3,000 tonnes PCBs wastes expected and disposal of PCB contaminated equipment achieved in Year 5;
 - Project monitoring and evaluation;
 - Project management.

Performance indicator

Environmentally sound management of 3,000 tonnes of PCBs wastes and equipment containing PCBs is implemented.

4.3.7.3. POP-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

As POP-PBDEs occur in products/articles in use or its wastes, it is necessary to develop environmentally sound management for products/articles containing these substances. This could be done by strengthening regulatory measures of hazardous wastes to include POP-PBDEs as mentioned earlier, institutional strengthening to develop criteria, standards and other provisions for environmentally sound management including recycling, storage and disposal operations, raising awareness of various stakeholders and public. Indonesia has ratified the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Therefore, the action plans regarding these matters should be in line with those under the Convention. The Basel Convention defines environmentally sound management as “taking all practicable steps to ensure hazardous wastes and other wastes are managed in a manner which will protect human health and the environment against adverse effects which may result from such wastes.” In this context, the way in which hazardous wastes are managed should be in an environmentally sound manner from their point of sources through storage, transportation, treatment, reuse, recycling, recovery and ultimate disposal.

Action plans

1. Development of environmentally sound management systems for products/articles containing PBDEs.

Detailed action plans

- a. Evaluation of regulation related to restriction of import of WEEE, the import of second-hand EEE and second-hand of vehicle and developing environmentally sound management systems for products/articles containing POP-PBDEs. In line with this is to develop a regulatory framework for e-wastes and for end of life vehicles and within this framework address hazardous chemicals including POP-PBDEs, as well as develop framework for plastic recycling and within this address POP-PBDEs and other toxics in plastics;
- b. Developing criteria, standards and other provisions for environmentally sound management of activities including handling, recycling, storage and disposal;
- c. Assessment of the technical guidelines on ESM of international agencies for POPs;

- d. Developing a national hazardous wastes management system and setting national goals and standards;
- e. Increasing awareness of the various stakeholders and the public on environmentally sound management;
- f. Conducting technology assessment for processing wastes products/articles containing POP-PBDEs in the framework of BAT/BEP.

Performance indicator:

Environmentally sound management for products/articles containing POP-PBDEs in the framework of BAT/BEP is established.

- 2. Environmentally sound management of the POPs wastes in electrical and electronic equipment (WEEE).

Detailed action plans

- a. Project preparation;
- b. Project implementation.

Performance indicator:

Environmentally sound management practices of POP-PBDEs in electrical and electronic wastes (WEEE) are established.

4.3.7.4. PFOS

Although some industries no longer use PFOS and its related substances in complying with the regulation, stockpiles of these chemicals need to be managed as long as they are still present. The same manner is performed for handling and disposal of article in use.

Action plans

The use of best available techniques and best environmental practices (BAT/BEP) for wastes disposal technologies for wastes containing PFOS in the industries using PFOS.

Detailed action plans

- a. Assessment and selection of at least two destruction technologies for wastes containing PFOS;
- b. Optimization or modification of the destruction technologies selected;
- c. Monitoring and evaluation of the destruction technologies selected;
- d. Assessment of incentives for the promotion of technology transfer and investment.

Performance indicator

Wastes disposal technologies for wastes containing PFOS are available.

4.3.8. Activity: Identification of contaminated sites (Annex A, B and C chemicals) and remediation in an environmentally sound manner

4.3.8.1. Pesticides

Land contaminated by DDT in Malang and Bogor have been identified and documented in the 2008 NIP. The 2013 inventory suspects that Pasir Gombong (West Java) is contaminated by HCB.

Action plans

Conduct an in-depth inventory to identify and verify the contaminated land.

Detailed action plans

- a. Carry out survey and identify the presence of HCB;
- b. Remediation on land contaminated by DDT.

Performance indicator

1. Residual level of DDT is measured;
2. Contaminated land is remediated;
3. Inventory data on HCB is available.

4.3.8.2. PCBs and PCDDs/Fs

There is no particular data on contaminated sites by PCBs and PCDD/Fs. However, several areas were identified with electrical equipment containing PCBs. Therefore,

environmental monitoring will be conducted on those areas. Furthermore, aside from HCB, Pusarpedal will also conduct monitoring on the existence of PCBs in Pasir Gombong, Bekasi.

Action plans

Environmental monitoring on the suspected POPs contaminated areas based on inventory results.

Detailed action plans

- a. Establishment of and training for data monitoring capacities;
- b. Data consolidation on areas potentially contaminated by PCBs and PCDDs/Fs;
- c. Conduct regular monitoring on potential areas contaminated by PCBs and PCDDs/Fs;
- d. Assessment at incineration residue disposal sites.

Performance indicator

Availability of data on PCBs and PCDDs/Fs concentration on certain areas based on the inventory data of potential PCBs and PCDDs/Fs contamination.

4.3.8.3. POP-PBDEs (tetraBDE, pentaBDE, hexaBDE and heptaBDE)

No specific contaminated sites could be identified related to these substances based on available data monitoring. However, preliminary inventory report identified formal and informal recycling activities for e-wastes and end-of life vehicles that could be potentially contaminated with PBDEs. For instance, preliminary analyses of polymer materials, in particular of those derived from e-wastes, were found to contain POP-PBDEs. The action plan will adopt appropriate strategies to identify contaminated sites by POP-PBDEs in the framework of in-depth and comprehensive inventory, as well as environmental monitoring.

Action plans

1. Developing method for evaluation of contaminated sites according to their current or potential adverse impact on human health and the environment (as part of in-depth and comprehensive inventory of POP-PBDEs).

Detailed action plans

- a. Develop and improve the monitoring system for POP-PBDEs;
- b. Monitor removable sources of POP-PBDEs;
- c. Monitor the presence and degree of contamination of POP-PBDEs in the environment and biota;
- d. Monitor the location of POP-contaminated PBDEs;
- e. Monitor-POP concentrations of PBDEs in the general public and people who have a high risk of exposure to POP-PBDEs.

Performance indicator

Method to assess contaminated sites and potential impact in the environment and human health by POP-PBDEs is available.

2. Conducting further in-depth inventory on potential contaminated sites with PBDEs related to e-wastes and end-of life vehicles activities (part of in depth and comprehensive inventory of POP-PBDEs).

Detailed action plans

- a. Develop implementation plan inventory;
- b. Identify and coordinate key stakeholders;
- c. Perform inventory;
- d. Data management;
- e. Reporting.

Performance indicator

1. Comprehensive data of inventory on various sectors is available;
2. Assessment of POP-PBDEs contamination in e-wastes and end of life vehicles sites is conducted.

4.3.8.4. PFOS

PFOS contaminated sites to be considered are fire-fighting training areas with AFFF and similar foam use (historically most of them were PFOS containing foams), such as in airports, refineries, oil storages, military sites and oil drilling areas. Other sites are disposal

areas of wastes and sludges of industries that have used and still use PFOS and its related substances.

Action plans

Investigations into potentially contaminated sites of PFOS and related substances.

Detailed action plans

- a. Development of strategies for investigation into potentially contaminated sites of PFOS;
- b. Investigation into potentially contaminated sites of PFOS.

Performance indicator

Data on contaminated sites of PFOS is available.

4.3.9. Activity: Facilitating or undertaking information exchange and stakeholder involvement

Since Indonesia has ratified the Stockholm Convention, Indonesia has shared information with other countries and has responded to requests for information from them and from the Secretariat. These activities will continue to remain so including exchanging information on updates on the newly listed POPs under the Convention. The National Focal Point and National Contact Point for Stockholm Convention is Ministry of Environment (MoE).

Action plans

Continue information exchange with other countries and respond to requests for information from them and from the Secretariat.

Detailed action plans

Information exchange and involvement of stakeholders.

Performance indicator

Routine exchange of information between countries is carried out.

4.3.10. Activity: Public awareness, information and education

Action plans

1. Developing system and mechanism of information/communication on any aspect of POPs to various target groups.

Detailed action plans

Road map and system of public awareness, information and education needs for POPs.

Performance indicator

System and mechanism of information/and communication on POPs to various target group are established.

2. Conducting education and awareness activities to ensure that individuals and communities receive the information needed to assist informed decision making in dealing with issue of POPs as described in Table 4.1.

Table 4.1. Public awareness, information and education needs for POPs and the alternatives

No	Target group	Awareness raising	Administrative and legal training	Technical training	Pilot project	Website and publication materials
1	Goverment official (central, local)	√	√	√	√	√
2	POPs relevant users	√	√	√	√	√
3	General public and NGOs	√	-	-	√	√
4	Women	√	-	-	-	√
5	Youth	√	-	-	-	√
6	Universities and research institution	√	√	√	√	√
7	Industry and trade associations	√	√	√	√	√

Note:

√ : needed

- : not needed

Detailed action plans

- a. Preparation for implementation of the road map and system;
- b. Implementation of the road map and system.

Performance indicator

Road map is established and implementation is carried out.

3. Public awareness increase on PCB related issues.

Detailed action plans

- a. Stakeholder engagement, including NGOs and civil society, is established;
 - Drafting of an awareness raising strategy, addressing identification of targets (NGOs, industry, scientific institutions, environmental authorities) and preferred target-based communication actions;
 - Development of target-based awareness raising materials for each target group identified;
- b. Development and implementation of training and awareness programs;
 - Holding of workshops on PCBs for specific target groups including NGOs;
 - Training for authorities, university operators, NGOs;
 - Increasing public participation in information report regarding PCBs stockpiles. It is strongly associated with increased knowledge and public awareness on PCBs;
 - Printing, dissemination, broadcasting.

Performance indicator

1. Number of participants involved in the awareness raising increases;
2. Availability of awareness raising materials;
3. Number relevant stakeholders participated in awareness raising increases;
4. Number of awareness raising activities successfully implemented increases;
5. Availability of questionnaire result on impact of awareness raising activities;
6. Workshops and trainings on PCBs implemented and information are disseminated.

4.3.11. Activity: Reporting

Action plans

According to Article 15, Indonesia is committed to provide national reporting to the Secretariat.

Detailed action plans

Provide national reporting to the Secretariat.

Performance indicator

National reporting to the Secretariat is routinely conducted.

4.3.12. Activity: Research, development and monitoring (Article 11)

Action plans

Several researches on contamination status of POPs in environment and exposure to human have been carried out although still limited to and not including the impacts of POPs on human health. Therefore it is necessary to conduct action plans on monitoring and impact assessment of POPs.

Detailed action plans

- a. Epidemiological case-control study on factors related to cancer occurrence;
- b. Bioassays to study mechanisms of action of POPs and endocrine disrupting chemicals (EDCs);
- c. Chemical and biological analytical methods to measure POPs and assess endocrine disruption;
- d. Monitoring the exposure on foetuses and developing children;
- e. Reducing the use and release of EDCs:
 - Industrial, municipal and medical wastes;
 - Good agricultural practices for pesticides;
- f. Studying threshold concentrations of POPs pesticides in soil, water and food stuff;
- g. Assessment of recycling activities of WEEE plastic in the country, technologies used and pollutants present;
- h. Establishing research programs, assessment, monitoring and impact of endocrine disrupting chemical including PBDEs and POPs - contaminated areas;

- i. Conducting study on dioxins quality standard in the environment and from emission release and dioxins measurement in environment and gas emission in power generation sector and industry as well as at food product;
- j. Conducting study on UPOPS (dioxins/furans and other unintentional POPs) from textile industry, residual steel industry and emission of wastes burning;
- k. Carrying out further study or research related to human health, environmental and socio-economic effects of PFOS.

Performance indicator

National monitoring program and review on POPs impacts is initiated.

4.3.13. Activity: Technical and financial assistance (Articles 12 and 13)

Indonesia needs technical and financial assistance to develop and strengthen its capacity in the implementation of the provisions of the Convention. Technical and financial assistance is needed, especially for the following aspects:

- Research;
- Laboratory;
- Training;
- Development of institutional capacities;
- Transfer of technology.

All activities related to the above aspects can be conducted through matching funds and assistance from the Secretariat of the Stockholm Convention and/or other related donors.

Action plans

Develop and submit project proposals to the Secretariat of the Stockholm Convention and/or related donors.

Detailed action plans

- a. Preparation of project proposals;
- b. Finalisation of project proposals;
- c. Submission of project proposals;
- d. Follow up.

Performance indicator

Project proposals submitted to funding donors.

4.4. Resources Requirements

In order to achieve effective NIP, several resources are required as follows:

- Strong institutions and capacities to coordinate NIP implementation;
- Harmonisation of regulations concerning hazardous substances and hazardous wastes management particularly related to POPs;
- Active participation of all relevant stakeholders;
- Effective enforcements of laws related to POPs;
- Adequate funding and its sources, including budget allocation from central and local government, as well as grants from donor institutions.